A Thesis

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# CERTIFICATE

This is to certify that the thesis entitled "***Premenstrual Syndrome (PMS)***" submitted for the Degree of Doctor of Philosophy by **Miss Nehal D. Shah** is the record of research work carried out by her under my guidance and supervision.

I further certify that the work has not been submitted either partly or fully to any other university or institution for the award of any diploma or degree.

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## DECLARATION CERTIFICATE

*I hereby declare that the work incorporated in the present thesis is original and has not been submitted to any University/ Institution for the award of any Degree or Diploma.*

*I further declare that the results presented in the thesis and considerations made therein, contribute in general to the advancement of knowledge in Zoology.*

**Miss Nehal D. Shah**
**(Research Student)**

# *Preface*

*Genetics tells us that it is the human female which possesses more hereditary material in her XX chromosomes than the human male. Indeed Lamartine observed "there is the woman at the beginning of all great things." The female gender occupies a place of such paramount importance in the living systems, that it becomes a solemn duty of the human society to help the female of its species to resolve her health issues whether they are physical, mental or both.*

*The body of a woman is divinity in itself; it is the abode that welcomes new life. From the time of her birth on Earth, nature systematically prepares her for motherhood by activating the instinctive and hidden feminine aspects of her being. A woman has to undergo tremendous physical, mental, emotional and psychological changes throughout her life. Such continuous and varied change within her body makes her prone to several disturbances.*

*Menstruation, Pregnancy and Menopause are some of the most significant phases in her life; it as if she is reborn after each of these phase. The root cause of such phases is the hormonal changes which lead to tremendous changes in her, ultimately affecting her surroundings too. Premenstrual tension (PMT) or premenstrual stress (PMS), pre and post partum blues of*

*pregnancies and premenopausal time at the onset of menopause, are observed to be the most pathetic phases of a woman's life, all over the world. They cause serious mental depressions and psychic problems rather than physical ailments.*

*It is wise to remind ourselves that it is the female who delivers the progeny. A man, a family, a society and even a nation is directly and / or indirectly defined by this gender; her health disturbances can create turmoil in all or various spheres of life.*

*Nowadays, number of cases of gynecological, endocrinological and hematological disorders and particularly polycystic ovarian syndrome (PCOS), Uterine Fibroid, Menstrual Disorders, Hormonal disturbances, Endometriosis as well as various types of ovarian - uterus cysts are increasing at alarming rates in young girls of age between 16 and 28 years. These issues are mainly caused due to lack of healthy lifestyles, unbalanced diet and stress.*

*Premenstrual syndrome (PMS) alone affects 75% to 90% of women of reproductive age all over the world. Approximately 150-200 physical, psychological and behavioral symptoms have been recognized as PMS symptoms which are most visible during premenstrual time of a woman.*

*Medically, an intermediate form Perimenstrual Syndrome and Premenstrual Dysphoric Disorder (PMDD), a more severe form of PMS has also been recognized. The type and*

*intensity of its symptoms may vary from one woman to another as well as from one month to another for a given woman. Many a times, it may worsen other disorders like Arthritis, Clinical Depression, Migraine etc., and put the sufferer in Premenstrual Magnification (PMM) state. In medical parlance, a syndrome is a group of symptoms that collectively indicate a disease state or at least an abnormal condition. This nebulous clinical state has also been called the Premenstrual Distress, Congestive Dysmenorrheal, Pelvic Congestion Syndrome and the Toxemia of Menstruation.*

*It is a fact that world cultures believed that menstrual woman was possessed by an evil spirit. No wonder Aristotle had stated that a menstrous woman could dull a mirror with a look and the next person to look into it would be bewitched! Such horrific views borne out of traditions and social-cultural beliefs since millennia have impaired scientific study of menstruation and its related disorders.*

*We, men and women, have been conditioned to view menses and its problems in a negative and neglectful way. Such has been the neglect that even though Hippocrates discussed PMS in the fourth century B.C. it was only recognized as a medical epidemic in the nineteenth century!*

*How to define and treat PMS is a controversial matter in the world of health sciences. Various researchers draw contradictory results and conclusions, it does not help that PMS is*

*not a well defined disease but rather a mixed bundle of individual responses to a specific phase; the menstrual cycle. Even today many do not consider PMS to be a major problem; but simply an obscure concept which has a short periodic phase that passes mostly unnoticed. It follows that there is no single remedy and not all women are successful in finding a solution to it.*

*The overall level of awareness regarding PMS and related issues is extremely low in India. The younger generation though is more aware and this awareness has allowed them to freely come forward and seek solutions to PMS related problems, which if not treated, degrades the quality of life and disrupts daily routines. Hence, such awareness drives deserve a rousing applause.*

*It has been observed that due to fast pace of life, malnutrition, increasing stress and anxiety, excessive use of contraception, change in environmental conditions, quality of life (QOL) is decreasing fast and more and more women are showing frequent and severe forms of PMS.*

*The exact cause of PMS is unknown. So far, there is no availability of physical examination findings or specific lab tests for the diagnosis of PMS. Only a 'Symptom Monthly Calendar' can help a woman identify the most troublesome symptoms and to confirm the diagnosis of PMS.*

*Unfortunately, there is hardly any scientific work available on PMS and PMDD in India! Often these problems go*

*unnoticed or are ignored as it is believed that they are a part and parcel of the menstrual cycle, and hence no medication is essential! Hence, there was a pressing need to unravel the truths and facts. This research work has been undertaken to address that all important need as well as spread awareness and knowledge.*

*It is the demand of this century to promptly address the health issues of women – and thereby secure healthy future generations. If we neglect this demand then it can lead to seriously unforgiving times for the human civilization.*

# Acknowledgement

***"Feeling gratitude and not expressing it***

***is like wrapping a present and not giving"***

***– William Arthur Ward***

*A dynamic research work demands great sources of energy from all walks of life. And it is indeed a privilege to express gratitude towards all those who stood beside me during this work, may be merely with words, which is surely inadequate but atleast opportunistic.*

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| ABF | Abdominal fullness |
| ACD | Acidity |
| ACOG | American College of Obstetricians and Gynecologists |
| AIS - D | Altered interest in sex - decrease |
| AIS - I | Altered interest in sex - increase |
| ANOVA | Analysis of Variance |
| APA | American Psychiatric Association |
| AR | Anger |
| AX – FR | Anxiety - Fearlessness |
| AX - NRN | Anxiety - Nervousness |
| AX - PAL | Anxiety - Palpitation |
| AX – PN | Anxiety - Panic |
| AX – RL | Anxiety - Restlessness |
| AX - TDML | Anxiety – Tension due to monotonous lifestyle |
| AX – TIC / HV | Anxiety – Tightening in chest / Hyperventilation |
| AX - UE | Anxiety - Uneasiness |
| AX - WOR | Anxiety – Worries / Anxious |
| BA | Backache |
| BAC | Bodyache |
| BC | Before Christ |
| BDA | British Dietetics Association |
| BDI | Beck Depression Inventory |
| BMI | Body Mass Index |

| | |
|---|---|
| BOR | Boredom |
| BR - MSG | Breast problems – Mastalgia |
| BR – P | Breast problems – pain |
| BSO | Bilateral Salpingo Oophorectomy |
| CAP | College of American Pathologists |
| CAP – D | Change in Appetite – decrease |
| CAP – I | Change in Appetite – increase |
| CAP – T.L. | Change in Appetite – total loss |
| CBC | Complete Blood Count |
| CBT | Cognitive Behavior Therapy |
| CDC | Centers for Disease Control and Prevention |
| CF | Confusion |
| CGIS | Clinical Global Impression Scale |
| CLS | Clumsiness |
| CNS | Central Nervous System |
| CO | Constipation |
| COPE | Calendar of Premenstrual Experiences |
| CRS | Cry Spells |
| DAF | Daily Assessment Form |
| DBT | Doubtfulness |
| DIA | Diarrhoea |
| DRSP | Daily Record of Severity of Problem |
| DSM | Diagnostic and Statistical Manual of Mental Disorder |
| DZ | Dizziness |

| | |
|---|---|
| E-2 | Estradiol |
| EC | Eye complaints |
| EPO | Evening Primrose Oil |
| EXC | Exacerbation of disease |
| F | Fever |
| FC - D | Food craving - decrease |
| FC - I | Food craving - increase |
| FGF | Forgetfulness |
| FIT – CO | Craving for food items – cold |
| FIT – SA | Craving for food items – salty |
| FIT – SO | Craving for food items – sour |
| FIT - SP | Craving for food items - spicy |
| FIT – SW | Craving for food items – sweet |
| FL | Feeling Low |
| FS | Feeling Sad |
| FSH | Follicular Stimulating Hormone |
| GABA | Gamma amino butyric acid |
| GAS | Global Assessment Scale |
| GnRH | Gonadotropin releasing hormones |
| GR | Gas retention |
| HA | Headache |
| Hb | Haemoglobin |
| HAM – D | Hamilton Rating Scale for Depression |
| HF | Hot flush |

| | |
|---|---|
| HRT | Hormone replacement therapy |
| HYP | Hyperactivity |
| IBS | Irritative Bowel Syndrome |
| ICD | International Statistical Classification of Diseases |
| IDI | Indigestion |
| IGF | Increased Guilt Feeling |
| INS | Insecurity |
| IRT | Irritation |
| ISO | International Organization for Standardization |
| IUD | Intrauterine device |
| LAC | Lower abdominal cramps |
| LH | Luteinizing Hormone |
| LIN | Loss of interest in routine activities / hobbies |
| LLPDD | Late Luteal Phase Dysphoric Disorder |
| LOL | Loneliness |
| LS | Low Sugar |
| LSC | Loss of self control |
| LTH | Luteotropic Hormone |
| LTL | Less tolerance – Light |
| LTLN | Less tolerance – Light and Noise |
| LTN | Less tolerance – Noise |
| MDQ | Menstrual Distress Questionnaire |
| MOD | Major Depressive Disorder |
| MS | Mood swing |

| | |
|---|---|
| N | Nausea |
| NABL | National Accreditation Board for Testing and Calibration Laboratories |
| NDC | National Dairy Council |
| NIMH | National Institute of Mental Health |
| NSAIDS | Non – Steroidal Anti-inflammatory Drugs |
| PAF | Premenstrual Assessment Form |
| PCOD | Polycystic Ovarian Disorder |
| PDG | Poor Judgment |
| PID | Pelvic Inflammatory Disease |
| PIH | Pain in hands |
| PIL – CAM | Pain in legs – calf muscles |
| PIL – FUL | Pain in legs – full legs |
| PIL - KT | Pain in legs – knees to soles |
| PIL - OSO | Pain in legs – only soles |
| PIL – OTH | Pain in legs – only thighs |
| PIL – THKN | Pain in legs – thighs to knees |
| PJ – BJ | Pain in joints – Body joints |
| PJ – KJ | Pain in joints – Knee joints |
| PMDD /PDD | Premenstrual Dysphoric Disorder |
| PMS | Premenstrual Syndrome |
| PMT | Premenstrual Tension |
| PMT – A | Premenstrual Tension – Anxiety |

| | |
|---|---|
| PMT – C | Premenstrual Tension – Carbohydrate or Craving for Sugar |
| PMT - D | Premenstrual Tension - Depression |
| PMT – H | Premenstrual Tension – Hyper hydration |
| PMT – O | Premenstrual Tension Syndrome – Observer |
| PMT – S | Premenstrual Tension Syndrome |
| PMT - SR | Premenstrual Tension Syndrome – Self Rating |
| PMT | Premenstrual Tension |
| POMS | Profile of Mood States |
| PRISM | Prospective Record of the Impact and Severity of Menstrual Symptoms |
| PSST | Premenstrual Screening Tool |
| RC | Recurrent Cold Sores |
| RTI | Reproductive Tract Infection |
| SAS | Social Adjustment Scale |
| SCL - 90 | Symptom Checklists - 90 |
| SNRC | Symptom not reported in any cycle |
| SP – AC – 1 | Skin Problems – Acne – one |
| SP – AC – F | Skin Problem – Acne – Few |
| SP – AC - M | Skin Problem – Acne – Many |
| SP - BD | Sleep – Bad Dreams |
| SP - D | Sleep - Disturbed |
| SP – DR | Skin Problems – Darkening/ Dullness |
| SP - L | Sleep - Less |

| | |
|---|---|
| SP - M | Sleep - More |
| SP – SS | Skin Problems – Shine of skin |
| SPAF | Shortened Premenstrual Assessment Form |
| SPSS | Statistical Package of Social Sciences |
| SRATC | Symptom reported in all three cycles |
| SROC | Symptom reported in any one cycle |
| SRTC | Symptom reported in any two cycles |
| SSRIs | Selective Serotonin Reuptake Inhibitors |
| STDs | Sexually Transmitted Diseases |
| SW – ABD | Swelling – Abdomen |
| SW – BOD | Swelling – Body |
| SW - BR | Swelling – Breast |
| SW – FA | Swelling – Face |
| SW – FIN | Swelling – Fingers |
| SW – H | Swelling – Hand |
| SW - L | Swelling – Legs |
| $T_3$ | Triiodothyronine |
| $T_4$ | Thyroxin |
| TEN | Tension |
| TSH | Thyroid Stimulating Hormone |
| U – L | Urine – Less |
| U – M | Urine – More |
| UNICEF | United Nations Children's Fund |
| USG | Ultrasound Sonography |

| | |
|---|---|
| **UTI** | **Urinary Tract Infection** |
| **VAS** | **Visual Analog Scale** |
| **VC** | **Violent crimes** |
| **WHO** | **World Health Organization** |
| **WK** | **Weakness** |
| **WLN** | **Worthlessness** |
| **WRA** | **Want to remain alone** |
| **WTG** | **Weight gain** |

# UNITS

**1) g/dL=grams per deciLiter**

**2) mIU/ml=milli international unit per millilitre**

**3) ng/ml= nanograms per millilitre**

**4) pg/ml=pictograms per millilitre**

**5) uIU/ml=micro international unit per milliliter**

# **p value:** According to Dictionary definition on Online Glossary of Research Economics http://www.econterms.com/: "It is the probability, if the test statistic really were distributed as it would be under the null hypothesis, of observing a test statistic [as extreme as, or more extreme than] the one actually observed".

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# Introduction And Review of Literature

# Chapter 1

# INTRODUCTION
# AND
# REVIEW OF LITERATURE
# CHAPTER 1

Reproductive health is a crucial part of general health and a central feature of human development. It is a reflection of health during childhood and plays a decisive role during adolescence and adulthood as well as sets the stage for health beyond the reproductive years for both women and men. It also affects the health of the next generation. Reproductive health is a state of complete physical, mental and social well-being and not merely the absence of reproductive disease or infirmity. Reproductive health deals with the reproductive processes, functions and system at all stages of life. A healthy reproductive system makes the miracle of life possible particularly in case of women, who are the ultimate stakeholders of families and society. Neglecting even the smallest of health issues of women, for the very briefest of time can prove hazardous for a community in multiple ways.

In the present study an effort has been made to extensively study and understand from various angles, one such controversial ovarian cycle syndrome or gynecological disorder popularly called as **Premenstrual Tension (PMT) or Premenstrual Syndrome (PMS).** It is a stress which appears as a physical symptom prior to the onset of menstruation (www. goldbamboo.com / relate-t/1654-tr8298.html). It occurs more often in women, who are between their late twenties and early forties and have conceived at least one child, have family history of depression and have a past medical history of either postpartum depression or mood disorder (www.womenhealth.gov; www.medlineplus.com).

According to the American College of Obstetricians and Gynecologists (ACOG), (1994) usually 85% of menstruating women have at least one PMS symptom as a part of their monthly cycle. At this point, it is worth mentioning that even though PMS is known and researched by the scientific community for over 80 years, it still remains a mystery to be unfolded! This phenomenon is directly and / or indirectly related to the reproductive system of woman, menstruation and ovulation. We will look at each in detail in the following paragraphs.

## (A) Female Reproductive System

The human female reproductive system has considerably greater responsibility than male reproductive system as it performs many functions like Oogenesis, Reception of Sperm during copulation, providing an environment conducive to fertilization, supplying nutrition to the baby and providing a birth canal for the baby. Female genital organs can be mainly divided into – *(1) External Genital Organs (FIGURE -1) and (2) Internal Genital Organs (FIGURE - 2).*

In the true pelvic cavity lie a Pair of Ovaries, Pair of Oviducts (Fallopian tubes or uterine tubes), a Uterus and a Vagina, which are the main organs of female reproductive system *(FIGURE – 3)* whereas pair of Mammary glands (Breasts), as shown in *FIGURE - 4*, positioned over the pectoral muscles of the chest wall are the accessory organs of female reproductive system.

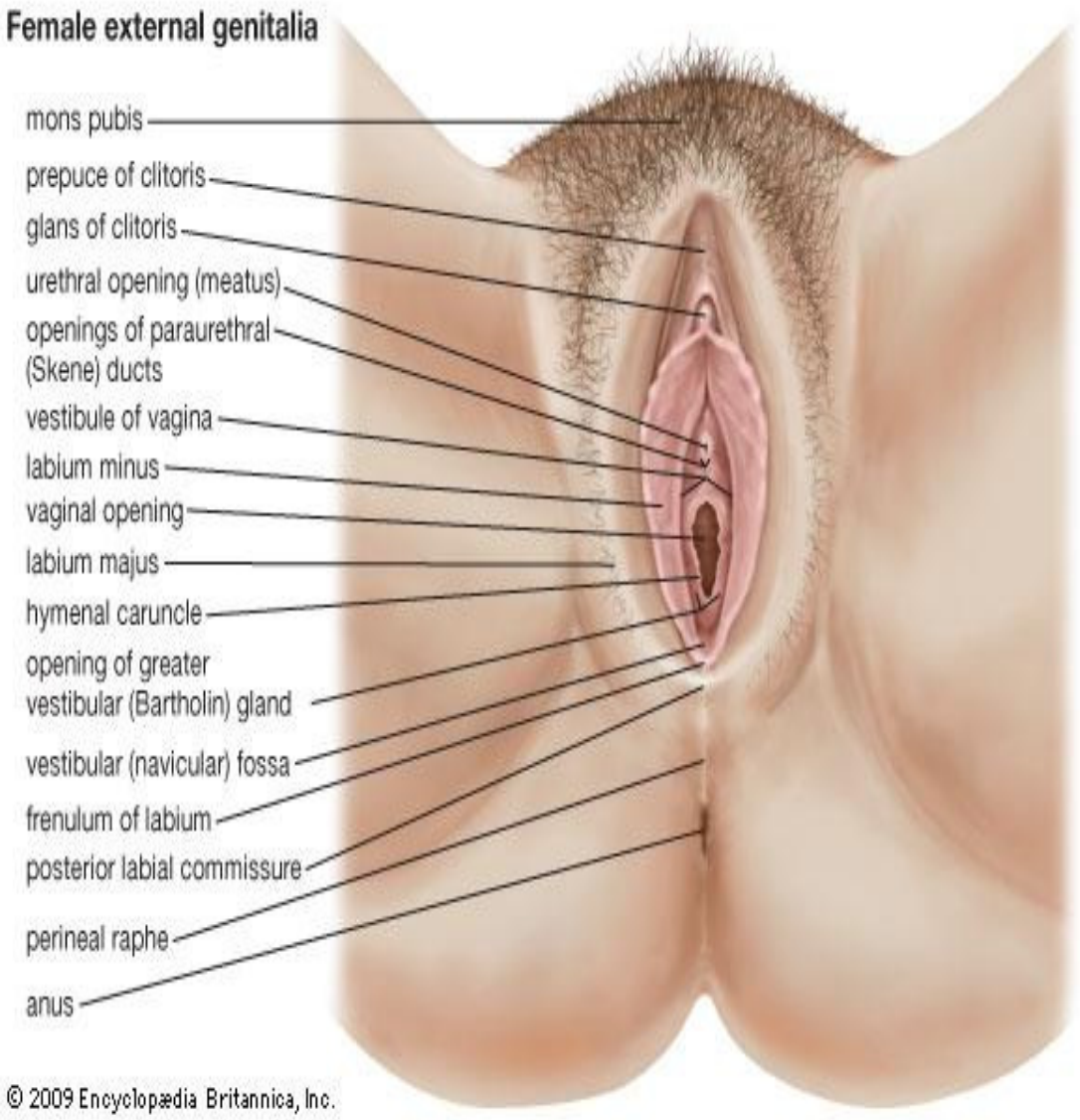
Female external genitalia
mons pubis
prepuce of clitoris
glans of clitoris
urethral opening (meatus)
openings of paraurethral (Skene) ducts
vestibule of vagina
labium minus
vaginal opening
labium majus
hymenal caruncle
opening of greater vestibular (Bartholin) gland
vestibular (navicular) fossa
frenulum of labium
posterior labial commissure
perineal raphe
anus
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Figure - 1

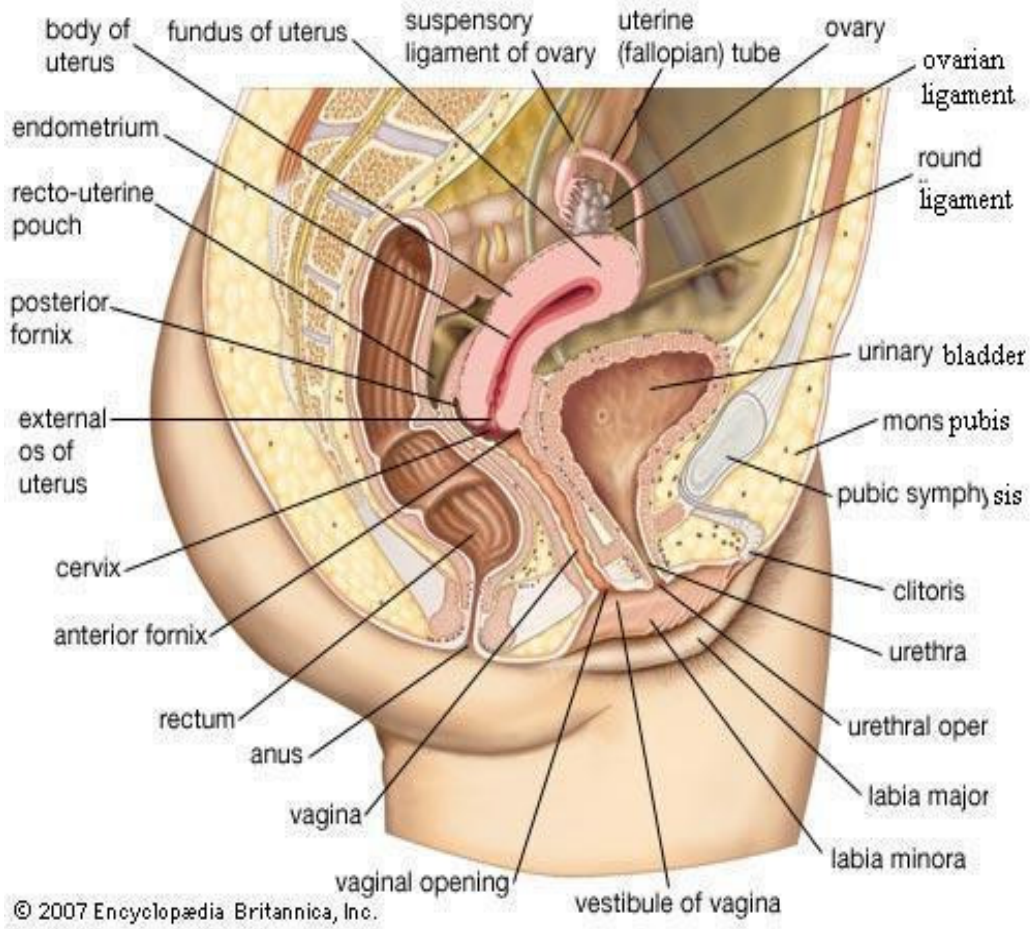



**Figure-2 Sagittal Section of Female Reproductive System- Internal Genital**

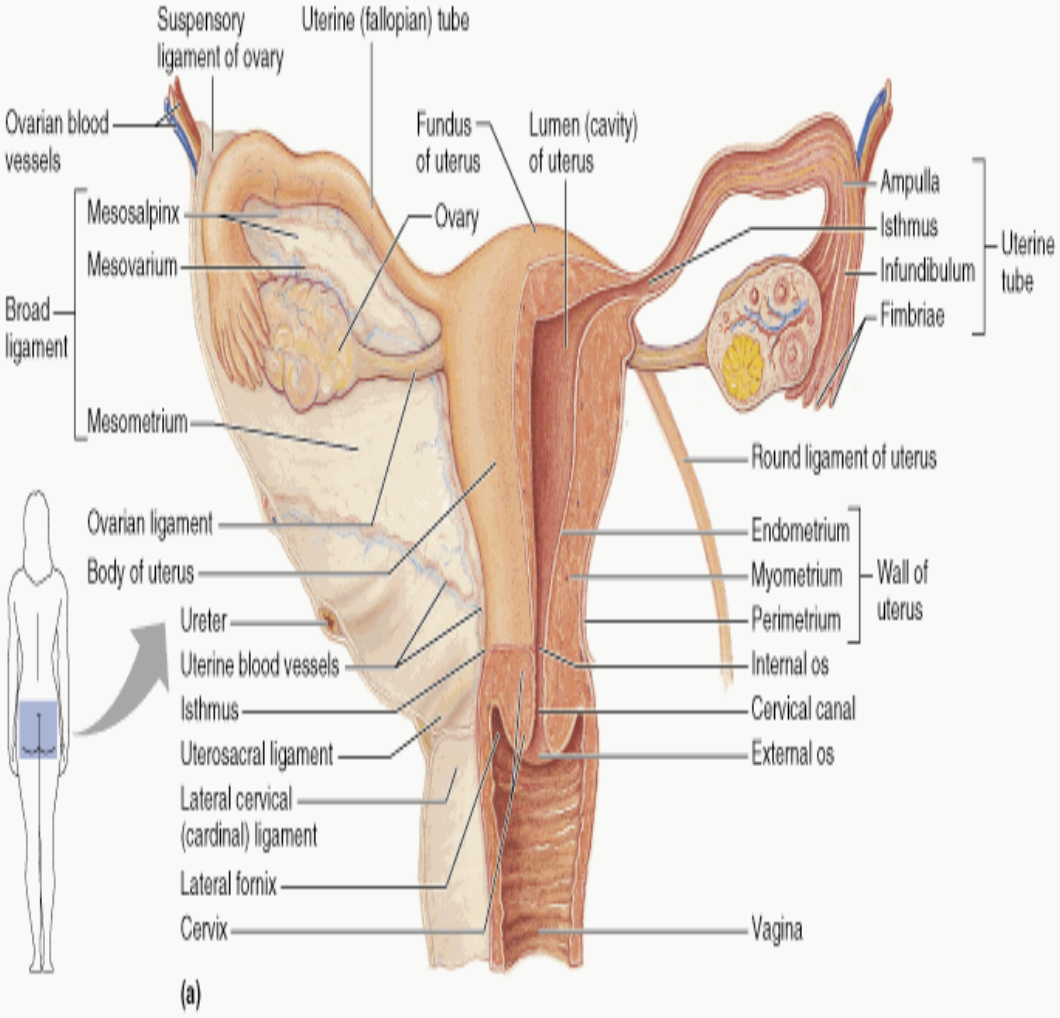





**Figure - 3** Female Pelvic Viscera showing main reproductive organs

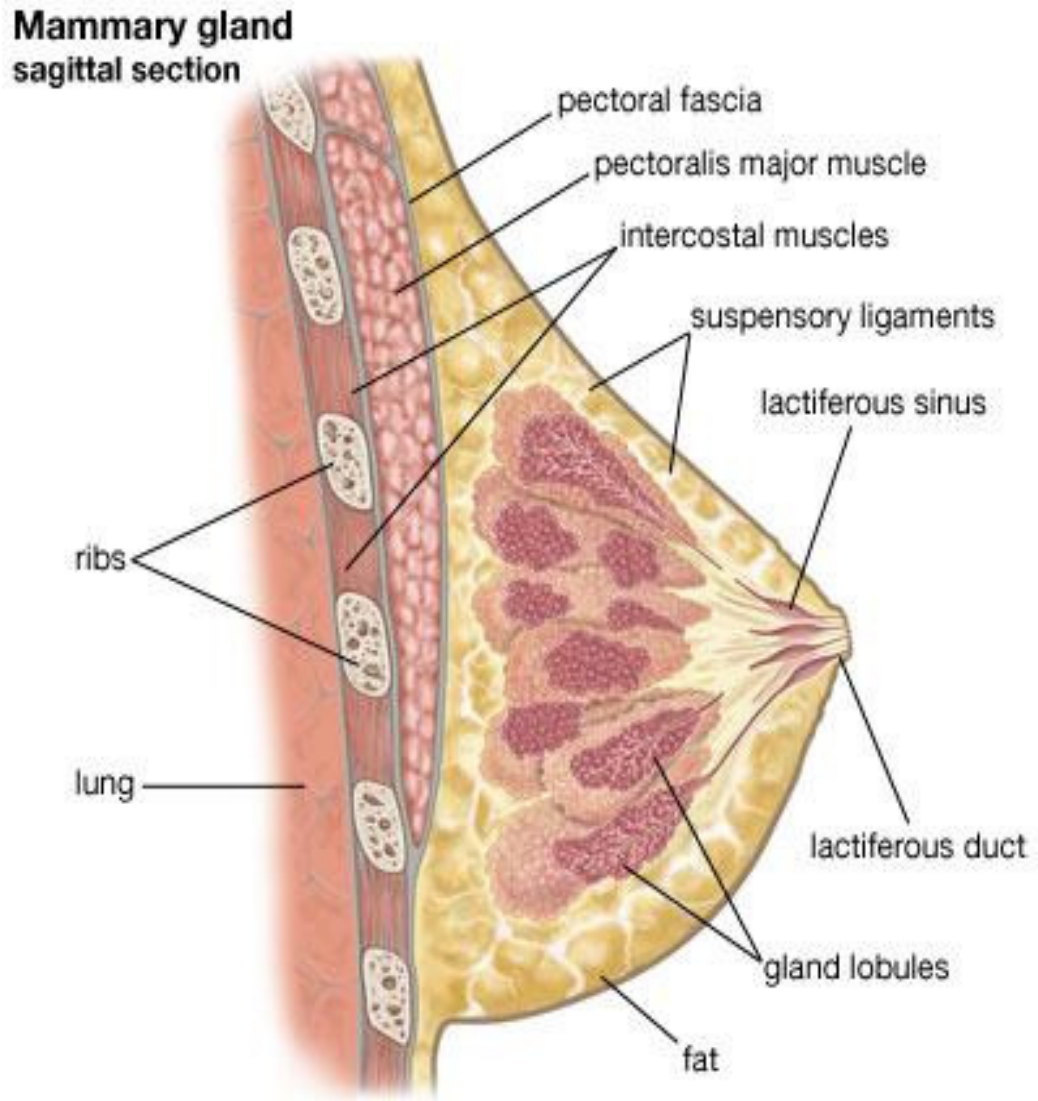
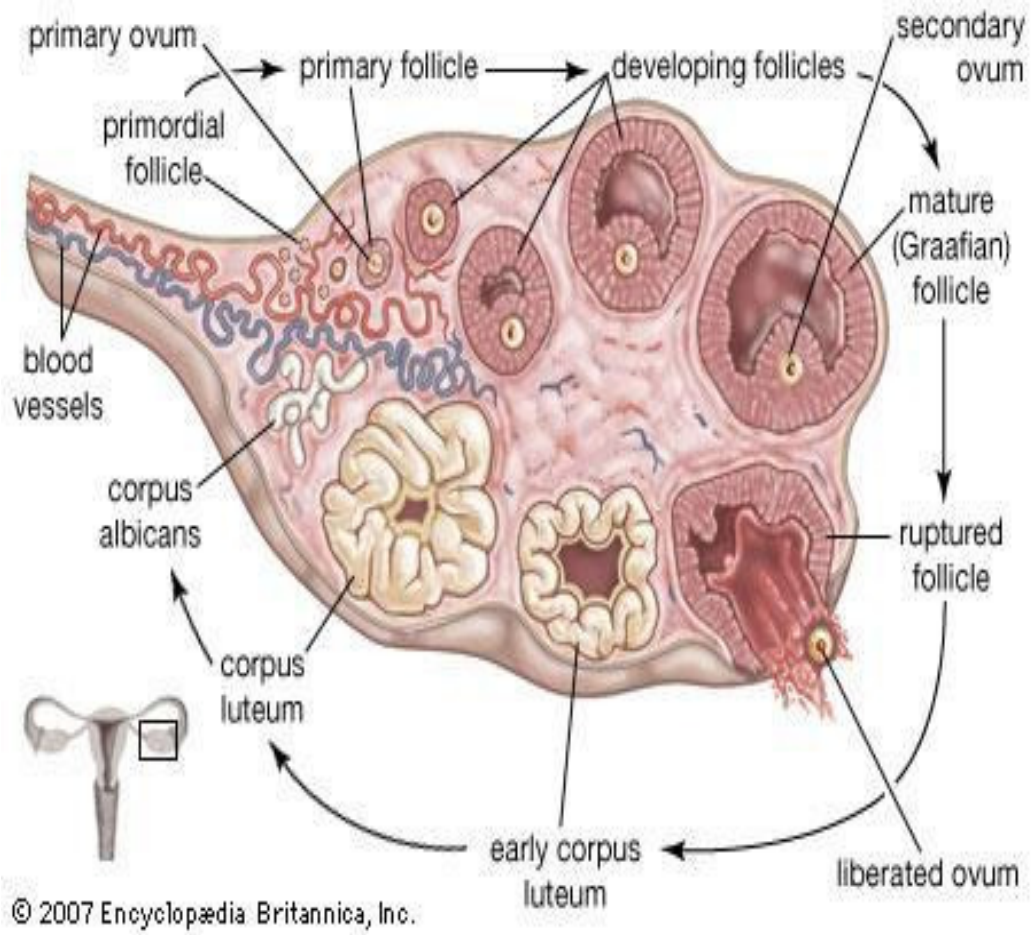

Mammary gland
sagittal section
pectoral fascia
pectoralis major muscle
intercostal muscles
suspensory ligaments
lactiferous sinus
ribs
lung
lactiferous duct
gland lobules
fat
© 2008 Encyclopædia Britannica, Inc.

**Figure - 4**

**The Ovaries:**

Each Ovary is an oval pinkish grey compact organ made up of an outer cortex and an inner medulla. In the pelvic cavity, the ovaries are loosely placed in place by a fold of peritoneum that holds them to the broad ligaments of the uterus. In an adult ovary approximately measures about 3 - 4 cm in length, 2 cm in width and 0.8 – 1 cm in thickness. It generally weighs from 2 to 3.5 gm (Gray, 1918 and Dutta, 2009). The female gametes - eggs or ova, in various stages of maturation remain enclosed in the scattered ovarian follicles that are embedded in the stroma of the cortex *(FIGURE - 5).* Before puberty, the ovaries are small and after menopause they atrophy and become shrunken. Medially, it is close to the fimbria of fallopian tube, which stretches over it around ovulation. Ovaries change continuously as they perform their physiological functions.

The main functions of ovaries are (1) to produce and release ovum into the fallopian tubes through the process of ovulation (2) and to release estrogen, progesterone, androgen and relaxin hormones time to time.




T.S. Of Ovary **Figure - 5**

**The Uterus:**

It is a hollow pyriform, thick-walled, muscular organ situated deeply in the pelvis between the bladder in front and rectum behind. The uterus measures about 7.5 - 8 cm in length, 5 cm in breadth, at its upper part, and nearly 1.25 - 2.5 cm in thickness. Its weight varies from 30 to 80 gm (Gray, 1918 and Dutta, 2009). As per its position in the pelvic cavity, uterus can be ***Retroverted uterus*** (tilted backward) or ***Anteverted Uterus*** (tipped forward). Uterus is made up of Body or Corpus, Isthmus and a Cervix *(FIGURE – 3).* During puberty it grows faster while after menopause uterus atrophies. Wall of uterus consists of 3 layers from outside inwards: (1) Perimetrium (2) Myometrium and (3) Endometrium *(FIGURE – 3).*

The main functions of uterus are (1) conduit for sperm transport and the site for implantation of fertilized ova (2) placentation (3) growth and development of the foetus (4) parturition (labor and delivery).

**Female Monthly Sexual Cycle:**

The normal reproductive years of the female are characterized by monthly rhythmical changes in the rates of secretion of

female hormones and corresponding physical changes in the ovaries and other sexual organs. This rhythmical pattern is stated to be the female monthly sexual cycle by Guyton and Hall (2006).

Two significant results of this cycle are –

(1) Release of single ovum each month from ovary through ovulation which is known as ovarian cycle.

(2) Formation of uterine endometrium in advance for the implantation of the fertilized ovum at the required time of the month through uterine cycle.

**Ovulation and Ovarian Cycle:**

The shedding of the ovum from the Graffian (or ovarian) Follicle of Ovary is called Ovulation (Singh and Pal, 2001).This ovum is yet not mature and is indeed a secondary oocyte which is undergoing cell division. After release of ovum, the follicle gets transformed into Corpus Luteum. The series of changes that begin with the formation of an ovarian follicle and end with the degeneration of the corpus luteum constitute the ovarian cycle *(FIGURE – 5)* and occur within 4 weeks.

Ovarian Cycle consists of (1) Recruitment of groups of follicles (2) Selection of dominant follicle and its maturation (3)

Ovulation (4) Corpus luteum formation and its demise. The cycle starts on the first day of menstruation and consist of 2 phases (1) the Follicular phase – during which ovum ripens and discharges. This lasts for about 14 days and is followed by (2) Luteal phases shown in *FIGURE - 6* (Chatterjee, 1997).

**Fate of Corpus Luteum:**

According to Berry (1981) and Singh and Pal (2001), if the ovum released is not fertilized by the sperm (male gamete) the corpus luteum will persist for fourteen days and is known as ***Corpus Luteum of Menstruation or false corpus luteum.*** When it degenerates it forms a white fibrous structure which is aptly termed corpus albicans. But as and when fertilization occurs and pregnancy results, corpus luteum will be known as ***Corpus Luteum of Pregnancy or true corpus luteum*** and will persist for three to four months.

**Uterine Cycle or Endometrial Cycle:**

While the changes concerned with ovulation and the formation of corpus luteum are going on in the ovary, the uterine endometrium shows striking cyclical changes. These cyclical changes constitute the uterine or menstrual cycle (Singh and Pal, 2001). Cycle can

be divided into 4 phases: Menstrual (Destructive or Bleeding) Proliferative phase, Secretory (Premenstrual or Postovulatory) and Regenerative phase (Chatterjee, 1997, *FIGURE – 6).*

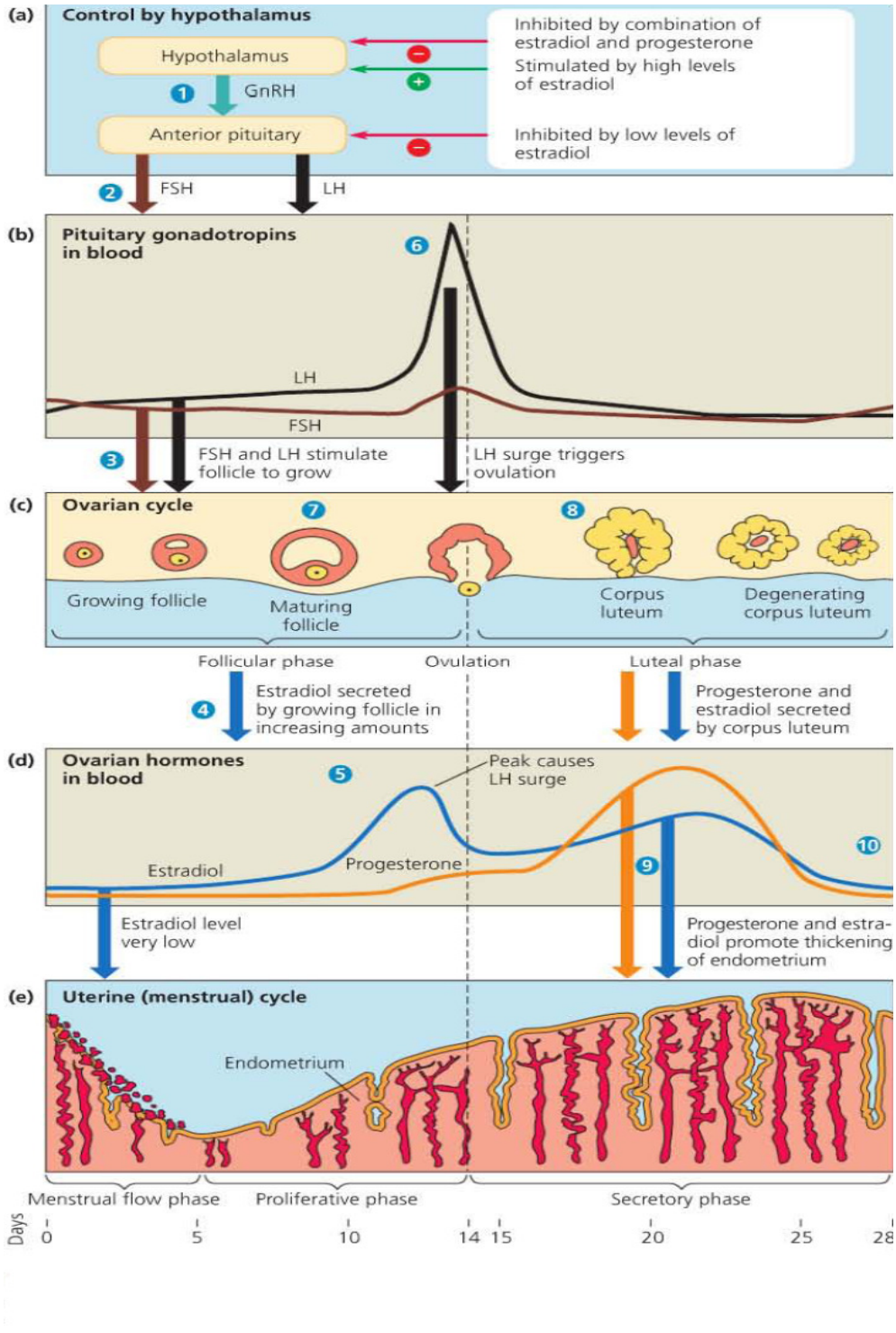



**Figure-6 Reproductive Cycle http://yshean.blogspot.in/2010/11/ovarian-cycle.html**

Various changes occurring during these phases along with ovarian changes and role of hormones are listed in *TABLE – 1* below.

**Table – 1**

**Brief Overview of Events of Reproductive Cycle**

| Phase and Uterine Changes | Ovarian Changes | Cause and Control |
|---|---|---|
| ***1) Regenerative Phase*** | | |
| Healing and regeneration of Endometrium (1st to 5th day – about a week) | Corpus luteum has degenerated, inhibitory action of progesterone absent, follicle maturation and estrogen secretion starts | Caused by the action of estrogen from maturing follicles, controlled by FSH of anterior pituitary |
| | | |
| ***2) Proliferative Phase*** | | |
| Mucosa thickens about 3-4 mm, endometrial glands become longer, tortuous, narrow and straight (5th – 6th day till 14th day) | Graffian follicle maturing, estrogen secretion rise, ovulation on 14th day, corpus luteum formation starts | Caused further by the action of estrogen, controlled by FSH which finally is inhibited by high level of estrogen |
| | | |
| ***3) Secretory Phase*** | | |
| Mucosa thickens further by 6 – 8 mm, glands more enlarged and distended (15th – 28th day – about 2 weeks) | Corpus luteum growing, progesterone secreted which inhibits further maturation of follicles | Caused by progesterone, formation of corpus luteum and secretion of progesterone controlled by LH and LTH of anterior pituitary |
| | | |

| *4) Menstrual Phase* | | |
|---|---|---|
| Endometrium is sheded (28th day, for 4-6 days) | Corpus luteum degenerates | Lack of progesterone , certain prostaglandins aids discharge of menstrual flow |

**Menstruation:**

It is degeneration and shedding off of endometrium (uterine lining) prepared for pregnancy. Menstrual fluid in fact contains some blood, as well as cervical mucus, vaginal secretions, prostaglandins, enzymes, bacteria, unfertilized ovum, leucocytes and endometrial tissue. Menstrual fluid is reddish-brown, a slightly dark in colour than blood. As per Dawn (1980-aand b), "Menstruation (derived from Greek word, men = month) is the monthly vaginal bleeding coming at the interval of about 28 days from the estrogen - progesterone primed uterine endometrium". Eden and Lockyer (1916) stated that, "Menstruation is a periodic haemorrhage from the corporeal endometrium which usually first appears coincident with puberty and continues throughout the fertile period of life".

This occurs during the reproductive age of a woman (from menarche to menopause) except during pregnancy and sometimes during

lactation. First menstruation occurs between 11 – 15 years of age with a mean of 13 years (Poonam and Tiwari, 2007, Chakravorty, 2009) and is known as **Menarche** whereas permanent cessation of menstruation due to loss of ovarian follicular activity at the end of reproductive life is known as **Menopause** (Ochei and Kolhatkar, 2003). Regular menstruation *(Eumenorrhea)* lasts for a few days, usually 3 to 7 days. The average length of menstrual cycle is 26 to 30 days. The average blood loss during a normal period is 35 – 80 ml (Chakravorty, 2009).

**Neuroendocrinology and Female Reproductive System:**

Female sex hormones play a significant role in above mentioned sexual cycle of a woman. It consists of three hierarchies of hormones *(FIGURE - 6).*

(1) A hypothalamic releasing hormone, gonadotropin - releasing hormone (GnRH).

(2) The anterior pituitary sex hormones, follicle- stimulating hormones (FSH) and luteinizing hormone (LH), both of which are secreted in response to release of GnRH.

(3) The ovarian hormones, estrogen and progesterone, which are secreted by the ovaries in response to the two female sex hormones from anterior pituitary gland (Guyton and Hall, 2006).

Hypothalamus – pituitary – ovarian axis is the key determinant in this cycle. Normal menstrual cycle depends on cyclic ovarian steroid secretions which in turn are controlled by the pituitary and the hypothalamus and to some extent are influenced by the thyroid and adrenal glands. Any deviation in the hormonal pathway will alter the ovarian function and thereby the menstrual cycle. Also, these various hormones are secreted at drastically differing rates during different parts of the cycle *(FIGURE – 6).*

*TABLE – 2* describes main functions of these hormones.

**Table - 2**

**Hormones and their main functions**

| Hormones | Functions |
|---|---|
| Gonadotropin-releasing hormone(GnRH) | Causes release of LH and FSH |
| Follicular –stimulating hormone (FSH) | Growth of follicles in ovaries |
| Luteinizing hormone (LH) | Formation of corpus luteum, estrogen and progesterone synthesis in ovaries |

| | |
|---|---|
| Estrogen | Promotes growth and development of female reproductive system, female breasts, female secondary sexual characters |
| Progesterone | Responsible for premenstrual changes of uterine mucosa, development of breast during pregnancy |

**Disorders of Menstruation:**

Disorders of ovulation, irregularities in length of menstrual cycle, disorders related to bleeding during menses, painful period, etc constitute Menstrual Disorders. Few of them are listed in *TABLE –3.*

**Table – 3**

**Brief Overview of Menstrual Disorders**

| No. | Name |
|---|---|
| 1 | Amenorrhoea – Failure of menses<br>a) Primary Amenorrhoea – absence of menarche even when girl is over18 yrs.<br>b) Secondary Amenorrhoea – cessation of menses for 3 or more cycle following normal menstrual function. |
| 2 | Cryptomenorrhoea – Concealed menses |
| 3 | Dysmenorrhoea – Painful menses<br>a) Primary Dysmenorrhoea (Spasmodic)<br>b) Secondary Dysmenorrhoea (Congestive) |
| 4 | Polymenorrhoea (Epimenorrhoea) – too frequent menses at regular intervals of 2or 3 weeks. |
| 5 | Metrorrhagia – irregular, intermenstrual uterine bleeding |

| | |
|---|---|
| 6 | Oligomenorrhoea – infrequent menses at intervals longer than 35 days |
| 7 | Hypomenorrhoea – scanty menstrual loss in duration & amount |
| 8 | Menorrhagia – excessive menstrual blood loss in amount or duration or Both |
| 9 | Premenstrual Syndrome (PMS) – psycho-neuro-endocrine disorder of unknown etiology |
| 10 | Premenstrual Dysphoric disorder (PMDD) - most severe form of PMS |

Although menstruation is a physiological process, it may give rise to various discomforts in some women which appear in premenstrual phase and persist on the first day of menses. These menstrual discomforts are called **Menstrual molimina** (Dawn, 1980 - c). Menstrual molimina is a mild form of PMS as it does not interfere in the routine life of a woman. When a group of symptoms occur in the week or two weeks (7 to 14 days) before this monthly bleeding and usually goes off after bleeding starts. This is known as **Premenstrual Syndrome (PMS) or Premenstrual Tension (PMT)** (www.womenshealth.gov,www.nlm.nih.gov/medlineplus/ency/article/001505.htm,www.medicinenet.com/symptoms_and_signs/articl.htm). PMS is different for each woman. As monthly periods stop during menopause, it brings an end to PMS also. At the extreme end of the spectrum is a condition known as **Premenstrual Dysphoric Disorder** (**PMDD**). This

is the most severe form of PMS. Women suffering from PMDD tend to have severe psychological changes such as depression, irritability, anger, and tension before the start of their periods every month.

## (B) Historical background of PMS

History of PMS is shaped by four landmark stages. These eras are:

**(1) From the time of Hippocrates (370 BC) till 19th century:**

During this period PMS was mostly believed as something related to increased seizure activity in late luteal phase of menses. People gradually started recognizing and studying symptoms and this lead to the beginning of the understanding of this problem. It was first described in the Torah, the Talmud or the works of Hippocrates. A female Italian scholar, Trotulo of Salerno wrote about it in 11th century. Giovani da Apdua in 16th century clearly described link between menses and depression. In 18th century, Richard von Krafft – Ebing, an Austro – German Psychiatrist produced a monograph 'Psychosis Menstualis' while JE Hitzig worked extensively on menstrual mood disorder. Observers like Brierre de boismont, a French physician and Psychiatrist and Ian Brockington, an English Cardiologist worked on menstrual psychosis out of his passion in psychiatry and attempted to establish the

relation between menses, agitation and *surexcitation* (overstimulation) (O'Brien and Ismail, 2007).

A hundred years ago, Victorian physicians warned that menstruation might cause temporary insanity, and that women could go berserk including attacking friends and family or even killing infants! It was earnestly suggested that such women should be locked up during their menstrual years for their own safety as well as of the society.

**(2) From PMT to PMS in first half of 19th century:**

As mentioned by Israel (1967) and Sloane (1980), Robert. T. Frank, an American chief of obstetrics and gynecology at Mt. Sinai Hospital, New York City, was the first to introduce the condition 'Premenstrual Tension'. In 1931 he coined it in a paper reading, at the Academy of Medicine, New York; he explained that 15 patients were found with the syndrome of irritability, anxiety, depression and edema (swelling) in the days before menstruation or in the first four days of the flow and disappear abruptly with the onset of menstrual flow. In the same year, psychoanalyst Karen Horney published a paper on "premenstrual mood swings", on the irritability and anxiety, the listlessness, self-depreciation, or even outright depression, which many

women experienced in the days preceding menstruation, linking them to strongly rejected fantasies of motherhood (Stolberg, 2000).

Later, Greene and Dalton used the phrase **'Premenstrual Syndrome'** in 1953 in a report of 84 cases recognizing the wider range of symptoms and extended its definition too (Cameron, 2000; Edmonds, 2000; Cronje *et al.,* 2003*;* Studd, 2003; Speroff and Fritz, 2005). During this period, the link between ovarian cycles and symptoms was recognized.

**(3) <u>From PMS to PMDD (19th – 20th century)</u>:**

Traditionally it was thought that PMS affect multiparous middle class articulate women in their late 30s and 40s (O' Brien *et al.,* 2003; Shaw *et al.*, 2003). A great deal of scientific energy was expended in an attempt to define and quantify premenstrual disorders. Also ovarian endocrine research dominated this era. Theory of progesterone deficiency and its related progesterone and hormonal replacement therapy (HRT) along with many diagnostic criteria also evolved over this time period. As stated by d'Orban (1983) and Speroff and Fritz (2005) in the 19th and 20th century's menstruation and its related health problems were considered to be responsible for antisocial behaviour.

International Statistical Classification of Diseases (ICD) and Related Health Problems of WHO listed PMS in 9th version (in 1975) and in ICD – 10 (in 1992) under pain and other conditions associated with female genital organs and menstrual cycle with code 625.4 with code N94 respectively.

Sloane (1980), has mentioned about **Katharina Dalton** *(PLATE – 1, www.the lancet.com),* the pioneer researcher in the field of PMS and an English Physician who has written extensively on this, **"Curse of Eve"** as she said, argued PMS to be responsible for increased incidences of crime, jailing for alcoholism and prostitution, school misdemeanors, sickness in industry, hospitalization for accidents, psychiatric disorders and general hospital admissions. Also, Insanity Defense Reform Act of 1985 in US [18 U.S.C.A.20 (Supp. 1985)], provided that PMS may be argued as a mitigating factor in criminal behaviour if it is connected with psychosis (Silberstein, 1991; Decherncy and Nathan, 1991).

**(Plate - 1)**

## Katharina Dorothea Dalton

A British Physician & Pioneer Researcher for PMS
Wrote the books *Once a Month: The Original Premenstrual Syndrome Handbook* (1978) and *Depression after Childbirth: How to Recognize, Treat, and Prevent Postnatal Depression*.
Born in London, UK, on Nov 11, 1916, she died on Sept 17, 2004, aged 87 years.

In 1987, a variant of PMS namely Late Luteal Phase Dysphoric Disorder (LLPDD) was identified whose diagnostic criteria were listed by the American Psychiatric Association (APA) in Diagnostic and Statistical Manual of Mental Disorders, third edition (DSM – III), (Elliot, 2002) for further systematic research, but in 1993, DSM – IV changed the name to Premenstrual Dysphoric Disorder (PMDD/ PDD) and modified the diagnostic criteria slightly (Rivera and Frank, 1990; Keye, 1998; Fraser *et al.,* 1998; O' Brien *et al.,* 2003).

**(4) From PMDD till today:**

In this period it was realized that women are sensitive to normal levels of ovulatory progesterone and that this possibly has a neuroendocrine explanation. Scientific studies showed that therapy can be achieved by altering neuroendocrine status with psychotropic drugs (notably selective serotonin reuptake inhibitors – SSRIs) or by elimination of ovulation. Parry (1997) states that in the last two decades a degree of understanding has emerged and treatment guidelines are now available from clinical studies. Association of PMS and other physical – psychiatric disorders in women's' life cycles has been comprehensively reviewed by Halbreight (Connolly, 2001).

Britain had been the leading country in research related to PMS and thereafter America (Knnapen and Weisz, 2007). Their contribution to the findings of PMS is unsurpassed to that of the little work by other western countries. In present times PMS is studied more systematically in Western countries especially by psychiatrically trained clinicians as compared to the handful amount of research in Asia. Today we have succeeded in finding its prevalence, discovering its major symptoms, unearth its more severe form and provide symptomatic treatment to some extent.

## (C) Definitions of PMS

PMS is not a single discrete entity or a specific syndrome, but a heterogeneous group of symptoms better named Premenstrual Changes. As a result of its ambiguous nature, there is no universally accepted definition of PMS.

Moreover, it is both difficult to define PMS and quite controversial too. However, any definition of PMS must recognize that the syndrome is a recurring cyclical disorder in the luteal phase of the menstrual cycle, involving behavioural, psychological and physical changes resulting in loss of work or social impairment (Reid and Yen,

1981; Edmonds, 2000; Cameron, 2000). As stated by Cronje *et al.*, (2003) and Studd (2003), no one has yet provided true definition of PMS as so many symptoms have been associated with the condition, but there is no doubt that it does not occur prior to puberty, after menopause or during pregnancy.

Premenstrual Syndrome is made up of two words, **Premenstruum (is the stage of menstrual cycle immediately preceding menstruation) and Syndrome (association of several clinically recognizable features, symptoms, phenomena or characteristics that often occur together).** Webster on-line dictionary defines PMS as a syndrome that occurs in many women from 2 to 14 days before the onset of menstruation.

Some of the popularly accepted and broadly considered definitions and explanations on what is PMS are as follows:

(1) PMS was defined by a National Institute of Mental Health (NIMH) consensus workshop group in 1983 as: "A constellation of mood, behavioral, and /or physical symptoms that have a regular cyclical relationship to the luteal phase of the menstrual cycle, are present in most if not all cycles, and remit by the end of the menstrual

flow with a symptom-free interval of at least one week each cycle (Freeman, 2011).

(2) According to Israel (1967), "It is characterized by alteration of personality during ten days preceding the expected menstruation, a change that terminates abruptly with the onset of the flow".

(3) PMS is "The cyclic occurrence of symptoms that are of sufficient severity to interfere with some aspects of life and which appear with consistent and predictable relationships to menses" as told by Endicott *et al.,* (1981), http://apt.rcpsych.org/cgi/contnet/full/7/6/469 and Gise *et al.,* (1988).

(4) "In every woman, a few days before the approach of menses, mild subjective and objective changes occur, but when, during the week or ten days before the menses these changes are exaggerated, and it is termed PMT" defined by Masani (1982).

(5) "PMS is the name given to a group of symptoms that generally include headache, breast swelling and tenderness, abdominal bloating, swelling of the hands and feet's, fatigue, depression,

tension, irritability and increased appetite –especially for sweet or salty foods" (Michaud *et al.,* 1988).

(6) According to Dickerson *et al.,* (2003), (www.aafp.org/afp/20030415/1743.html) it can be defined as, "a common cyclic disorder of young and middle age women characterized by emotional and physical symptoms that consistently occur during the luteal phase of the menstrual cycle."

(7) "PMS is a combination of emotional, physical, psychological and mood disturbances that occurs after a woman's ovulation and normally ends with the onset of her menstrual flow" (www.medicinenet.com).

(8) PMS is characterized by cyclic symptom fluctuation: symptoms appear premenstrually, abate with the onset of the menses & reappear premenstrually in the next cycle (Reiber, 2008).

(9) Bahamondes *et al.*, (2007) refers " PMS is more common but less severe than Premenstrual Dysphoric disorder (PMDD), it is the cyclic occurrence of physical and emotional symptoms that are of sufficient severity to interfere with some aspects of life and that occur for upto 2 weeks prior to menses, ending soon after the onset of the

menstrual period, while PMDD is recognized as a cause of severe premenstrual symptoms, which lead to impairment of functioning, and diminished productivity and quality of life".

(10) Dutta (2009) describes, "PMS is a psychoneuroendocrine disorder of unknown etiology, often noticed just prior to menstruation". He also says that if (a) it should not be related to any organic lesion. (b) it regularly occurs during luteal phase of each ovulatory menstrual cycle (c) symptoms must be severe enough to disturb the life style of the women or she requires medical help and d) symptom – free period during rest of the cycle, if these criteria are fulfilled and large number of symptoms appear during the last 7-10 days of menstrual cycle, it is PMS.

## (D) Symptomatology of PMS

There have been numerous attempts to know, validate and quantify PMS symptoms. Around 160 – 200 symptoms have been recognized to be associated with premenstrum in variable intensities since Frank's original publication in 1930s. The character of symptoms is less important than their timing and severity. Some researchers tried to subtype PMS by carrying out factor analyses of symptoms recorded by

women on standardized questionnaires. The most common symptoms were categorized into 8 symptom clusters derived from 47 symptoms with 6 (pain, concentration, behavioural change, autonomic reaction, water retention, negative affect), as most important, by Moos (1968) (Fraser *et al.,* 1998).

Few researchers also classify these symptoms into a) cognitive or affective and b) physical or somatic symptoms. Further, the most recognized symptoms of PMT / PMS were divided into 4 subgroups namely **(1) PMT – A (Anxiety) (2) PMT- C (Carbohydrates or Craving for sugar) (3) PMT – H (Hyper hydration) and (4) PMT –D (Depression)** (Abraham, 1983; Abraham and Rumley, 1987 and Lark, 1989, www.drkaslow.com/html/premenstrual_syndromes.html).Also, few clinicians describe PMS to be **Primary PMS** (symptoms disappear) and **Secondary PMS** (symptoms improve) during menstruation, depending on the degree of underlying psychopathology. Edmonds (2000) reports that O'Brien divided the syndrome into 4 groups namely (1) Physiological premenstrual symptoms, (2) Primary PMS with complete symptom resolution for atleast a week between menstruation and ovulation, (3) Secondary PMS with partial symptom resolution and (4) a

psychiatric disorder wrongly attributed to PMS. Although it should be noted that this kind of classification of symptoms into categories, subtypes or subgroups do not represent any specific etiologies or pathophysiological mechanism.

Later on a broader classification came into existences and PMS symptoms are nowadays grouped into physical, psychological and behavioural symptoms (Sen Gupta, 2001; Dickerson *et al.,* 2003; Cronje *et al.,* 2003; Studd, 2003). Most women share to have experienced negative symptoms as mentioned in *TABLE - 4* during PMS, but there are reports where they have also admitted to have experienced certain positive symptoms during this phase like more energy, zest to finish pending matters, more efficient at work, more interest in things in general, sense of more control over one's life, socially more able, more libido, younger face, more creative ideas, more relaxed and self assured, more affectionate and perception of having more attractive breast (Campagne and Campagne, 2007).

Number of medical conditions like asthma, depression, epilepsy and other seizure disorders, rheumatoid arthritis, migraine, catamenial pneumothoraces, multiple sclerosis, systemiclupus

erythematosus, inflammatory bowel disease, irritable bowel syndrome (IBS) , allergy, common cold, respiratory tract infection, edema, etc worsen or exacerbate during premenstrual days. This is sometimes referred to as **Menstrual Magnification** (Somon and Zieve, 2009, Hsiao and Liu, 2007, Speroff and Fritz, 2005).

Following *TABLE - 4* lists the most common PMS symptoms available in PMS related literature.

**Table – 4**

**Symptoms of PMS**

| **Physical Symptoms** |
|---|
| **1*) Abdominal Problems*** **–** Abdominal bloating, Abdominal Pain or Cramps, Pelvic heaviness or Pressure, Abdominal Fullness |
| |
| **2) *Breast related Problems*** **–** Breast tenderness, breast swelling, breast pain, mastalgia, Breast engorgement |
| |
| **3) *Edema*** **–** variable degrees of edema of extremities, puffiness of face or fingers, bloated body, water or fluid retention, temporary weight gain |
| |
| **4) *Aches*** **–** Headache or migraine, body ache, back ache, muscle or joint pain, muscle or joint stiffness |
| |
| **5) *Gastro– intestinal problems*** **–** constipation, diarrhea, Indigestion, nausea, vomiting, dizziness, feeling gaseous |
| |
| **6) *Thirst and appetite changes*** **–** total loss of appetite, decrease or increase in appetite, binge eating, over eating, craving for specific food items like chocolates, ice-cream, junk or spicy food |

| |
|---|
| **7) Fatigue, weakness, tiredness or lack of energy** |
| |
| **8) *Others* –** acne, allergy, soreness, sweating or hot flashes, pins and needle sensation in hands &feet, less tolerance to light and / or noise, poor impulse control |
| |
| **Psychological – Behavioural Symptoms** |
| **1) *Anxiety and depression related problems* –** unreasonable tension, tension due to domestic routine, decreased interest in activities, loss of interest in hobbies, feeling sad or dejected, hopelessness, worthlessness or self deprecating feelings, anxious or no edge, feeling low, uneasiness, nervousness, suicidal tendencies, difficulty concentrating, wish to remain alone, feeling lonely, unreal feeling, violent feeling, panic attacks, restlessness or jitteriness, paranoia |
| |
| **2) *Mood disorder* –** depressed mood, mood swings, irritability or agitation, anger or temper outbursts or aggressive |
| |
| **3*) Sleep disorder* –** hypersomnia, insomnia, disturbed sleep, bad reams or nightmares, excessive sleeping |
| |
| **4) *Behavioural symptoms* –** cry spells or tearfulness, increased fear, poor judgment, confusion, social withdrawal, boredom, lethargy |
| |
| **5*) Others* –** emotional hypersensitivity, interpersonal conflicts, altered interest in sex, clumsiness or poor co-ordination, accident prone, decreased efficiency, easy bruising, reduced coping skills |

## (E) Epidemiology of PMS

Nearly 90 - 95% of the women all over the world in their reproductive age experience atleast one PMS symptom (O'Brien *et al*.,

2003). Unfortunately, as there is no single uniform tested method of assessment of PMS, the rate of prevalence and severity also varies as per the research methodology used by a researcher. Also, the presence or absence of PMS is generally determined from the experiences of symptoms, so it becomes very difficult to establish its true prevalence. However, from the presently available epidemiological survey based studies, 75% women experience some recurrent PMS symptoms, 20-40% are mentally or physically incapacitated to some degree and 3- 5 % experience severe distress (Silberstein, 1991).

Literature related to PMS reveal that there are different opinions amongst scientists regarding the age when this syndrome prevails the most in women. Golub (1988) mentioned that Lloyd was the first to write about **'mid thirties syndrome'** where he noted relation between age and PMS. Also, Dalton, the pioneer researcher for PMS reported increased incidences of PMS with increasing age among childless and parous women. While few say that it is infrequent in adolescents but occur maximum during early twenties and early thirties, few others believe that incidences are more during 30 – 45 years of age.

It is proposed that in cases of sexual abuse, intolerance to contraceptive pills, women with younger children, spontaneous miscarriages, pre-eclampsia and postpartum depression, pregnancy complicated by abortion, pregnancy induced hypertension and hyper emesis gravidarum show presence of PMS or its symptoms more compared to other women (Sen Gupta, 2001 and Keye, 1998), but none of these have a scientific validation. It is said that those who show psychologic mechanisms such as unresolved oedipal conflicts, hidden marital discords and pregnaphobia also show clinical patterns of premenstrual tension (Israel, 1967).

PMS is not predominant in any racial or social class (Sen Gupta, 2001) but it is believed by many that there is an impact generated by cultural attitudes towards menses and its related issues (Golub, 1988), which in turn show variation in the way women in different parts of world experience PMS. Cross- cultural comparisons have suggested a predominance of somatic symptoms relative to emotional symptoms in several ethnic cultures (Pearlstein, 2007). One of the study also reveals that prevalence of PMS and PMDD is higher in Latin American Countries (Brazil, Mexico etc.) than in European Countries (Germany,

Italy, UK, Spain, France, Hungary etc.), (Bahamondes, *et al.,* 2007). WHO has concluded that PMS has been found world-wide in both developed and developing countries (Reiber, 2008).

## (F) Etiology and Pathogenesis of PMS

PMS is a disorder of unknown, complex and multifactorial etiology (www.aafp.org/afp/20030415/1743.html). No sure cause is yet known. Studies prior to 1983 did not incorporate appropriate diagnostic methods and thus lacked accuracy and homogeneity. Later all efforts were made in the direction of isolating a specific pathophysiologic mechanisms. Several theories have been proposed by Magos (1988), (Cronje *et al.,* 2003; Studd, 2003) briefed in *TABLE –5*. Sen Gupta (2001) also supports these theories and suggests hyperprolactinaemia theory along with them. But none of these are able to find the root, instead, all work upon the justification of symptoms only. We yet don't have any biological markers of PMS. The causes of PMS have not been clearly elucidated and have been attributed to hormonal changes, neurotransmitters, prostaglandins, diet, drugs and lifestyle.

Ovarian hormones also appear to contribute since PMS responds to the Gonadotropin Releasing Hormone - GnRH (Freeman *et*

*al.,* 1997). However, due to contradictory results of researchers, there is a general agreement that PMS is probably the result of a complex interaction between ovarian steroids and central neurotransmitters (Bianchi-Demicheli *et al*., 2004). It is worthy to mention here that serotonin(5- HT), a neurotransmitter has been found potent in PMS pathogenesis and many PMS symptoms have been associated with serotonergic dysfunction (Silberstein, 1991). PMS is perhaps resulting due to ovarian hormones, beta endorphin and psychosocial factors. Thus PMS has a basic psychophysiologic origin that is linked up with menstrual cycle, primarily biological but with psychosociologic overlay (Speroff and Fritz, 2005).

Genetic factors also seem to play crucial a role, as the concordance rate is two times higher in monozygotic twins than in dizygotic twins (Kendler *et al*., 1998; Dickerson, 2003; www.aafp.org/afp/20030415/1743.html). Irrespective of which hypothesis is correct, the subjective nature of the disorder makes it impossible to deny that emotional and psychogenic factors not only aggravate the symptoms but also lead to additional symptoms (Thorn,

1957; Israel, 1967). Till date though, no specific pathophysiological mechanism for PMS has been established.

**Table – 5**

**Proposed theories for PMS**

**(Cronje *et al. 2003* and O'Brien *et al.,* 2003)**

| ***Biological*** | |
|---|---|
| Female sex hormones | Estrogen excess |
| | Progesterone deficiency |
| | Estrogen/progesterone ratio |
| | Estrogen/progesterone withdrawal |
| Neurotransmitters & co-factors | Serotonin |
| | Endorphins |
| | Dopamine |
| | GABA |
| | Catecholamines |
| | Cholinergic |
| Fluid retention | Sex hormones |
| | Renin- angiotensin-aldosterone axis |
| | Prolactin |
| | Vasopressin |
| | Dietary factors |
| Glucocorticoids | |
| Androgens | |
| Prolactin | |
| Antidiuretic hormone | |
| Vitamin deficiency | Vitamin A |
| | Vitamin B6 |
| Reactive hypoglycemia | |
| Endogenous hormone allergy | |
| Prostaglandins | Excess |

| | |
|---|---|
| | Deficiency |
| Endogenous opiate peptides | Mid – luteal increase |
| | Premenstrual withdrawal |
| Menstrual toxin | |
| Magnesium deficiency | |
| Melatonin | |
| Thyroid abnormality | |
| Atrial natriuretic peptide | |
| Altered capillary permeability | |
| ***Psychological//Psychosomatic*** | |
| ***Social & Evolutionary*** | |
| ***Genetic*** | |

## (G) Diagnosis of PMS

Inconsistent acknowledgement of over 150 symptoms contributes to the difficulty in diagnosis. Gynecological practice is almost always informed by an objective test or visual information on which to base diagnosis and provide treatment. No such objective tests are available for quantification for PMS (Dhingra and O'Brien, 2007). Also there are no laboratory tests or physical findings that indicate a diagnosis of PMS. Physical examination of patients, blood tests and biochemical findings can only help screen the symptoms which mimic like PMS and in excluding other disorders. Clinical diagnosis of PMS relies

predominantly on the subjective self - reporting of symptomatology as there are no specific diagnostic tests.

Researchers attempted to use rating scales that were essentially established and designed actually to quantify other psychiatric and psychological conditions until the Menstrual Distress Questionnaire (MDQ) was published by Moos which used 47 item 0-6 rating scale. Also, Premenstrual Mood Index was the first visual analog scale (VAS) used for the first time within the context of a randomized clinical trial of spironolactone at the University of Nottingham, UK (O'Brien *et al.,* 1979). Later on, many premenstrual symptom screen tools and techniques were framed by different researchers which are listed in *TABLE – 6* below. Presently over 65 different daily symptoms rating instruments are available. Thus diagnosis is instrument – specific (Reiber, 2008). Despite multiple questionnaires, we are still not convinced that there exists a reliable objective method for observing and measuring symptoms that are experienced internally, rather than manifested via external behaviour.

One of the limitations in establishing the diagnosis of premenstrual disorder is the lack of universally accepted diagnostic criteria. Factors generic to the diagnosis of PMS are that (1) the somatic,

affective, and / or behavioural symptoms only occur in ovulatory women and that (2) the symptoms must recur cyclically in the luteal phase of menstrual cycle and resolve by the end of menses, leaving symptom-free interval in the late follicular phase, before ovulation. The main current diagnostic criteria are summarized in *TABLE – 7* which are just acknowledged but not completely accepted by scientific community.

**Table – 6**

**Techniques used to quantify premenstrual symptoms**

**(Dhingra and O'Brien, 2007)**

| References | Method | Comment |
|---|---|---|
| *Hamilton, 1960 | Hamilton Rating Scale for Depression (HAM – D) | Observer – rated instrument to assess 17/21 items in premenstrual mood disturbance |
| | | |
| *Beck *et al.,* 1961 | Beck Depression Inventory (BDI) | 21 items self – report questionnaire, symptoms rated 0-3 to give an overall depression score |
| | | |
| Moos, 1968 | Moos Menstrual Distress Questionnaire (MDQ) | 47 symptoms rated on a six – point scale |
| | | |

| | | |
|---|---|---|
| *McNair *et al.,* 1971 | Profile of Mood States (POMS) | 65 symptoms rated on 0-4 scale combined to give summary scores for 5 dimensions |
| | | |
| *Weissman and Bothwel, 1976 | Social Adjustment Scale (SAS) | Self – report instrument containing 56 questions in 7 different sections |
| | | |
| Endicott *et al.,* 1976 | Global Assessment Scale (GAS) | Has not been used extensively |
| | | |
| *Guy, 1976 | Clinical Global Impression Scale (CGIS) | 7 point observer/patient – rated global scale |
| | | |
| *Derogatis and Cleary, 1977 | Symptom Checklist – 90 (SCL-90) | General index of psychological and physical symptoms plus additional 9 subscales |
| | | |
| O'Brien *et al.,* 1979 | Visual analog scale (VAS) : Premenstrual Mood Index | 100mm line at either end of which are opposing adjectives representing the symptoms |
| | | |
| Steiner *et al*., 1980 | Self – Rating Scale for Premenstrual Syndrome | 36 item yes/no rating scale |
| | | |
| Steiner *et al.,* 1980 | Premenstrual Tension Syndrome – Observer (PMT – O) & Self – Rating (PMT – SR) | Assessing symptoms 10 different domains.36 symptoms with severity ranging from 0-4 |
| | | |

| | | |
|---|---|---|
| Halbreich *et al.,* 1982 | Premenstrual Assessment Form (PAF) | Retrospective questionnaire based on psychological and behavioural symptoms |
| | | |
| Reid, 1985 | Prospective Record of the Impact and Severity of Menstrual Symptoms (PRISM) | Daily chart records a large number of symptoms rated 1-3 |
| | | |
| Rubinow *et al.,*1984 | Visual analog scale (VAS) | 100mm line at either end of which are opposing adjectives representing the symptoms |
| | | |
| Magos *et al.,* 1986 | Modified Moos Menstrual Distress Questionnaire (MDQ) | 10 items derived from MDQ, usually subjected to Trigg's trend analysis |
| | | |
| Casper and Powell, 1986 | Visual analog scale (VAS) | 100mm line at either end of which are opposing adjectives representing the symptoms |
| | | |
| Magos and Studd, 1988 | Premenstrual Tension – Cator (PMT – Cator) | 5 symptoms rated 0-3 S |
| | | |
| Mortola *et al.,* 1990 | Calendar of Premenstrual Experiences (COPE) | ---------- |
| | | |

| | | |
|---|---|---|
| Endicott and Harrison, 1990 | Daily Record of Severity of Problems (DRSP) | 22 item rated 0-6 specially for symptoms of PMDD |
| | | |
| *Rivera – Tovar and Frank, 1990 | Daily Assessment Form (DAF) | 33 item symptoms checklist rated from 0(none) to 6 (extreme) |
| | | |
| Steiner *et al.,* 2003 | Premenstrual Screening Tool (PSST) | Retrospective 0-3 scale. Retrospective for PMDD |

** Methods originally designed for diagnoses other than PMS or PMDD.*

**Table – 7**

**Current Diagnostic Criteria for PMS**

**(Halbreich, 2004)**

| | ***ICD – 10** | ***ACOG** |
|---|---|---|
| Diagnostic entity (& ICD – 9 code) | PMTS (625.4) | PMS (625.4) |
| | | |
| Category | Gynecology | Gynecology |
| | | |
| Temporal Pattern | Occur premenstrually | Occur 5 days before menses |
| | Remit following menses | Remit within 4 days of onset of menses |
| | | No recurrence atleast until day 13 of cycle |
| | | |
| Symptoms | Tension, headache, molimen | Atleast 1 symptom of : depression, angry outburst, irritability, |

| | | |
|---|---|---|
| | | anxiety, confusion, social withdrawal, breast tenderness, abdominal bloating, headache, swelling of extremities |
| | | |
| Severity | Not specified | Identifiable dysfunction in social or economic performance |
| | | |
| Retrospective report of symptoms | Implied not specified | In each of the three prior cycle |
| | | |
| Prospective confirmation | Not required | Two cycles |
| | | |
| Other requirements | ---------- | Not associated with pharmacologic, hormone, alcohol or drug use or abuse |
| ** ICD – 10 = International Classification of Diseases, 10th edition; ACOG = American College of Obstetricians & Gynecologists; PMTS = Premenstrual tension syndrome* | | |
| | | |
| | | |

**Menstrual Symptometrics:**

Various researchers had developed electronic database systems and gadgets for storage, documentation, data analysis etc to maintain daily record of symptoms of PMS in a simple manner in the form of menstrual symptometrics. MiniDoc method, Simple palmtop

programmed for daily menses cycle symptoms, Premenstrual tension Cator, device made by Nottingham University using very early PDA (Amstrad Pen Pad) etc., were few to list (Dhingra and O' Brien, 2007). Due to rapid advancement in technology and lacunae in research work, these attempts were never independently validated nor used further.

## (H) Treatment and Management of PMS:

There is a wide range of proposed therapeutic regimens for the treatment of PMS as shown in *TABLE – 8* below. Around 327 different treatment options are available (Chakmakjian, 1983; Cronje *et al.,* 2003; Studd, 2003). Therapeutic interventions for PMS range from the conservative (lifestyle and stress management) to treatment with psychotropic medications and hormonal therapy or surgical procedures to eliminate ovulation or ovarian function (for the more extreme case). While all these treatments are successful in relieving symptoms for some of the women treated, to date no one intervention has proven to be effective for all (Steiner, 1997). A symptomatic treatment or a combination of lifestyle changes with medication is usually suggested as per the complaint of sufferer or sometimes women themselves undertake self help using alternative therapies. Owing to conflicting results of

various studies regarding the efficacy of various treatments for PMS, it becomes tough for physicians to help the patient. Thankfully, in the last two decades a fair degree of understanding has emerged and treatment guidelines, derived from clinical studies, are now available.

Due to the complex nature of this condition and the methodological difficulties that still plague studies of premenstrual symptoms and premenstrual syndromes, there is no universal agreement with respect to its definition, epidemiology, etiology, diagnosis, investigation or treatment. Nevertheless, we are now able to understand what Premenstrual Syndrome really is, how to establish its diagnosis and how best to help women deal with it. The facts from above literature review alarms us to look into, think deeply and elucidate this hidden - illness of women. Input for rigorous efforts for detailed study particularly in present era where science and technology has progressed unbound in each and every field and nothing seems to be impossible with its power are undoubtedly requisite!

**Table – 8**

**Treatment Options for PMS**

| |
|---|
| ***1) Life style changes / modifications*** **–** to eat small meals of complex carbohydrates, do exercise or yoga, sugar, salt, caffeine, alcohol restriction, support bra |
| |
| ***2) Psycho-social treatments*** **–** Insight therapy, anxiety/anger management, cognitive behavior therapy (CBT), marital and family therapy, psycho-therapy, counseling, self help and support groups, biofeedback, relaxation/motive therapy, spiritual healing |
| |
| ***3) Dietary & nutritional supplements*** **–** calcium & magnesium supplements, zinc, manganese, Vitamin E, Vitamin B6 (Pyridoxine), Gammalinolenic acids, Kelp, L-lysine, L-tyrosine, multivitamin – mineral complex, essential fatty acids, L- tryptophan supplement. |
| |
| ***4) Herbal treatments–***Evening primrose (Oenotherabiennis)oil (EPO), Cayenne, Dong quail Chinese herb, Ginseng, Pulsatilla, Raspberry leaves, St. – John's wort (Hypericumperforatum), Wild Yam, American valerian, Chaste berry(Vitexagnuscastus), Ginkgo biloba |
| |
| ***5) Hormonal treatments*** **–**progestogens and progesterone, oral contraceptives (cyclic/continuous), testosterone, Gonadotropin releasing hormone(GnRH) analogues, dopamine agonist, hormonal implants, anti- prostaglandins, Bromocriptine, estradiol (oral/patch/implant), thyroid hormone, anti-progesterone, |
| |
| ***6) Non- hormonal pharmacological (drug) treatments*** **–** diuretics, non-steroidal anti-inflammatory drug (NSAIDS),anti-anxiety drugs, tranquilizers, anti-depressants (SSRIs – selective serotonin reuptake inhibitors and non- SSRIs), aldosterone, phenobartritone, beta-blockers, |
| |

| |
|---|
| ***7) Surgical treatments –*** bilateral salpingo- oophorectomy (BSO), endometrial ablation, hysterectomy, intravaginal electrical stimulation, irradiation of ovaries |
| |
| ***8) Non – pharmacological treatments (complementary & alternative therapies)*** **–**Hypnosis, Homeopathy, acupuncture and acupressure, stress – management, chiropractics, light therapy, massage, Ayurveda, aromatherapy, Bach flower remedies, chelation therapy, craniosacral therapy, osteopathy, reflexology, naturopathy |

# Aims and Objectives

# Chapter 2

# AIMS AND OBJECTIVES

# CHAPTER 2

Since ancient times, menstruation has been predominantly viewed with negativity, labeled with taboos, linked to evil spirits and perceived as a 'dirty' secret of woman's body. It was believed to be the most awful normal natural process which 'needs not to be discussed'! Unfortunately, such sadistic attitudes of human society towards menses and its related disorders ensured that such an important phase of woman's life remained inexplicable and ill-understood even till date. One such very critical and sensitive yet an absurd condition in women is Premenstrual Syndrome (PMS). The present study aims to explore all the possible aspects of this disorder in the utmost scientific manner.

Literature review on PMS clearly shows that massive research has been done to investigate various aspects of PMS in Europe and America, but developing countries like India are still lagging behind. There is a dire need for in-depth evaluation and assessment of this myriad of problems in India (Chandra *et al.,* 1994). Hence, with an aim to put

forth systematic data and document the actual prevalence of PMS in Indian women, this investigation was planned.

Speroff and Fritz (2005) said, "An educated understanding of these sexual and reproductive events is a powerful mechanism for dealing with perceived discomforts and disorders of menstruation." Education brings awareness and awareness can lessen our troubles to a great deal. The present research does not restrict itself to obtaining results or understanding approaches, attitudes and myths related to menses and women problems; it goes further - it makes a real-world effort to curb this issue.

Just as menstruation is neglected in our society, premenstrual syndrome is often neglected by many people from research and medical community. PMS is often largely unnoticed most of the time not only by physicians but even by women themselves - just as they ignore menses and related problems are taken for granted as 'normal occurrences!' This research aims to highlight the seriousness of this issue; to emphatically prove and establish beyond doubt that negligence could be hazardous.

It also aims to sensitize each and every person about the existence of PMS – the oft intangible culprit - and develop a mechanism which can provide better medical aids to women.

**To achieve and execute the above mentioned aims, following objectives or goals were set:**

(1) To unravel the true nature and prevalence of premenstrual syndrome (PMS) in respondents of age groups 13 to 36 years of Surat, Gandhinagar and Ahmedabad.

(2) To find out and identify which PMS symptoms are experienced by these subjects and to know the occurrence and severity of the same.

(3) To analyze the possible causes responsible for PMS.

(4) To identify subjects with PMDD, find the number of incidences of PMDD and to know its intensity in present sample subjects.

(5) To understand and know from teachers and mothers how they and girls close to them, deal with this disorder.

(6) To study the presently available curative and preventive measures suggested by health professionals and other holistic medicine practitioners in against of PMS and or menses related complains.

(7) After complete analysis of the data, suggest steps about how to deal with PMS and its related issues.

(8) To make efforts in promoting and providing scientific education about PMS, menstruation and its disorders so as to bring awareness in society about such health problems.

# Methodology

# Chapter 3

# METHODOLOGY

# CHAPTER 3

Study design is the most vital element of a research work. How the research will be conducted that itself becomes a predictor of the success rate in terms of getting fair results. In this chapter apart from brief overview of plan of work, essential components of this scientific work like (1) Study Sample (2) Study Instruments (3) Method of Study (4) Definitions for the Study (5) Statistical Evaluation in the Study (6) Limitations of Study are described at length.

## Plan of work:

A survey was conducted in Surat, Gandhinagar and Ahmedabad, three major cities of the state of Gujarat, from the year 2006 to 2010 whereby total of 720 respondents were personally interviewed and all the details noted in a questionnaire form. 160 subjects were interrogated thrice during their three menstrual cycles, while 142 subjects were screened by the rating scale Proforma given by Allen *et al.,* 1991, for further intensive study of PMS. For clinical studies, blood tests and ultrasonography were done in 60 cases. In addition to this, to gain an

overview of the attitudes related to PMS and menses, presently used medication, awareness related to PMS problems etc., 50 Doctors and 50 Mothers - Teachers were interviewed.

*CHART - 1* gives a schematic view of this complete plan of work undertaken for the present research work.

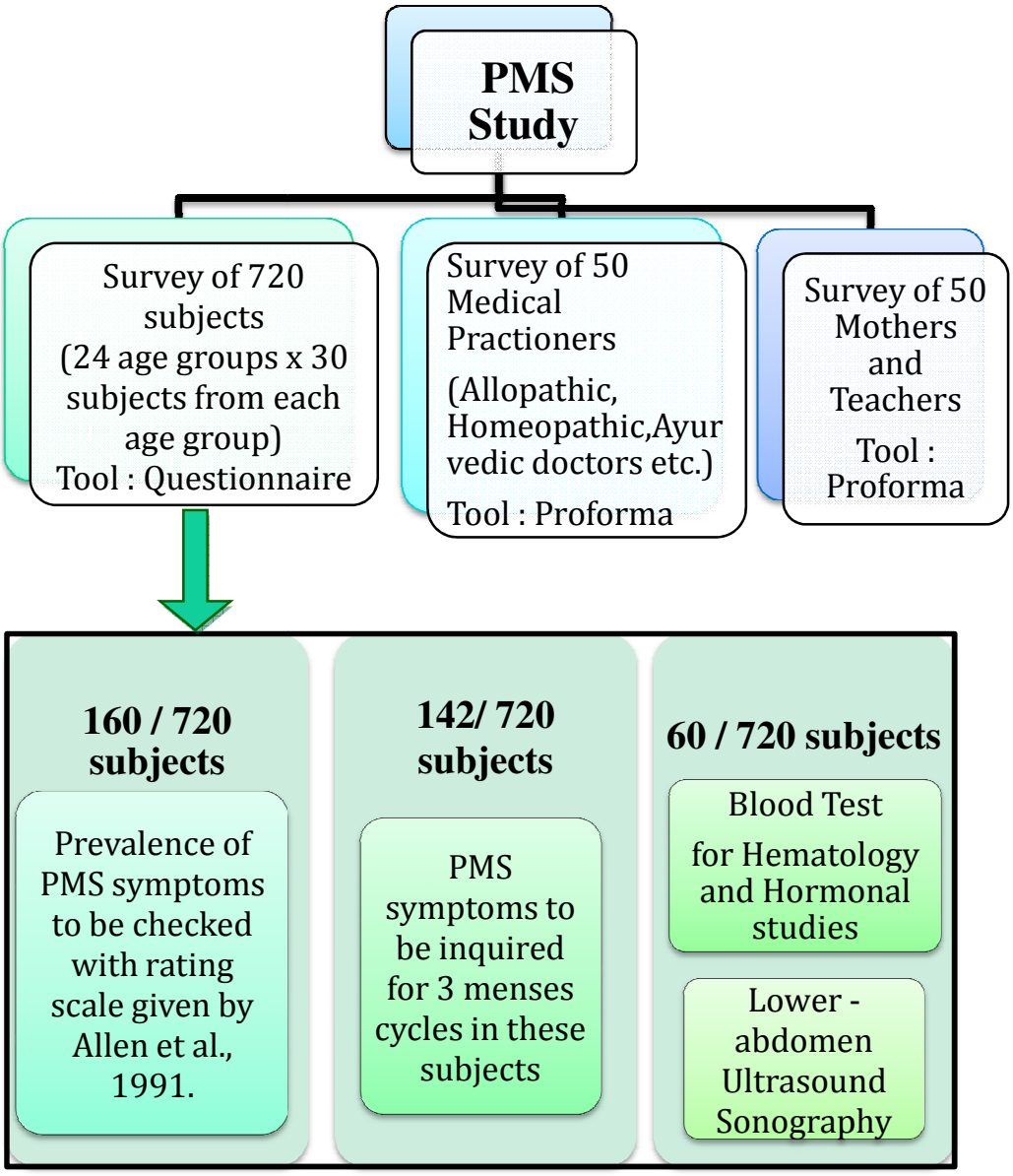



**Chart – 1**
**Plan of Work for Present Study on Premenstrual Syndrome**

## (I) Study Sample

**(1) <u>Size of Sample</u>** –

As mentioned in the Plan of Work, (30 x 24 =) 720 respondents were included in the present study. 30 respondents were interrogated for each age group from 13 years to 36 years. Total 24 age groups were considered for this research work.

**(2) <u>Study Area</u>** –

Mainly urban zones of Surat, various sectors and nearby regions of Gandhinagar and few parts of Ahmedabad city were chosen to conduct surveys as mentioned below:

(a)Various parts of Surat City: Varachha, Katargam, Athwalines, Nanpura, City Light Road, Piplod, Ichchhanath, Adajan and Rander

(b)Sectors and nearby regions of Gandhinagar: Sector number 12, 13, 21, 22, 23, 6, 7, 3, Vavol of Gandhinagar, Kadi, Kalol, Randheja, Mansa, Chandkheda.

(c) Few parts of Ahmedabad: Gujarat University area, Bodakdev, Thaltej, Vastrapur, Satellite area, C G Road, Ashram road, Maninagar.

As it was a random survey so no specific criteria were planned for deciding the study area except that the investigator tried to survey as many different areas as possible for variable data collection.

**(3) Selection of Subjects –**

Generally the mean menarche age of an Indian female is 13.5 years (Dawn, 1980) whereas mean age at menopause ranges in Indian women from 40.32 to 48.84 yrs (Sharma *et al.*, 2007). Again the premenopausal years (35 to 40 years of age) experience turmoil of large number of physiologic changes. Women aged 40 - 60 years show changes in hormonal levels for example increases in LH (Dawn, 1980) and increase in FSH (MacNaughton *et al.*, 1992). Thus opting for age groups 13 to 36 years was most appropriate in present research. At the same time it helped avoid confusion and differential diagnosis of pre menopausal and menopausal symptoms to that of PMS. Above all, 13 to 36 years age fall in the reproductive phase of a lady which turns out to be the best period of study for detailed analysis of PMS. Apart from the age, number of other criteria were affixed to ensure a nearly error free study.

**Inclusion criteria for Study Sample:**

(1) Only those subjects in whom menstruation cycle had started were interviewed.

(2) Generally subjects having regular menstrual cycles of 21 to 35 days were preferred for the study.

(3) All those who had normal health from last 3 to 6 months prior to the interview and falling in the age group between 13 to 36 years were included irrespective of their socio-demographic backgrounds.

**Exclusion criteria for Study Sample:**

(1) Those who were undertaking any medication related to menses, gynecological or medical conditions.

(2) Hormonal interventions within last 3 months prior to the interview.

(3) Those subjects who were taking contraceptive pills were not undertaken for blood tests and sonography.

(4) Those with physical disorders severe enough to warrant treatment

(5) Those with any chronic major mental illness

(6) Those that were not menstruating at all or were pregnant were excluded.

(7) Those who or their family members are having some unusual medical history.

## (II) Study Instruments

In order to obtain unbiased and appropriate data, following questionnaires were used. All the questionnaires were in English language and were prepared after appropriate content – analysis on the subject.

**(1) PMS Questionnaire**

To collect exhaustive information of study subjects, a comprehensive questionnaire *(ANNEXURE - I)* was prepared with six major sections *(A, B, C, D, E, F)*, after studying the already established literature on PMS and from the pilot study undertaken at the beginning of this research. Respondents were made aware about this research project, PMS phenomenon, and the questionnaire. Later, personal unstructured interviews were conducted with the consent of the subjects and details were filled in this questionnaire.

The first part of the tool consisted of general profile of the subject like age, job, education, marital status, health status etc. In the second part, details regarding their family members, economic status of

the family, diseases prevailing in family etc. were noted. Detailed marital status of the respondent (including family planning and pregnancy details) and their dietary information were jotted in part third and fourth respectively. As PMS is directly related to menstruation, subject's mother and their own menses history like number of days, regular / irregular periods, blood flow, pain factor etc., was also taken as fifth main factor of the questionnaire. The last and final part was the most important one wherein PMS symptoms – (a) 31physical and (b) 23 behavioural and psychological symptoms were listed. Through these 6 sections investigator has tried to collect detailed history of the subjects to help differential diagnose PMS which includes such symptoms that can coincide or mimic with other physical and or psychological disorders (Pearlstein and Stone, 1998, Connolly, 2001).

**(2) <u>Shortened Premenstrual Assessment Form (SPAF)</u>**

There are many ways and means of analyzing PMS as described earlier in *CHAPTER -1*, *TABLE - 6 and TABLE - 7*. Apart from a detailed PMS questionnaire *(ANNEXURE – I)*, a quick yet reliable tool which can measure, verify and quantify distinct and relatively stable set of symptoms, was needed in this research. Allen and his group designed a

shortened ten questions' assessment form from an already valid instrument namely Premenstrual Assessment Form (PAF) of 95 items which demanded extensive periods of time to complete. They practically executed and checked the validity and internal consistency of this Rating Scale. As this 10 - item SPAF *(ANNEXURE - II)* suited the study design which precludes the 95 - item PAF, it was adopted for research ahead. In addition to this, SPAF served to be a vital instrument in judging the intensities of PMS symptoms.

Here, each symptom out of ten symptoms was provided 1 to 6 scores where 1 means no change and 6 means noticeable extreme change. This Proforma was used as a Self – Judgment Form and all the subjects had to rate the symptom severity as per their experience. Before filling up this Proforma, PMS, its symptoms and how to rate them was explained in detailed to the subjects.

**(3) <u>Proforma for Doctors</u>**

Gujarat as well as India is a core place of various types of alternative, holistic healing methods and various medical approaches. People prefer Homeopathy, Ayurveda, Herbal Medicines, Acupressure etc., more than Allopathic Medicines for cure and prevention of diseases.

Present study also attempted to gather facts related to remedies and healing methods of PMS from 50 Health Professionals. Those Medical Practitioners who had an experience of at least five years in their field were included in this study. All of them were interviewed personally with the help of a Proforma *(ANNEXURE - III)* which was prepared under the guidance of few such Medical Professionals. Ten simple open ended questions like what type of complaints lady patients come with, what medicines and alternative therapies these Medical Professionals suggest, what could be the cause of PMS etc., were asked.

**(4) Proforma for Mothers - Teachers**

For the perception of the most realistic scenario regarding various premenstrual aspects prevailing in the society 30 mothers and 20 lady teachers were interrogated with the help of a short Proforma *(ANNEXURE - IV).* Only those mothers who had menstruating daughters and only those teachers who frequently came across female students of menstruating age were included for present study so that their experiences could be utilized. Just like the Proforma for Health Professionals *(ANNEXURE – III)*, here too, open ended direct questions, eight in number, were included. Answers to questions such as what kind

of complains girls do, what guidance or suggestions teachers / mothers provide, what are their observations etc., were obtained through non – directive interviews.

## (III) Method of study

All the aspects of the research satisfy human ethical principles. All the respondents were made to understand the purpose of this study and were assured of the confidentiality about their identity and personal information especially those who participated for clinical tests (Blood tests and Sonography). Besides them, prior to the conversation, all the health professional, mothers and teachers were also assured of not disclosing their identity and were given appropriate respect as participants. Only after the due consent of all these (subjects, doctors, mothers and teachers) dialogues were conducted. Quantitative research approach with descriptive design was followed for this research as a major aspect.

**(1) <u>Pre study activity</u>** –

Before this investigation was conducted, a small pilot study of 25 subjects was undertaken to do most error free data collection through survey with the PMS questionnaire. Few required changes from

the experience of this study were made to the design of this work, methods of data collection, tools for the same etc. Guidance of few experienced Gynecologists was also taken in planning the blood tests and sonography of the subjects. This study showed that women with low level of education and young school going girls had difficulty understanding certain items of questionnaire. Therefore here, the interviewer read each item, explained and ensured that respondent understood it well before jotting the information.

**(2) Survey and Follow –up Interviews** –

Cross – sectional random retrospective descriptive survey was conducted in different parts of 3 cities of Gujarat as mentioned in Study area above. Direct face to face dialogues were conducted during the first meet with the respondents. Later, most of these subjects were followed time to time and their PMS symptoms, general health, menstrual regularity etc., were verified usually in person, or sometimes by telephone and at times, even through emails.

**(3) Hematology, Hormone assay and USG study –**

To understand the role of hormones in PMS and to know the conditions of ovaries and uterus for general health and during luteal

phase, 60 subjects were undertaken for hematology, immunoassay and ultra sound sonography (USG) after their due consent from the whole study sample (n = 720). These tests were also required to rule out the possibility of other disorders (Johnson, 2004 and Bahamondes *et al.*, 2007). Single blood samples were taken during luteal phase (during the 10 days prior to the expected date for the onset of menses) of the menstrual cycle. Serum levels of Ovarian hormones – Estradiol and Progesterone, Pituitary hormones - LH, FSH and TSH, and Thyroid hormones - $T_3$, and $T_4$, were checked from the blood samples along with complete blood count (CBC) with the help of internationally recognized instruments like **Siemens ADVIA Centaur CP Hormonal Assay System** *(PLATE – 2)* and **Beckman Coulter AC·T$^{TM}$ 5 DIFF AL Analyzer (Cell Counter)** *(PLATE – 3 and TABLE -9)* respectively. Also for this, internationally accepted standardized procedures were implemented. All these tests were undertaken with the help of Doctors and technical staff at Desai Metropolis Pathological Labs Pvt. Ltd, Surat Branch of NABL (Certificate No. M – 0009), ISO – 15189: 2007 and CAP -2005 accredited METROPOLIS Health Services (I) Ltd., Mumbai.

During this same period of luteal phase of these subjects, lower abdomen ultrasound sonography (USG) was undertaken either with the help of city's renowned Radiologists Dr. Ninad C. Shah at Rays Digital X-ray, Sonography and Colour Doppler Centre, Surat or by Dr. Sunil O. Banka, Om Diagnostics Digital X-Ray, Sonography and Mammography Centre, Surat as per the suitability of the subjects. All the sonography were done using internationally branded instrument **ALOKA Ultrasound Diagnostic Equipment SSD – 500** *(PLATE – 4).*


**Plate – 2**

**ADVIA Centaur CP Hormonal Assay System**

**It is a two-site sandwich immunoassay using direct Chemiluminometric (CLIA) technology.**

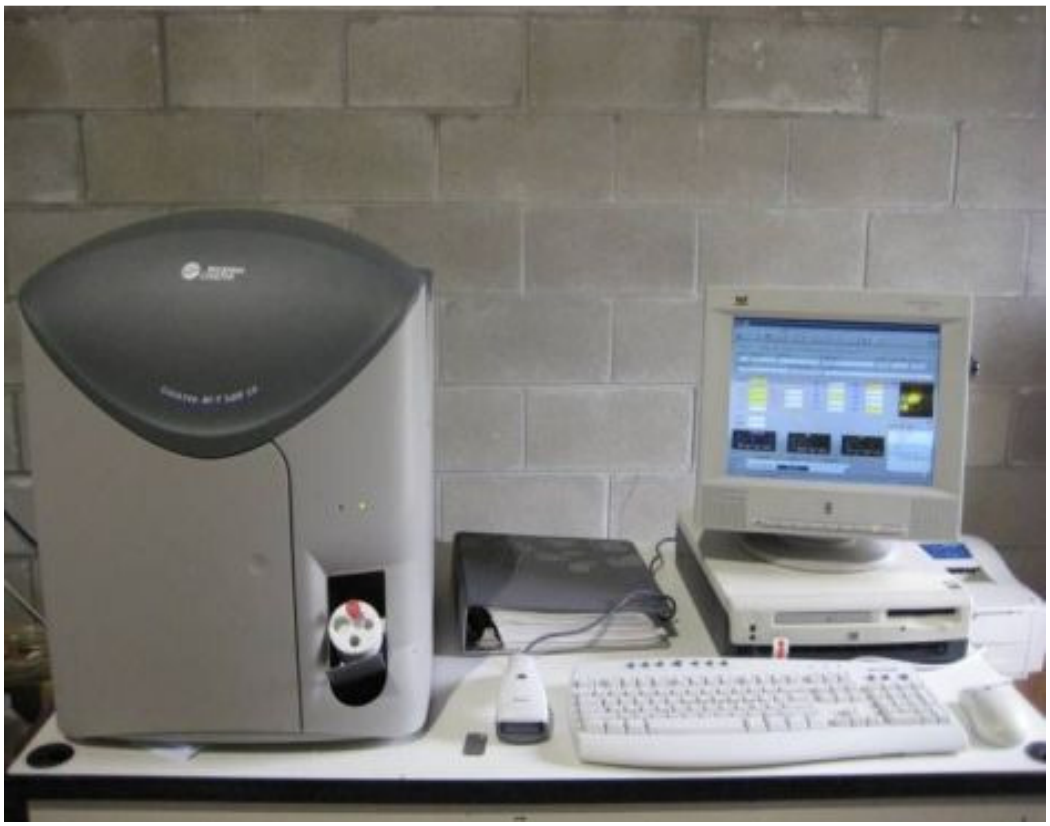


**Plate – 3**

**Beckman Coulter AC· T$^{TM}$ 5 DIFF AL Analyzer (Cell Counter)**

**A fully automated hematology analyzer providing a 5-part white cell differential.**

**TABLE - 9 Differential Measurement Technologies For Cell Counter**

| Fluid Dynamics | Technology | Measurement | Differential Output | Methods |
|---|---|---|---|---|
| Dual Focused Flow Aperture | Absorbance cytochemistry and Volume ($A^CV$ Technology) | Light Absorbance of Cytochemically stained cells Volume vs. Count | Lymphocyte Monocyte Neutrophil Eosinophil | Methods of Sheenan *et al.*, (1947) and Kass (1981) |
| Volume Aperture | Differential Lysis | Volume vs. Count | Basophil White CellCount | |


**Plate – 4**

**ALOKA Ultrasound Diagnostic Equipment SSD – 500**

Equipment uses electronic convex and electronic linear probes. These probes possess row of vibrators in their scanning section. A fixed number of vibrators constitute a block which transmits and receives ultrasound waves. These vibrator blocks are electronically switched in sequence in order to produce a slice image.

## (V) Definitions for the present study

**(1) PMS:** Every month, prior to the onset of menses a state of 7 to 10 days occur wherein lady experiences various physical, behavioural and psychological changes which disappear with the start of menses. This state is known as PMS. Even if she is suffering a single symptomatic change, she is ought to be a PMS sufferer.

**(2) PMDD:** When PMS symptoms especially the psychological – behavioural symptoms like anger, irritation, mood swing etc., are not only experienced severely but for a longer duration compared to PMS symptoms, such that it surely interrupts the normal life of a woman to a very great extent, then it is PMDD.

**(3) Regular Menstrual Cycle:** 21 – 30 days cycle was considered to be regular. A shift (early or delay) of 7 days in the expected menses date was regarded to be normal and regular.

**(4)Luteal Phase of Menstrual Cycle:** The phase of menstrual cycle, ten to seven days prior to the onset of Menses, is the luteal phase.

## (VII) Statistical Evaluation

Statistics is a powerful and sensitive tool for an investigator for systematic observation and measurement of a phenomenon. It ensures

determination of accurate results. Thus the presently collected data was analyzed using both descriptive and inferential statistics. For organizing, processing, analyzing and summarizing the data, **Microsoft Office – Excel 2007 and IBM Statistical Package of Social Sciences (SPSS) version 20** for Windows Version 2007 were used.

All the graphs and tables were prepared in Excel worksheets while to check the existence of associations and correlations between different variables and to test the significance of the same statistical tests **like Independent Student's t- test, Chi – square test, Pearson's Correlation and analysis of variance (ANOVA)** were done using SPSS software. Along with these frequencies, means and averages, percentages etc., were also calculated wherever necessary.

## (VI) Limitations to the Study

As the present study depends on the response of the subjects, a low degree of error may be present which should be neglected. Respondents' mood, capacity to perceive and interpret a question, expressing their experiences in correct manner and words etc., do affect to some extent. Even though enough care was taken to remain unbiased

yet, there are chances of subjective influence of the investigator and human limitation of interpreting the information.

For second and third time follow – ups no. of subjects could not be included due to their pregnancy, unavailability, lack of time, change of residence, being out of town, change in phone nos., getting married, etc. Due to limitations of monetary aids and as the study was based on women of Indian society who are culturally and socially bonded to certain dogmas and beliefs, no post menstrual blood tests or sonography could be conducted for further comparisons. This was also one of the reasons that lab tests were limited to 60 subjects and hardly any subject was below the age of 18 years.

# Socio-Demographic Profile of the Respondents Chapter 4

# SOCIO - DEMOGRAPHIC PROFILE OF THE RESPONDENTS

# CHAPTER 4

Humans are social animals. They live in organized societies and create a milieu unique for themselves; these societies often grow to become identified with geographic areas and cast their indelible dominance over the mind, body and life of a person. Social environment of a person creates a fix mould for that individual to grow and develop as a civilian. Also, it defines an individual's characteristics like mannerisms, dressing, food habits, marital aspects and customs, cultural beliefs and attitudes, religious dogmas and so on. Thus if we neglect the study of social, religious, ethical, economical and cultural facet of an individual, we can never reach to the root of a problem. Further health status and socio-economic status are important dimensions of an individual's well being (Ardington and Case, 2010). So, to derive valid conclusions, it is absolutely crucial to study medical problems like PMS in the context of the socio – demographics of the respondents (Uncu *et al.*, 2007 and Christian *et al.*, 2011).

In addition, a demographic context is inevitable for a study set in a feminine framework, especially when she is the part of age - old cultural heritage India where religion overpowers even today. India has a unique cultural pluralism where superstitions co – exist with science and even today people in various parts of country live in different centuries (Sheth, 2006)! Moreover, most of the world societies are male dominating including India which is even more orthodox, rigid and conservative in matters of women in particular. Furthermore, it is also important to study the women in socio - demographic context, as they are closely related with regards to perceptions-positive or negative (Liu and Eden, 2007; Christian *et al.*, 2011).

Number of studies have concluded that a person with premenstrual problems may have strong psychological and socio – cultural determinants (Thomas and Narayanan, 2006). Besides biological determinants of PMS, one must identify and consider psycho-social factors to improve our understanding of this phenomenon and for developing effective management strategies. However it's worth mentioning at this juncture, that there are few studies available on socio – demographics and menstrual problems and further, hardly any studies are

available on socio – demographics and PMS with respect to Indian women.

In understanding the impact of all these factors, this chapter brings forth socio – demographic and economic status of the respondents. The ethnicity of respondents undoubtedly plays a covert yet potent role in defining their health status. This chapter will surely give a closer view of the surroundings of these respondents and therein lays the triggers for certain factors which make these respondents more vulnerable to PMS.

At the time of personal interviews of the respondents (henceforth referred to as subjects) during the survey work, this data was collected using PMS questionnaire *(ANNEXURE – I)* wherein questions related to these areas were already framed in sections like General Profile, Family details, etc. Also, many respondents shared their personal matters, family problems, marital life etc. with the investigator besides the questions asked to them. This chapter tries to present all such observations to help paint the actual picture of subjects.

## (I) Education and job status of the respondents and their family members

In any society, education is a reasonable indicator of development and is essential for better quality of life (Gudipudi, 2010). Education is the only tool which can help change a person's mindset and bring more awareness in the society. It develops thinking capacity, influences decision making and judgmental qualities of a person. Sharmila and Dhas (2010) have correctly stated that "Education for women is the best way to improve the health, nutrition and economic status of a household that constitute a micro unit of a nation's economy". With reference to the same, when analyzed in present study, 58.75 % (423 / 720) respondents had completed studies whereas 41.25 % (297 / 720) were still pursuing education. Below mentioned data in *TABLE – 10* clearly indicates that the number of subjects who had completed high school education, college education or university education was much high as compared to the generation of their parents particularly mothers and only 6 subjects were found illiterate, which indeed is a matter of pride. This certainly indicates that in a nation like India where after independence only a little more than one third of women are literate

(Karlekar, 1998), it is noticeable that there is remarkable reform in literacy rate of women in Gujarat (Surat, Gandhinagar and Ahmedabad) (Sujay, 2009).

But the educational profile of husbands was not found satisfactory as compared to the subjects. At the same time, it was bothersome that 21 subjects were ignorant of their mother's education and 26 did not know that of their father's! This does raise question on the family bonding and interaction of subjects with their parents.

**Table - 10 Educational Profile of subjects and their family members**

| Education level | No. of Subjects | No. of Mothers of the Subjects | No. of Fathers of the Subjects | *No. of Husbands of the Subjects |
|---|---|---|---|---|
| Illiterate | 6 | 75 | 19 | 1 |
| Primary Education till class 7 | 22 | 183 | 80 | 6 |
| High School Education till class 10 | 159 | 228 | 193 | 61 |
| Higher Education till class 12 | 144 | 100 | 133 | 91 |
| Graduation (Completed college education) | 276 | 96 | 220 | 150 |
| Post graduation (PG) | 110 | 17 | 45 | 49 |
| Higher education more than PG | 3 | 0 | 4 | 2 |

| | | | | |
|---|---|---|---|---|
| **Subjects had no information about Education of parents** | **Nil** | **21** | **26** | **Nil** |
| **** There were 360 / 720, married subjects in this study*** | | | | |

Also, when asked about the work profiles, number of woman were found to be happily engaged in multitasking that is handling family responsibilities along with professional work. There were 24.58 % (177 / 720) working women and 40.69 % (293 / 720) students. Remaining 34.72 % (250 / 720) were house wives. Few were found engaged in stitching – sewing, giving tuitions, running beauty parlours from their homes itself while others were doing job in teaching profession, banking services, private companies etc.

Investigator observed that these working women were more agile and confident due to enough exposure in work environment, as compared to those who were at home. But housewives suffer more anxiety (Mukhopadhyay *et al.*, 1993) and are more prone to suffer depressions than working women (Soomro *et al*, 2012). In both cases, both the factors – stress and depression can create psycho-somatic health problems for women and may lead to more or intense PMS symptoms.

When similar study was carried out for subjects' mothers, it was noted that 85.27 % (614 / 720) subjects had mothers as home makers while 14.72 % (106 / 720) subjects had working women as their mothers. The work profile of fathers and husbands can be studied from below *TABLE – 11*.

**Table - 11 Job Profile of Father and Husband of the subjects**

| Job Profile | No. of Father of the Subjects | No. of Husband of the Subjects |
|---|---|---|
| Job (in private or government sector) | 359 | 189 |
| Business | 220 | 113 |
| Farming | 68 | 4 |
| *Others | 77 | 50 |
| Not working | 0 | 4 |

*** Jobs like auto rickshaw driving, tailoring, wireman, carpentry etc.**

## (II) Economic Status of the respondents

From the above job profiles one can easily congregate economic status of the study subjects. To mention, 62.5 % (450 / 720) female respondents came from economically well do to families, who were earning more than 10,000 Rs. per month while 4.86 % (35 / 720) had source of income below 5000 Rs. per month. Details of the same can be noted from *TABLE – 12*. It can be concluded that most of the subjects

belonged to middle class families or upper middle class families.

At this point one cannot neglect the words of Girma and Genebo (2002) that, economic status helps predict access to quality food and better health services from the point of nutritional status. Availability of enough nutritious food surely determines health status. As most of the subjects possess high economic status, they are less likely to be a part of malnutrition and related health problems.

**Table - 12 Family Income of the Subjects**

| Income/month (Rs.) | Less than 5000 Rs. | 5000 Rs. | 5000 to 10,000 Rs. | 10,000 to 20,000 Rs. | More than 20,000 Rs. |
|---|---|---|---|---|---|
| No. of Subjects (%) | 35 (4.86) | 36 (5) | 199 (27.63) | 239 (33.19) | 211(29.30) |

## (III) Religion and Casteism

In the present subject population majority were Hindus, 90 % (648 / 720) while few 5.69 % (41 / 720) were Jains and 3.61 % (26 / 720) Muslims, whereas only 0.69 % (05 / 720) were Christians by religion. The castes and sub castes of Brahmins and Patels were a major group of this study.

Religion plays a key role in imposing certain customs on women particularly, for example observation of fast *(Upvas)*. Doing fast is a common custom for various religions like Muslims observed *Roza* for a month, Jains do *Athai Tap* and *Paryushan parva* and Christians observe *Lent* for 40-50days before Easter. Here fasting due to cultural pressures, religious beliefs or family force (particularly mothers, mother – in – law or some religious guru) was found very common amongst these subjects. Periodic fasting *(Upvas)* was seen more in married adult women as an intricate part of regular traditions. They observe a fast atleast twice a month on particular days like *Ekadashi, Chauth* or *Agyaaras* as per Hindu calendar *(Panchang)*, which have high religious – spiritual significance. The younger group was also not unaware of fasting on name of God or goddess. Girls in age groups 13 to 23 years were also found to skip meals after a particular deity for the betterment of their future, success in studies and exams, etc. In present study, 31.66 % (228 / 720) subjects observed fast atleast once a week. Out of these, 25.55 % (184 / 720) subjects did fasting once a week, 5.41 % (39 / 720) twice a week and 0.69% (5 / 720) subjects observed fast more than 2 times per week.

Again, religion has its dominating interference even in how to manage menstrual days by a woman. During the survey, number of menstrual myths and religious dogmas were observed. The *TABLE - 13* below indicates this fact clearly that even today Indian women are made to succumb to certain rituals. Interestingly, none of the subjects had any idea that why restrictions were imposed on them during menstrual days. The only answers obtained were, that we were taught to do so by our mother, mother – in – law or simply because of family tradition". They were made to believe that they need to be "quarantined" due to the impurities coming out of their bodies in such days and other such baseless dogmas.

Thus a definite class of women is still staunch believers of age old myths and is suffering lack of scientific knowledge with respect to their period problems. However, none of the subject ever shared of being told of PMS by their religious gurus, or in their holy scriptures. They had gained lot of downbeat things about menses from their elderly ones and thus had become negative towards phase of menses. However, they were never given any information about PMS from their mothers or other family elders and thus hardly anyone knew what PMS was. Though

PMS was not known as a phenomenon to them, they could very well sense the phase when explained and interrogated during the interview. But still, there were subjects, though very few who had read a little of PMS in popular columns of magazines or newspapers or had heard of it on some television shows.

**Table - 13 Taboos Practiced**

| Taboos Practiced by subjects during menses days | No. of Subjects (n = 720) (%) |
|---|---|
| Abstinence from cooking and staying away from family members and not touching anyone( sleeping, washing one's own clothes, use of utensils, food, water etc separately) , not to play with anybody, do not eat certain food items, as it is believed that her touch is impure during this time | 205 (28.47) |
| Abstinence from worship and going to Temple / Mosque | 421 (58.47) |
| Does not touch Pickles as it is believed it gets spoilt | 43 (5.97) |
| Other social – cultural – religious customs | 19 (2.63) |
| Does not follow any cultural customs as very young babies at home to look after, nobody to help in those days, nuclear family system, jobs etc. | 85 (11.80) |

One of the studies on 320 women of Kerala – India, undertaken by Thomas and Narayanan (2006) has reported statistically significant correlation between women of higher socio- economic strata to that of prevalence and severity of PMS. In their research work, they

found notable correlation of all the indices of socio-economic status (viz., educational status, occupational status, source of stable income, personal income, income of husband, composite score on socio-economic status, and membership in social organization) higher in the high scorers of premenstrual distress. When this is compared to present study, one can conclude that most of the respondents are educated females coming from higher socio – economic stratum that is their profile is very close to that of these study subjects from Kerala. And just like keralite ladies, these subjects are likely to suffer more PMS.

## (IV) Family System

Larger group of subjects came from nuclear families, 59.16% (426 / 720). Even though joint family system is one of the characteristic of Indian society, it was strange to find only 40.83 % (294 / 720) subjects living in joint family system. The prevalence of a dominant family ideology strictly demarcates definite roles and obligations for girls and women leads to their devaluation and marginalisation. The basic assumption in most of the Indian families, is that girls are inferior, physically and mentally weak, and above all, sexually vulnerable (Karlekar, 1998). Studies have even observed that, women's general

health and well-being is often not a high priority for the family, which was noticeable in this research work too (CHS and TISS workshop report, 1998; http://www.womenstudies.in/elib_public_policy1.htm).

When one looks into the number of siblings of these respondents, there were 22 subjects who had no siblings, that is, they were the only child of their parents. Most of the subjects had two siblings. This was found more in Jain and Muslim families and in those families who wanted a male – child. Also, it should be noted that many families still prefer sons over daughters and so, number of subjects had their youngest sibling – the boy! There is strong prevalence of girl infanticide in certain castes and creeds (Chager *et al.,* 2010).

Apart from this, studies have shown that children are subject to selective neglect in nutrition, morbidity and health care access depending on their gender and birth order. Chaudhuri, (2008) also supports this thought. In his work on sibling rivalry and child health, he mentions that Becker's pure investment model suggests that those siblings that have less competition from other siblings will tend to do better. A detailed overview about the birth order and number of siblings of the subjects of present study can be noted as mentioned in *TABLE – 14*

below. One might think that what can birth order and numbers of siblings have to do with PMS, but at this point one should remember that such factors play key role in physical development of girls, which surely matters how they will perceive certain health problems and diseases. Also, the inequality averse of parents and society leave a permanent psychological impact on the young minds of growing girls creating self constraints and making them sacrificial.

**Table - 14 No. of Siblings and Birth order of the subjects in the family**

| No. of Siblings | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| No. of Subjects possessing these siblings | 201 | 267 | 133 | 59 | 20 | 10 |
| Subjects' birth order amongst her siblings | Eldest | Middle | Youngest | | | |
| No. of Subjects | 304 | 236 | 158 | | | |

## (V) Marital Status and married life of the respondents

In this random mix group 49.72 % (358 / 720) respondents were married while 50 % (360 / 720) subjects were unmarried and 0.27 % (02 / 720) was divorcee. As the age group of 13 years to 18 years is that of young adolescent girls, it was obvious they were unmarried. But apart from them, only 1 case in each age group – 19 years and 20 years

were found to be married. Also, very few married girls in age groups 21, 22 and 23 years were observed. This shows that largely girls in Gujarat are not much insisted for marriage in early ages as compared to other states of India (Sujay, 2009) however few were found engaged in early age. This surely depended on the caste and creed to which she belonged. Yet, many subjects had enough space for overall development, to study, make career, etc. Also, girls were found to be stepping out, away from their homes, for education, job and career purposes with the support of their families. But yes, of course once again community matters here and that's why in few cases, girls were even sent for high school education and colleges in better places from their villages with the help of resources provided by their community organizations and associations *(mandals)*.

More than half of the married study sample - 53.05 % (191 / 360) made use of contraception whereas there were still a considerable number of subjects - 23.47 % (169 / 360) who never used contraception. But inspite of good literacy rate in study subjects, they were found to be more non-scientific in use of contraception and suffered number of myths. There were 14.44% (52 / 360) who got intrauterine device (IUD) implanted and 13.61 % (49 / 360) subjects underwent tubectomy. Oral

Contraceptive Pills (OC pills) were used by 20.55 (74 / 360) while in 14.44% (52 / 360) cases husbands used condoms.

## (VI) Awareness and Hygienic practices related to menstruation

Majority of the subjects, 53.47 % (385 / 720) were aware of menstruation before their menarche *(TABLE – 15).* But this certainly does not mean at all that they fully understood the physical and physiological process of menses nor they were mentally prepared for the first period (Dasgupta and Sarkar, 2008; Mahon and Fernandes, 2010). Additionally, Kumar and Srivastav (2011) states, 'cultural and social practices regarding menstruation depend on girls' education, attitude, family environment, culture, and belief.' But in the present research work, inspite of good formal education of respondents, it was found that only 4.58 % had gained proper scientific education from teachers and school seminars about menses and its related issues! Rest of them comprehended basics of menses that too very casual and mostly from their mothers or else from various peer groups and relatives *(TABLE - 15 and TABLE - 16).*

| Table - 15 Information about Menstruation | |
|---|---|
| | No. of Subjects (%) |
| Prior information | 385 (53.47) |
| No prior information | 335 (46.52) |
| Scientific information | 33 (4.58) |
| Casual Information | 687 (95.41) |

| Table - 16 Source of Information for Menses | |
|---|---|
| | No. of Subjects (%) |
| Mother | 403 (55.97) |
| Sister | 88 (12.22) |
| Friend | 139 (19.30) |
| Teacher / Educational Seminar / workshop | 30 (4.16) |
| Relatives (Aunty, Cousins, Brother's wife, grandmother) | 57 (7.91) |
| Books/Magazines/ Newspaper | 03 (0.41) |

Unfortunately, mothers' state, of majority of the subjects was even more amateur and confined to cultural as well as religious dogmas related to menses. Drakshayani Devi and Venkat Ramaiah (1994) found similar inferences in their study on menstrual hygiene in Andhra Pradesh, India. The other unauthentic sources like relatives, friends, siblings etc were still poorer to provide correct facts related to

menses. This kind of improper incomplete information increases misconceptions about menses. Also, for the young girls, the distress, shock and trauma of first period remain unaltered and permanent. Such mental hitch may grow further with number of menstrual cycles and end up into permanent complicated psychological trouble which may develop some psycho – somatic symptoms too. Such females are more likely to suffer PMS.

Moreover, this set – up clearly indicates that by no chance these subjects ever came across information related to PMS. Also, they won't be able to provide appropriate information on PMS to their progenies further.

Investigator grasped during the interaction with the subjects that subjects' communication with their mother does not seem to be very intimate as few could answer all the questions related to their mother's menstrual history to the point of satisfaction *(TABLE – 17).* At the same time it was quiet striking that subjects could answer more about menopause of their mothers and it is worth to note that many of the subject's mothers had got their uterus removed at the very onset of menopause. But still, there is remarkable communication gap between

mother and or parents and daughters in matters of sex education and core health issues. This raises an important question of concern at this point that when menses is taken so casually, would these people have a mindset to understand PMS? When the first basic information of menses is obtained from unauthentic sources, how can we expect PMS awareness?

**Table – 17 Outline of Mother's Menstrual History**

| Questions asked to the subjects regarding their mother's menstrual history during survey | No. of subjects (%) unaware of their mother's menstrual history |
|---|---|
| Pattern of menses (Regular or Irregular) of the mother | 70 (9.72) |
| No. of menstrual days of mother (less than 4, 4 or more than 4 days) | 286 (39.72) |
| Mother had painful menses or not | 182 (25.27) |
| Mother's menstrual bleeding was scanty, normal or heavy | 261 (36.25) |
| Mother was taking any medicine for menstrual problems. | 112 (15.55) |
| | |

Other than this, studies have established that there are possible chances of menstrual synchrony between mothers and their daughters (Weller and Weller, 1993). A positive association between

mothers and daughters in menarcheal age, parity and desirability of pregnancy has been found as well (Pouta *et al.*, 2005). Also, there are reports of significant correlation between mothers and their daughters about menstrual cycle characteristics. A mother's Perimenstrual experience may be predictive of her daughter's experience (Robinson, 1995). Hence, mother's menstrual history can be of much help. *TABLE – 17* reveals the number of subjects ignorant of their mother's menstrual history.

The subjects in the present study clearly lacked awareness and this is a significant finding as many studies have confirmed effective awareness does help in reducing PMS symptoms to certain extent (Seideman, 1990; Kirkpatrick *et al.*, 1990; Chau and Chang, 1999). Also, such knowledge allows better understanding, creates a positive self – concept and inculcates positive attitude towards menstruation related symptoms, health – related issues, PMS self – care measures and general well-being (Halas, 1987; Chau and Chang, 1999). Apart from the ignorance related to menses and PMS, many misconceptions and myths also thrive regarding food, dietary habits, menopause, contraception particularly use of copper – T etc.

However, hygienic practice seemed to be better in case of subjects as compared to their mothers *(TABLE - 18)* and there was not much great a difference between numbers of subjects using cloth rags and sanitary pads. However it is shocking that even today when multimedia has reached poorest of poor in Gujarat, there are women who don't use any kind of pads. Also, very few subjects were found to be using some cheap synthetic washable cloth material which was new to this study.

**Table - 18 Hygiene Practices observed during Menstrual Days**

| Material Used | Subjects (%) | Mothers' of the subjects (%) |
|---|---|---|
| **Sanitary Pads** | **308 (42.77)** | **64 (8.88)** |
| **Cloth pieces or rags** | **333 (46.25)** | **528 (73.33)** |
| **Both** | **77 (10.69)** | **23 (3.19)** |
| **Not using any kind of pads** | **02 (0.27)** | **01 (0.13)** |
| **No information available** | **--------** | **104 (14.44)** |

For both type of subjects one using rags or cloth piece and the other using readymade sanitary pads, there is always a question of managing menstruation hygienically and with dignity due to such social - cultural environment. Even in their homes, a culture of shame forces

women to find well-hidden places to dry the rags. These places are often damp, dark and unhealthy. This practice is responsible for a significant proportion of illness and infection associated with female reproductive health. Science has established that rags that are unclean cause urinary tract infection (UTI), reproductive tract infection (RTI) and pelvic inflammatory diseases (PIDs) (Nemade, 2009; Rokeya and Kabita, 2008; Mahon and Fernandes, 2010). Very often serious infections are left untreated whereas those using pads face trouble of disposing it correctly and properly. There were 5% (36 / 720) subjects suffering from itching in vagina, 8.75% (63 / 720) had leucorrhoea and 1.66 % (12 / 720) had urinary tract infection (UTI) in this research work.

## (VII) Attitudes and Perceptions of the respondents

It is for sure that Indian women psychology is deeply influenced by the social customs she is demanded to follow whether married or unmarried. Also, the stress level and anxiety that these subjects face seems to be much higher due to the narrow minded social makeup where we live as compared to the broad minded societies of European countries. Freedom of thought and decision making qualities were not noticed to satisfactory levels which was clear when questions

like are *you satisfied with your married life, what are you goals and ambitions of life,* etc were asked. Lack of self – respect and confidence, inferiority complex, ignorance, low – depressive approach towards one's own health and little spirit for living life were observed to a great extent. Many were unable to answer their blood groups, likes and dislikes and at times even negligible things like their complete proper residential postal address, etc,.! It seemed and many confessed too that their existence was limited to their family that is kids, in –laws or parents, spouse and house.

In between all this, it was strange enough to find that 84.02% (605 / 720) subjects claimed that they are extrovert by nature while only these 15.97 % (115 / 720) subjects reported to be introvert. If we believe that such a large group might be of extrovert nature, then it's even grimmer to conclude that there is exchange of thoughts on all sorts of topics but for them, their menstrual problems, reproductive aspects or other health issues are never a part of discussion! Can we expect any kind of PMS awareness here!?

When asked what they like to do in leisure time or do they hobbies, it was observed that 21.52% (155 / 720) didn't had any such hobbies while majority 78.47% (565 / 720) subjects who supposed that

they were involved in some hobbies, answered that they love to freak out, roam around, get dressed up and go to hotels for food when free, or simply gossip / chit – chat with neighbours or friends and pass the time. Actual hobbies like reading books, crafts and arts, cooking, stitching and sewing etc were observed less and generally with the adult ladies of above 30 years of age. Young adolescent girls were more involved in listening to music or watching T.V. rather than recreational activities like outdoor sports, reading good books or learning some kind of arts.

In a developing country like India where malnutrition and anemia are major problems with this gender, **66.94 % (482 / 720) were unaware of their Hemoglobin status.** Atleast one must know their blood group, so that in times of emergency, they can be taken care of, but here **31.11 % (224 / 720) subjects were ignorant of their blood groups.** It was found that unless any sickness or health problem reached certain severe unavoidable state, these women never consult for medical help or guidance. And if they ever visit a Doctor, they hardly follow the instructions and take prescribed medicines. This clearly indicated the sadist attitude of these subjects towards one's own self.

The fabric of the Indian society is not easily permeable to diagnostic tools like laboratory tests and sonography. At the same time, ladies of certain community were hesitant and ashamed to go for sonography. It was also tuff convincing possessive and dominating husbands for undertaking blood tests or USG. There exist huge annoyance, deterrence and embarrassment regarding sex and talks related to it. Subjects became skeptic towards the investigator when asked about their sex life, sexual urge before, after and during menstrual days.

From the discussion of all the facets of socio – demographics of the subjects of present study, **one can conclude that may be these factors might not be the main, direct and strongest causes for PMS, but somewhere to some extent they definitely intensify and develop propitious environment for PMS sufferance.** It is very correctly said that a person's health is influenced by four factors i.e. income, lifestyle, environmental population and occupational risks and the quality of available health care (World Development Report, 1996; Mahto, 2007). The health status and prevalence of PMS is discussed in the further Chapter 5 - Results and Discussion.

# Results and Discussion

# Chapter 5

# RESULTS AND DISCUSSION

# CHAPTER 5

Present Study is truly the artifact of the sincere and best efforts invested by the researcher in unfolding the intricate nature of PMS. This effort contributes to enhance our understanding of this challenging issue and the magnitude of the effort is best evident in this chapter of results and discussion. Here, the researcher presents the interesting outcomes that depict various facets of PMS in the respondents of Gujarat. The work is solidly founded in appropriate statistical analysis, thorough reviews aided by tabulations and graphs as well as necessary explanation and justifications. Adequate measures have been taken to provide even the minutest detail to portray exact picture of PMS in Indian women. The points of focus are described at length under different topics and sub-topics as follows.

## (I) Study of General Health, Food Habits and Familial Health of the Respondents

WHO defined health in its broader sense in 1946 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." Health is the general condition of a person's mind, body and spirit, usually meaning to be free from illness, injury or pain (http://en.wikipedia.org/wiki/Health). It was the first requirement for this research work to be familiar with the general health status of all the respondents so as to identify any such health problem which may interfere in the study of PMS. To fulfill this, general health profile was included in PMS questionnaire *(ANNEXURE - I)* and respondents were interrogated for the same.

To begin with results and discussion, major mass of the study sample that is **98.05 % (706 / 720) respondents had good normal health and only 1.94 % (14 / 720) suffered some common illnesses** which kept them sick regularly. 2 subjects with High Blood Pressure, 7 subjects with Low Blood Pressure, 1 Diabetic, 1 with Rheumatoid Arthritis, 1 suffering from Colitis, 2 with Gall Bladder Stone, 1 respondent with Heart Problem, 1 subject with Macular Amyloidosis and

12 with Headache or Migraine problem were discovered during the survey. A very small portion of the sample that is 5.13 % (37 / 720) were inflicted with problem of Allergy due to some cosmetic product or dust or food item while a large number 94.86 % (683 / 720) of respondents do not have allergy.

There were only 3 cases that had a past history of Clinical Depression. Neither the subjects nor their closest family members were reported to suffer any genetic disorder. Freeman (2007) and Wittchen *et al.,* (2002) have stated that presence of even 1 medical or psychological problem can increase the risk of PMS by 2 times. Thus overall good health does matter to keep one away from problems like PMS and PMDD. However, it's worth mentioning here that investigator did not come across any scientific study related to the effect of these above mentioned health ailments on menstrual cycle or Premenstrual Syndrome (PMS). Apart from all these above, there were 6 cases of Polycystic Ovaries (PCOD), 3 with Fibroid Uterus, 2 subjects had Cysts in uterus, and 8 respondents with ovarian cysts, 5 ladies had mild free fluid in pelvis, 2 with Endometriosis and 5 with Thyroid gland problems.

Again, for PMS, predisposing causes may include alcoholism (Svikis *et al.*, 2006) or past history of sexual abuse (Paddison *et al.*, 1990). With reference to this, none of the subjects were found having alcoholic drinks but there were 2 subjects who took tobacco snuff *(Naka Chhikani)* and 1 subject was found to be smoking *(Bidis made with tobacco filled in Tendu leaves – Diaspyros melanoxylon).* Bertone-Johnson *et al.*, (2008) proved in their study on 116,678 US females that smoking may increase risk of moderate to severe PMS. However, as most of the respondents of this study are non-smokers this factor is unimportant here. Also, during the survey, no one ever complained or shared suffering sexual abuse of any kind. Additionally, none of the subjects were suffering from STDs (Sexually transmitted diseases). As described in previous *CHAPTER – 4* Socio – *demographics of subjects,* only few, particularly married women - 5 % (36 /720) complaint of itching in vagina, 8.75 % (63 / 720) suffered leucorrhoea and (12 / 720) were having UTI.

It should be noted that nobody had undergone any major surgery or operation which might lead to PMS. Although 15 subjects were operated for Appendix, 4 for Lactating Adenoma of breast and 1

underwent Thyroidectomy. Some subjects had also undergone minor operations for Piles, Fissures and Tonsillitis.

**Body Mass Index (BMI) of the respondents:**

Nowadays, health science is referring BMI to a great extent as a reliable, simple and quick tool to scan and predict matters of health. Body Mass Index (BMI) is, "a heuristic proxy for human body fat based on the ratio of an individual's weight and height" (http://en.wikipedia.org/wiki/Body_mass_index). To check the general health status of individuals participated in this study, this statistical tool-BMI was utilized. It was calculated and interpreted with the help of on-line calculator (http://www.cdc.gov/healthyweight/assessing/bmi/index.html) provided on the website by Centers for Disease Control and Prevention (CDC), an operating component of Department of Health and Human Services, USA.

From this, it was found that **health status of 52.36% (377 / 720) subjects was normal while 47.63% (343 / 720) possessed BMI values either below or above the normal standards.**

Further from *TABLE – 19*, one can find that very less number (5.69 %) of respondents has obesity which is a matter of delight.

Overall, even though the cases are less yet obesity is more in age groups 24 years to 36 years which are important reproductive years of a woman *(TABLE – 20)*. Similarly, problem of underweight is much concentrated in age groups 13 years to 26 years may be as this is a group of adolescent females. This seems to be a valid conclusion also because as per UNICEF global report card (2012) 50% of Indian adolescent girls are unhealthy.

Well, at this stage, it should be mentioned that studies have discovered that women with higher BMI are likely to have PMS as compared to women with lower BMI (Deuster *et al.*, 1999 and *Masho et*

**Table - 19 Weight Status as per BMI of Study Subjects**

| Weight Status and BMI | No. of Subjects (%) (n = 720) |
|---|---|
| Underweight (UW) and BMI below 18.5 | 218 (30.27 %) |
| Healthy / Normal (H /N) and BMI 18.5 to 24.9 | 377 (52.36 %) |
| Overweight (OW) and BMI 25.0 to 29.9 | 84 (11.66%) |
| Obese (OB) and BMI 30.0 and above | 41 (5.69%) |
| Standards and categories are as mentioned by CDC, USA | |

*al.*, 2005). Accepting this finding, except the underweight subjects all 69.72 % (502 / 720) study subjects may be at a risk of PMS. Also from Masho *et al.*, (2005) research findings, those who are obese are still at much more greater risk of suffering from PMS and thus here, those obese (5.69 %) subjects are very likely to be at much more risk too! Analysis of impact of BMI status on respondents will be described further in another section - *V Study of Determinants of PMS and PMS symptoms* of this chapter.

**Table - 20 Health status of Subjects as per BMI (n = 30 subjects / age group)**

| Age Groups | No. of Subjects Underweight (UW) | No. of Subjects Healthy / Normal (H/N) | No. of Subjects Over weight (OW) | No. of Subjects Obese (OB) |
|---|---|---|---|---|
| 13 | 12 | 16 | 1 | 1 |
| 14 | 7 | 17 | 4 | 2 |
| 15 | 14 | 15 | 1 | 0 |
| 16 | 12 | 13 | 4 | 1 |
| 17 | 9 | 18 | 3 | 0 |
| 18 | 12 | 16 | 2 | 0 |
| 19 | 11 | 17 | 1 | 1 |
| 20 | 10 | 18 | 2 | 0 |
| 21 | 14 | 13 | 0 | 3 |
| 22 | 14 | 12 | 3 | 1 |
| 23 | 17 | 10 | 2 | 1 |
| 24 | 13 | 16 | 1 | 0 |

| | | | | |
|---|---|---|---|---|
| 25 | 11 | 13 | 4 | 2 |
| 26 | 11 | 13 | 5 | 1 |
| 27 | 7 | 14 | 4 | 5 |
| 28 | 7 | 16 | 3 | 4 |
| 29 | 3 | 18 | 7 | 2 |
| 30 | 4 | 21 | 2 | 3 |
| 31 | 3 | 20 | 4 | 3 |
| 32 | 7 | 16 | 5 | 2 |
| 33 | 4 | 16 | 8 | 2 |
| 34 | 8 | 14 | 5 | 3 |
| 35 | 3 | 19 | 8 | 0 |
| 36 | 5 | 16 | 5 | 4 |
| Total→ | 218 | 377 | 84 | 41 |

**Menstrual aspects of the respondents:**

As PMS is intricately associated with menstrual cycle and other menstrual disorders, it's imperative to scan over the characteristics of menstruation in present study sample. Menarche is the onset of menstruation and it is one of the most significant milestones in a woman's life (Zegeye *et al.*, 2009). The **average menarche age of the study sample was found to be 13.5 years.** Similar results of menarcheal age were also obtained by Dambhare *et al.*, (2012) in their study in Wardha district of Maharashtra State, India. Further in present study, there were 32.77 % (236 / 720) subjects who reported of experiencing menarche at the age of 13 years which is also the universal menarcheal age (Harrison,

1967) and it corresponds with the menarcheal age of girls in other Indian states as mentioned in the works of Poonam and Tiwari, (2007). World over for most females, menarche occurs between the age of 10 and 16 years, however it shows a remarkable range of variation (Thomas *et al*., 2001 and Zegeye *et al.*, 2009). As shown in *TABLE – 21*, the range of menarche in present study is between 9 to 18 years with slight difference from above. This might be due to sensitivity of menarche to no. of factors like nutritional status, geographical location, environmental conditions and magnitude of socioeconomic inequalities in a society (Chumlea *et al.*, 2003; Swanson and Havens, 1987; Thomas *et al*., 2001 and Zegeye *et al.*, 2009).

**Table - 21 Menarcheal Age of the Study Subjects**

| Menarche Age (in years) | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of Subjects | 4 | 5 | 36 | 127 | 236 | 149 | 112 | 46 | 4 | 1 |

In the study carried out by Silva CML *et al.*, (2008) on 2,876 Brazilian women from the 1982 live birth cohort , it was concluded that prevalence rates for symptoms and premenstrual syndrome were higher in women whose age at menarche was less than 11 years, but this

difference was not statistically significant. In correspondence to this, 9 subjects having menarche at the age of 9 and 10 years in this study sample *(TABLE – 21)* are likely to experience more PMS. But for sure results, further detailed study is needed with appropriate statistical analysis.

In addition to menarche, characteristics of menstrual cycle of these respondents and their mothers were also studied for better comprehension of the menstrual pattern. The outcomes are depicted in *TABLE – 22*. Also, this data helps in differential diagnosis of menstrual disorders, if any, other than PMS. The subjects and their mother have showed more or less, 28 days ovarian cycle. None of them have reported of facing severe menstrual disorders with themselves or within their close family relations. When interviewed, none of them were on any medication for menstrual disorders since last 6 months. But, there were 12.08 % (87 / 720) subjects who took 1 or 2 doses of prescribed medicine for menstrual pain generally on first day or in few cases on second day of menses. Except this, none of the subjects have undergone any treatment for premenstrual syndrome knowingly or unknowingly.

When details of menstrual cycle were studied with respect to PMS, no striking association was found. From *TABLE – 22*, one can find

| Table 22 Pattern of Menstrual Cycle of the Study Subjects (n = 720) | | |
|---|---|---|
| **Characteristics** | **Subjects (%)** | **Mothers' of the Subjects (%)** |
| **Regularity of Menstrual Cycle** | | |
| **Regular** | **630 (87.5)** | **628 (87.22)** |
| **Irregular** | **90 (12.5)** | **22 (3.05)** |
| **Information not available** | **-----** | **70 (9.72)** |
| **Duration of menses** | | |
| **Less than 4 days** | **224 (31.11)** | **149 (20.69)** |
| **4 days** | **139 (19.30)** | **76 (10.55)** |
| **more than 4 days** | **357 (49.58)** | **209 (29.02)** |
| **Information not available** | **------** | **286 (39.72)** |
| **Pain during menses** | | |
| **Less Pain** | **138 (19.16)** | **67 (9.30)** |
| **Moderate** | **125 (17.36)** | **84 (11.66)** |
| **Excessive** | **75 (10.41)** | **41(5.69)** |
| **Unbearable** | **108 (15)** | **99 (13.75)** |
| **Painless** | **274 (38.05)** | **230 (31.94)** |
| **Information not available** | **------** | **199 (27.63)** |
| **Amount of flow during menses** | | |
| **Scanty** | **52 (7.22)** | **29 (4.02)** |
| **Normal** | **524 (72.77)** | **323 (44.86)** |
| **Heavy** | **144 (20)** | **107 (14.86)** |
| **Information not available** | **-----** | **261(36.25)** |

that 12.5 % subjects had irregular menstrual cycle. However, this irregularity has no association with PMS (Fujiwara *et al.*, 2007). Additionally, number of studies has reported a significantly higher proportion of females with PMS were also found suffering from dysmenorrhoea compared to those females who had no PMS (Zegeye *et al.,* 2009 and Fujiwara *et al.*, 2007).

Also correlation between dysmenorrhoea and duration of PMS is found to be statistically significant in one of the studies carried out by Vichnin *et al.*, (2006) in adolescents at Pennsylvania, USA but investigator did not come across any such observations here. None of the subjects were medically declared to be a sufferer of dysmenorrhoea even though few were found to be taking medicines for painful menses. In this study no detailed differential diagnosis was carried out regarding pain during menses so it is difficult to throw light on the connection of PMS to that of dysmenorrhoea with full surety.

It is possible that PMS affects the pattern of menstrual cycle or vice versa, this calls for further in-depth research in that direction. It appears that although as members of the scientific community we know a

lot about menses and menstrual disorders, yet a lot remains to be known about relationship between PMS and menstrual cycle.

Once again the purpose of collecting data about menstrual histories of both mothers and daughters was also to find some association and common aspects particularly in case of PMS, between both of these, as they are genetically related, but due to unsatisfactory answers and incomplete information from the subjects regarding their mother's menstrual history (as mentioned in *TABLE – 17* of previous *CHAPTER – 4*), it was not possible to derive some concrete valid conclusions. However, superficially, it was observed that there was a close similarity between the experiences and menstrual pattern of daughters and mothers. It is very likely that those subjects showing PMS had a genetical base also due to their mothers, who might be suffering from the same.

Fryer and his colleagues (1999) have reported in their literature review number of research works which also support the thought that genetic background influences PMS. One such study mentioned by this team was that of Kendler *et al.,* (1998) who measured lifetime major depression and premenstrual symptoms twice over 6 years in 656 menstruating female twin pairs and found out (1) a modest

heritable influence (2) a little familial environmental influence and (3) a modest sharing of genetic and environment risk factors on PMS. Although presently, we do not have many studies talking on the genetics and heredity of PMS and thus this area still needs to be explored scientifically.

**Dietary Habits of the respondents:**

Food plays a crucial role by providing essential nutrients and thereby helps in not only maintaining both physical and mental health but also by increasing immunity of the body and slows down the process of senescence. In addition to this, including healthy diet in one's lifestyle is the first step towards managing PMS and PMDD (Bianchi-Demicheli *et al.*, 2004) as well as for general well – being. When analyzed, investigator noted that **79.16 % (570 / 720) subjects were vegetarians, 15.55 % (112 / 720) subjects were non-vegetarians while 5.27 % (38 / 720) were egg – vegetarians.** All those who were consuming meat of any type and or any sea food of animal origin were included in non – vegetarians here while those vegetarians who took no meat but had eggs were placed in egg – vegetarians.

Enormous research and personal experiences gathered from across the world from PMS sufferers has proven that diet not only influences menstrual cycle and its pattern (Pirke *et al.,* 1986) but can also affect prevalence and intensity of PMS. Studies suggest that in-take of low-fat vegetarian food and reduction of red meat or flesh food helps reduce PMS symptoms (Cornforth, 2011; http://womenshealth.about.com/cs/pms/a/reducsymptoms.htm).

Many reports have also recommended of becoming a complete vegan (having only plant-based food) and say no to animal – origin food as it helps fight PMS problems to a great extent. Although for the present study, investigator is unsure whether being vegetarian helped these subjects as majority were found to have poor dietary habits and not taking balanced food. But, this certainly creates a future opportunity to study the relation between food and PMS.

As per Bussell (2011) and British Dietetic Association (BDA) (2011), micronutrients particularly vitamins play a vital role in reducing PMS symptoms. Most of these are obtained from fruits and vegetables. But 73.61% (530 / 720) respondents were not consuming fruits on a regular basis, rather hardly ate fruits. There were 22.08% (159

/ 720) who consumed only selected vegetables in lunch - dinner. Subjects of certain communities for example, Jains avoided certain vegetables and pulses due to religious customs. The young adolescent group skipped *Dal*, a regular item of Indian meal, thus were lacking enough proteins too.

It's worth noting that drinking a cup of milk or having some fruit juice daily are extremely uncommon habits for these subjects irrespective of their age. Even though National Dairy Council (NDC), USA (2005) has recommended dairy products specially milk to be a good source of calcium and eight additional essential nutrients, including protein, potassium, phosphorus, vitamins A, D and B12, riboflavin and niacin. Also, NDC has stated that dairy foods can reduce the risk of osteoporosis, kidney stones and PMS .Yet there were 32.5% (234 / 720) who had no regular, not even one time in a day, intake of dairy products like milk, curd, buttermilk, butter, ghee, cheese etc. There were (332 / 720) who had atleast 1 cup of milk per day, (162 / 720) subjects included curd in small proportions in their meals, (221 / 720) respondents had 1 glass of buttermilk during lunch time every day, (14 / 720) ate butter in small amount in breakfast and very few only (5 / 720) subjects had cheese in little proportion in meals on daily basis.

Although ghee and butter are somewhere incorporated in the cooking of Indian meals, yet the overall consumption of dairy products like milk, curd, buttermilk was found to be poor amongst these subjects and looking to available researches like that of Bertone-Johnson (2005) who found out that participants consuming four servings or more per day of milk had a decreased risk of PMS as compared to those consuming one serving or less, present study sample is quiet vulnerable to PMS. Similar conclusions were made by Dermal *et al.,* (2004) from their work that those consuming more milk, cheese and yogurt experienced fewer PMS symptoms, including decreased abdominal bloating and cramps, fewer food cravings and a smaller increase in appetite than those who consumed less milk, cheese and yogurt.

Overall, it was observed that very few subjects were conscious about their food choices and simply consumed food in a very routine manner. On discussing the types of food products consumed by the subjects it was found that the intake of such product which would provide required micronutrients was less. For example, most subjects never took salads or dry fruits in their lunch, breakfast or any other meals. Food that they consumed provided more carbohydrates and fats, but was

not rich in the minerals and vitamins that they needed. Apart from physical health, dietary intake of such nutrients are more than essential for mental health, as they play chief role in the metabolism of large number of products and byproducts which are significantly linked with central nervous system particularly brain chemicals as well as number of body glands and their hormones (Mayo, 1999; Cornish and Mahl-Madrona, 2008; Bendich, 2000).

Furthermore, besides what food one consumes and of what quality, quantity or no. of servings also matter a lot in maintaining health which was found satisfactory to some extent with this study sample. Dieting (Fujiwara, 2007) and skipping breakfast (Fujiwara, 2003) has an adverse long-lasting effect on the reproductive functioning and quality of life of young women. Although such habits were not seen in most of the subjects, yet as mentioned in previous *CHAPTER - 4 Socio-demographic profiles of respondents*, fasting one day per week was very common amongst the subjects. Also, a range of variation was found amongst subjects in the matters of number of meals they had per day. Around half of the study sample 48.75% (351 / 720) subjects, had 3 times food per day that is two major meals – lunch and dinner and 1 breakfast or evening

*nashta* per day, while 29.16 % (210 / 720) had 4 meals and 7.63% (55 / 720) had more than 4 times food. It was good to know that only 3 subjects ate 1 time meal and 101 out of 720 (14.02 %) subjects had 2 times meal per day respectively.

As a matter of fact its well said that intake of plenty of fluids may help in reducing certain PMS symptoms like bloating and fluid retention (Simon and Zieve, 2009) but it was alarming that water consumption was not enough as 49.86% (359 / 720) subjects had less than 8 glasses of water (that is approximately 1.5 liters of water) and 13.47% (97 / 720) had around 8 glasses of water per day increasing their risk for PMS. In addition to this, lack of enough water can also lead to number of infections particularly UTI. However, there were 36.66% (264 / 720) subjects who had more than 8 glasses of water per day.

After a detailed examination of diet of the subjects from above and as mentioned earlier, it is quiet certain that these subjects do not have good healthy food habits and they do not eat balanced food. Moreover, it also seems as if they are neither much concerned nor aware of how far their food can make a difference in their health status. Above all this, women are amongst the most vulnerable groups who are highly

discriminated in Indian society in accessing nutritious food as well as health services (Chatterjee and Sheoran, 2007). Effect of food shall be again discussed with respect to PMS in more details in upcoming section - *V Study of Determinants of PMS and PMS symptoms* of the same chapter.

**Diseases prevailing in families of respondents:**

Diseases prevailing in a family can indicate many features of a person's physiology, body constitution and susceptibility towards diseases. To know respondents' actual health conditions from the roots, they were inquired whether their closest blood relations apart from parents and their siblings, had any diseases like diabetes, cancer, genetic disorders, reproductive problems etc. Diabetes was noted in the families of 28.33 % (204 / 720) subjects whereas depression was found in the families of 19.16 % (138 / 720) subjects. Mothers of 1.11 % (8 / 720) subjects and fathers of 36.38 % (262 / 720) subjects were accounted to be addicted while one or the other relative or close family members other then father – mother 18.88 % (136 / 720) subjects had addiction of tobacco, *pan –masala, gutkha* or alcohol. Prevalence of Cancer was seen in the families of 12.22% (88 / 720) subjects.

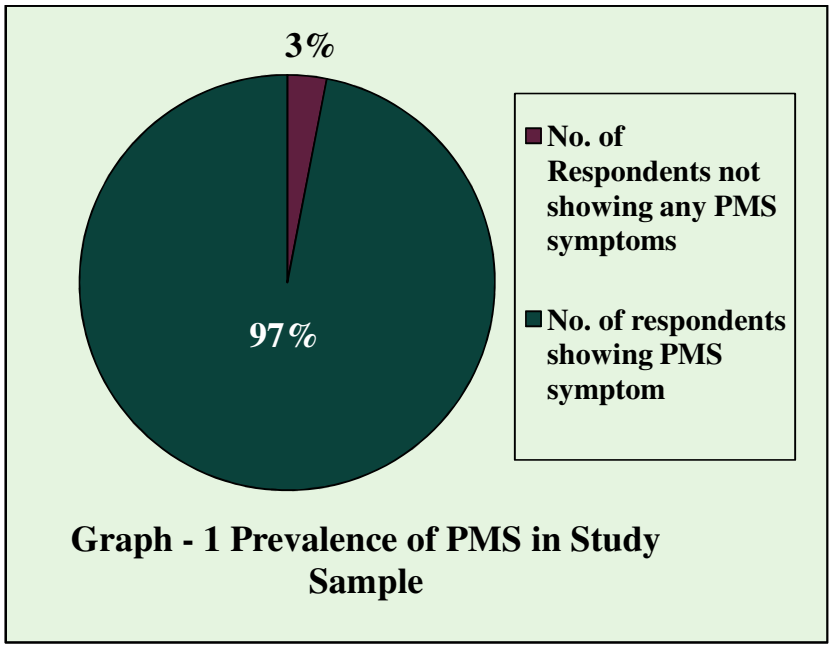
Some kind of physical deformities may be due to genetical disorder existed in families of 2.36 % (17 / 720) ladies while obesity accounted in families of 10.97 % (79 / 720) subjects. Strange enough was to find infertility or problems related to reproductive system to be in relatives of only 4.72 % (34 / 720) subjects. Amongst these apart from infertility, major complaints were irregular periods, heavy and prolonged periods. Again, this creates a skeptic situation, as the general statistics and reports reveal that reproductive health of Indian women is not satisfactory (Velkoff and Adlakha, 1998; World Bank, 1996; WHO, 1996) and this present data provides all the reasons to believe that many reproductive health problems are never considered or deliberately kept unnoticed believing them to be of no importance. This data might not show direct relevance to PMS, but it does reveal the familial health background of respondents which gives us strong reasons to presume that general health status of subjects cannot be overlooked.

## (II) Prevalence of Premenstrual Syndrome (PMS)

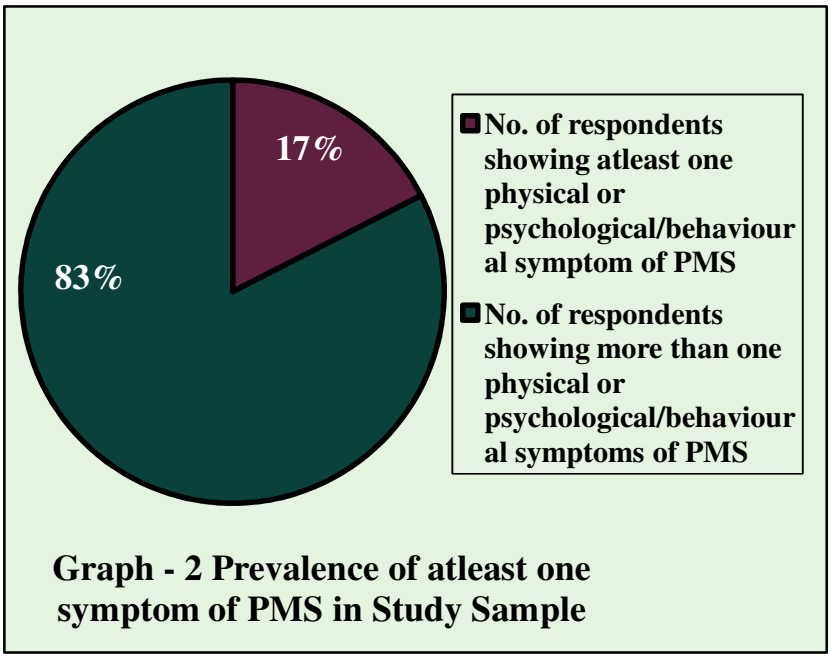
Nevatte *et al.*, 2008 quotes "Quantification of a disorder helps to confirm or refute diagnosis, and thus the appropriate treatment regimen can be instigated" Thus assessing prevalence of PMS and its

symptoms in a population based women sample starting from the year of menarche (here age 13 years) till age 36 years was the first and foremost aim of this present study. **When evaluated, 97% (698 / 720) subjects experienced PMS with variable number of symptoms while 83% (594 / 720) subjects experienced atleast one PMS symptom respectively** *(GRAPH - 1 and GRAPH - 2).* For present study 95 symptoms were chosen after literature review and subjects reported of having been suffering these symptoms in variable degrees each menstrual cycle, the week prior to menstruation and were relieved of it as menses start or at the most when it's about to get over.

World over prevalence of PMS is also estimated as per the diagnostic criteria given by World Health Organization (WHO) in International Statistical Classification of Disease and related health problems, $10^{th}$ revision (ICD–10) - N.9.3 Premenstrual Syndrome (Steiner,1997;bestpractice.bmj.com/bestpractice/monograph/419/resources/references.htm#ref-27). Here, one distressing symptom from a list of physical or behavioural symptoms is required for an ICD-10 diagnosis of PMS.




**Graph - 1 Prevalence of PMS in Study Sample**




**Graph - 2 Prevalence of atleast one symptom of PMS in Study Sample**

Symptoms may include the following:

(1) Feeling sad, hopeless, or self-deprecating

(2) Tension, anxiety, mood lability, tearfulness, or persistent irritability

(3) Anger

(4) Decreased interest in usual activities

(5) Difficulty concentrating

(6) Feeling fatigued

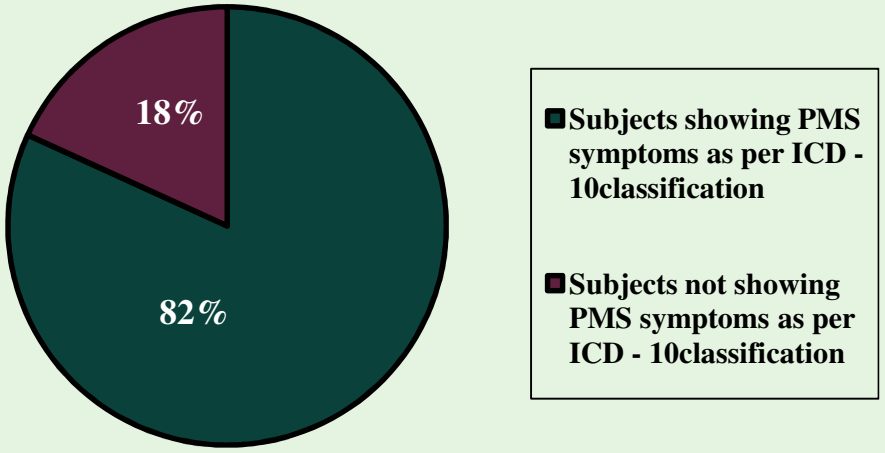
(7) Changes in appetite

(8) Hypersomnia or insomnia

(9) Feeling overwhelmed or out of control

(10) Other physical symptoms (such as headaches, breast tenderness or swelling, joint or muscle pain, bloating, or weight gain).

Following this international standard and being more accurate, **PMS in present study sample was also evaluated using ICD – 10 criteria and as per ICD – 10, existence of PMS in present study sample was found to be 82% (589 / 720)** *(GRAPH – 3).* Therefore PMS undoubtedly prevails in the respondents of Surat, Ahmedabad and Gandhinagar.




**Graph - 3 Prevalence of PMS as per ICD - 10 Classification system in Study Sample**

A comparative study of prevalence of PMS in various parts of India and other countries can be studied through *TABLE – 23*. With respect to this, when the frequency of PMS of this research study were compared to the frequencies obtained in various parts of India like Mumbai (Joshi *et al.*, 2011), Rewa (Singh *et al.*, 2008), Manglore (Mathias, 2006-a) Kanchipuram (Anandha *et al.,* 2011) etc., it was surprising that PMS in Gujarat sample (Surat, Ahmedabad and Gandhinagar) is much higher than rest others. In addition to this, it was shocking to find that the neighbouring countries like Pakistan (Pal *et al.*, 2011 and Tabassum *et al.*, 2005) and China (Lee *et al.*, 2005) also

showed lower incidence of PMS as compared to Gujarat respondents! Thus it's high time that we should address this disorder without underestimating and debating on its presence or prevalence. However, the results are quiet similar and close to those found in Saudi Arabia (Rasheed and Al - Sowielem, 2003), Japan (Takeda *et al.*, 2006) and Nigeria (Antai *et al.*, 2004) *(TABLE – 23)*.

**Table - 23 Comparative Overview of Prevalence of PMS in various study samples of India and other nations**

| India and other nations | Prevalence of PMS (%) |
|---|---|
| Present Study sample of Gujarat | 97 |
| Present study sample of Gujarat as per ICD - 10 classification | 82 |
| Cuddalore Dist., Tamil Nadu[0], India | 55.33 |
| Kanchipuram Dist., Tamil Nadu[1], India | 67 |
| Manglore as per ICD - 10 classification[2], India | 13.33 |
| Rewa, Madhya Pradesh[3], India | 60.74 |
| Mumbai[4], Maharashtra, India | 75.70 |
| Karachi, Lahore & Islamabad, Pakistan as per ICD - 10 classification[5] | 79.9 |
| Peshawar, Pakistan as per ICD - 10 classification[6] | 53 |
| Saudi Arabia[7] | 97 |
| China[8] | 76 |
| Korea as per ICD - 10 classification[9] | 98.60 |
| Osaka,Japan[10] | 95 |
| Turkey[11] | 76 |
| Nigeria[12] | 85.50 |
| Switerzland[13] | 10.30 |
| USA[14] | 58 |
| North West Ethopia[15] | 75.40 |
| Eastern Sudan[16] | 59.80 |
| Qatar, Iran[17] | 98.20 |

| Beirut, Lebanon[18] | 54.00 |
|---|---|

*0 Tamilselvi (2012) , 1 Anandha et al.(2011), 2 Mathias (2006), 3 Singh et al.(2008) , 4 Joshi et al. (2011), 5 Pal et al. (2011), 6 Tabassum et al. (2005), 7 , Rasheed and Al - Sowielem, (2003),8 Lee et al., (2005), 9 Choi et al. (2010), 10 Takeda et al. (2006), 11 Adiguzel et al.(2007) , 12 Antai et al.(2004), 13 Tschudin et al. (2010), 14 Singh et al.(1998), 15 Zegeye et al.(2009) , 16 Ali et al. (2011),17 Bakhshani et al. (2009), 18 Karout et al.(2012)*

## (III) Symptomatology

PMS is an intricate convergence of a number of physical, psychological and behavioural symptoms. From various experiences of women world over, it's recognized that PMS has a wide spectrum of over 200 such symptoms with variable degrees of severity and frequency. To make the task of studying so many PMS symptoms simpler, researchers throughout the world have created different assemblies of these symptoms.

Here too, for the present study, investigator has tried to follow the newer works on PMS semeiology (Sen Gupta, 2001; Dicerkson *et al.,* 2003; Cronje *et al.,* 2003; Studd, 2003) and thereafter has broadly classified around 95 symptoms into two groups as (1) Physical Symptoms and (2) Psychological – Behavioural Symptoms as listed in *TABLE –24.* How much is the occurrence of these symptoms in study sample and frequency of which symptoms are high or low can be

noted from the ranking in this table. Physical symptoms like Backache (BA) (48.33 %, 348 / 720) and Lower abdominal cramps (LAC) (43.75 %, 315 /720) plus Psychological - Behavioural Symptoms like Irritation (IRB) (44. 86%, 323 / 720), Anger (AR) (41.66%, 300 / 720), Loss of interest in routine activities / hobbies (LIN) (36.38 %, 262 / 720) and Mood swing (MS) (31.66 %, 228 / 720 ) were the most commonly experienced symptoms with high intensity.

On the other side incidences of physical symptoms like Swelling of hands (SW – H) and extra shiny skin (SP – SS) both were 0.42 % (03 / 720) whereas that of Swelling of legs (SW - L) and Pain in soles (PIL – OSO) both was 0.55 % (04 / 720) were minimum out of all physical symptoms. Similarly very less frequencies of psychological – behavioural symptoms like worries / anxiousness (AX – WOR) and decrease in food craving (FC – D) were 0.27 % (02 /720) and palpitation (AX – PAL) 0.69 % (05 / 720) were obtained *(TABLE – 24)*.

**Table - 24 List of 95 PMS Symptoms and their prevalence in Study Sample**

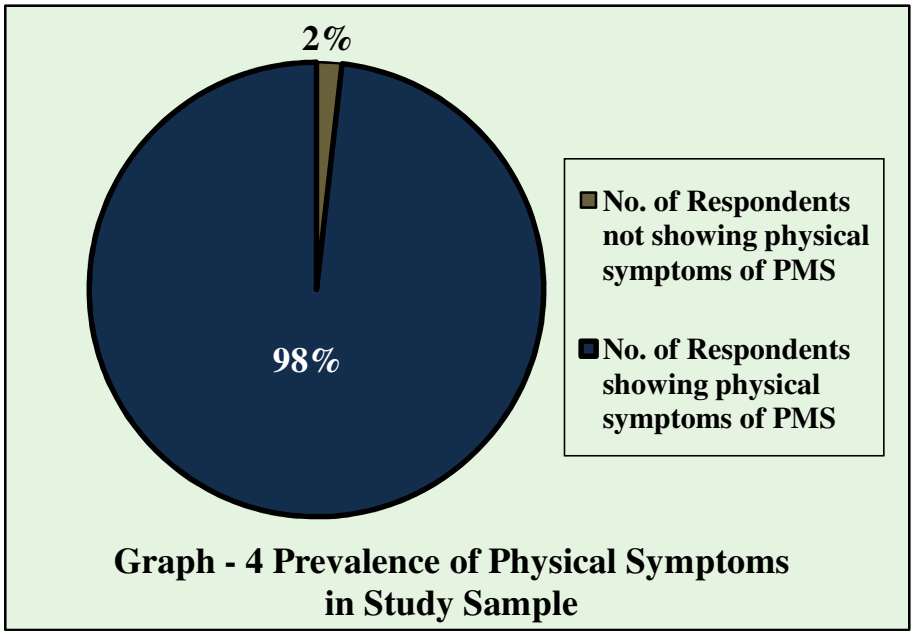
| Sr. No. | A) Physical Symptoms | No. of subjects out of 720 showing the symptoms | Ranking the symptoms from maximum presence to minimum |
|---|---|---|---|
| 1 | Headache (HA) | 111 (15.42%) | 22 |
| 2 | Backache (BA) | 348 (48.33%) | 1 |
| 3 | Bodyache (BAC) | 94 (13.05%) | 28 |
| 4 | Acidity (ACD) | 66 (9.16%) | 40 |
| 5 | Fever (F) | 51 (7.08%) | 46 |
| 6 | Change in Appetite - Increase (CAP - I) | 85 (11.81%) | 33 |
| 7 | Change in Appetite - Decrease (CAP - D) | 149 (20.69%) | 12 |
| 8 | Change in Appetite - Total Loss (CAP - T.L.) | 46 (6.38%) | 48 |
| 9 | Recurrent cold sores (RC) | 68 (9.44%) | 39 |
| 10 | Skin Problems - Darkening/ Dullness (SP-DR) | 9 (1.25%) | 65 |
| 11 | Skin Problems - Shine of skin (SP-SS) | 3 (0.42%) | 69 |
| 12 | Skin Problems - Acne - one (SP-AC-1) | 142 (19.72%) | 14 |
| 13 | Skin Problems - Acne - Few (SP-AC-F) | 75 (10.42%) | 37 |
| 14 | Skin Problems- Acne - Many (SP - AC - M) | 92 (12.77%) | 29 |
| 15 | Dizziness (DZ) | 133 (18.47%) | 16 |
| 16 | Low Sugar (LS) | 24 (3.33%) | 55 |
| 17 | Nausea (N) | 86 (11.94%) | 32 |
| 18 | Hot flush (HF) | 39 (5.42%) | 51 |
| 19 | Weakness (WK) | 148 (20.55%) | 13 |
| 20 | Urine - Less (U - L) | 21 (2.92%) | 56 |
| 21 | Urine - More (U - M) | 112 (15.55%) | 21 |
| 22 | Eye Complaints (EC) | 12 (1.66%) | 62 |
| 23 | Breast Problems - Pain (BR - P) | 79 (10.97%) | 36 |
| 24 | Breast Problems - Mastalgia (BR - MSG) | 60 (8.33%) | 42 |
| 25 | Weight gain (WTG) | 107 (14.86%) | 25 |
| 26 | Swelling - Face (SW - FA) | 11 (1.53%) | 63 |
| 27 | Swelling - Finger (SW - FIN) | 6 (0.83%) | 66 |
| 28 | Swelling - Body (SW - BOD) | 5 (0.69%) | 67 |
| 29 | Swelling - Abdomen (SW - ABD) | 102 (14.16%) | 26 |
| 30 | Swelling - Hand (SW - H) | 3 (0.42%) | 69 |
| 31 | Swelling - Leg (SW - L) | 4 (0.55%) | 68 |
| 32 | Swelling - Breast (SW - BR) | 52 (7.22%) | 45 |

| | | | |
|---|---|---|---|
| 33 | Pain in joints - Body joints (PJ- BJ) | 27 (3.75%) | 54 |
| 34 | Pain in joints - Knee joints (PJ - KJ) | 54 (7.5%) | 44 |
| 35 | Pain in legs - Full legs (PIL - FUL) | 148 (20.55%) | 13 |
| 36 | Pain in legs - Thighs to knees (PIL - THKN) | 6 (0.83%) | 66 |
| 37 | Pain in legs- Only thighs (PIL - OTH) | 21 (2.92%) | 56 |
| 38 | Pain in legs - Knees to toes (PIL - KT) | 11 (1.53%) | 63 |
| 39 | Pain in legs - Only soles (PIL - OSO) | 4 (0.55%) | 68 |
| 40 | Pain in legs - Calf muscles (PIL - CAM) | 116 (16.11%) | 18 |
| 41 | Pain in hands (PIH) | 36 (5%) | 52 |
| 42 | Lower abdominal cramps (LAC) | 315 (43.75%) | 3 |
| 43 | Gas retention (GR) | 84 (11.66%) | 34 |
| 44 | Indigestion (IDI) | 47 (6.53%) | 47 |
| 45 | Constipation(CO) | 18 (2.5%) | 57 |
| 46 | Diarrhoea (DIA) | 21 (2.92%) | 56 |
| 47 | Abdominal Fullness (ABF) | 64 (8.88%) | 41 |
| 48 | Exacerbation of disease (EXC) | 11 (1.53%) | 63 |
| **Sr. No.** | **B) Psychological / Behavioural Symptoms** | **No. of subjects out of 720 showing the symptoms** | **Ranking the symptoms from maximum presence to minimum** |
| 49 | Feeling low (FL) | | |
| 50 | Worthlessness (WLN) | | |
| 51 | Loss of interest in routine activites / hobbies (LIN) | 262 (36.38%) | 5 |
| 52 | Tension (TEN) | 115 (15.97%) | 19 |
| 53 | Violent crimes (VC) | 17 (2.36%) | 58 |
| 54 | Loneliness (LOL) | 154 (21.38%) | 11 |
| 55 | Mood swing (MS) | 228 (31.66%) | 6 |
| 56 | Confusion (CF) | 87 (12.08%) | 31 |
| 57 | Cry spells (CRS) | 138 (19.16%) | 15 |
| 58 | Clumsiness (CLS) | 131 (18.19%) | 17 |
| 59 | Irritation (IRB) | 323 (44.86%) | 2 |
| 60 | Anger (AR) | 300 (41.66%) | 4 |
| 61 | Sleep - More (SP - M) | 185 (25.69%) | 7 |
| 62 | Sleep - Less (SP - L) | 81 (11.25%) | 35 |
| 63 | Sleep - Disturbed (SP - D) | 10 (1.38%) | 64 |
| 64 | Sleep - Bad dreams (SP - BD) | 30 (4.16%) | 53 |
| 65 | Loss of self control (LSC) | 13 (1.81%) | 61 |
| 66 | Altered interest in sex - increase (AIS - I) | 16 (2.22%) | 59 |

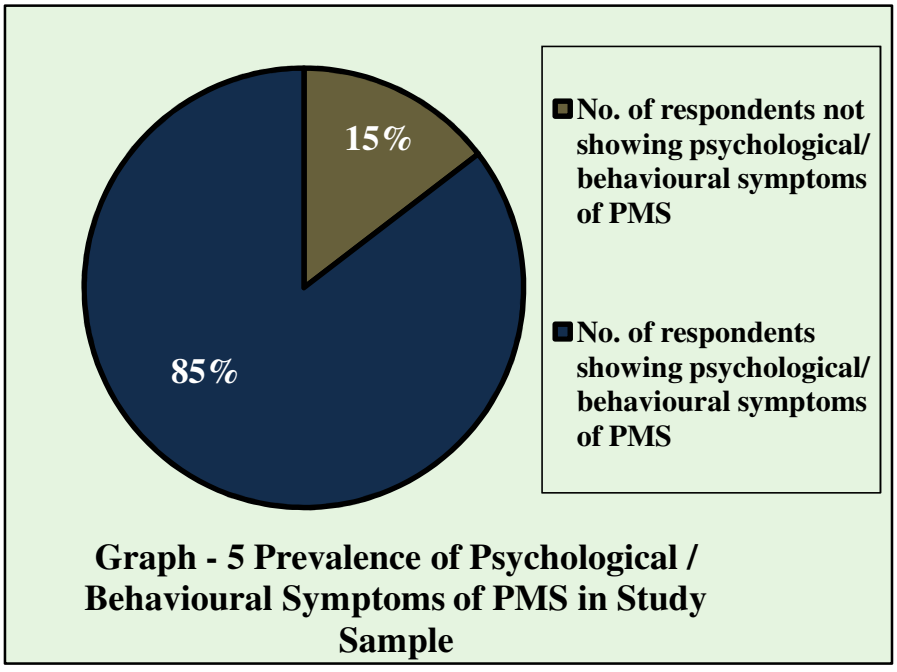
| | | | |
|---|---|---|---|
| 67 | Altered interest in sex - decrease (AIS - D) | 41 (5.69%) | 50 |
| 68 | Food craving - increase (FC - I) | 173 (24.03%) | 9 |
| 69 | Food craving - decrease (FC - D) | 2 (0.27%) | 70 |
| 70 | Craving for food items - sweet (FIT - SW) | 42 (5.83%) | 49 |
| 71 | Craving for food items - cold (FIT - CO) | 12 (1.66%) | 62 |
| 72 | Craving for food items - sour (FIT - SO) | 11 (1.53%) | 63 |
| 73 | Craving for food items - salty (FIT - SA) | 114 (15.83%) | 20 |
| 74 | Craving for food itmes - spicy (FIT - SP) | 100 (13.88%) | 27 |
| 75 | Boredom (BOR) | 71 (9.86%) | 38 |
| 76 | Forgetfulness (FGF) | 59 (8.19%) | 43 |
| 77 | Poor judgement (PDG) | 79 (10.97%) | 36 |
| 78 | Increased guilt feeling (IGF) | 17 (2.36%) | 58 |
| 79 | Doubtfulness (DBT) | 24 (3.33%) | 55 |
| 80 | Want to remain alone (WRA) | 175 (24.31%) | 8 |
| 81 | Less tolerance - Light (LTL) | 18 (2.5%) | 57 |
| 82 | Less tolerance - Noise (LTN) | 64 (8.88%) | 41 |
| 83 | Less tolerance - Light & Noise (LTLN) | 109 (15.14%) | 24 |
| 84 | Insecurity (INS) | 11 (1.53%) | 63 |
| 85 | Hyperactvity (HYP) | 14 (1.94%) | 60 |
| 86 | Feeling Sad (FS) | 9 (1.25%) | 65 |
| 87 | Anxiety - Uneasiness (AX - UE) | 107 (14.86%) | 25 |
| 88 | Anxiety - Tension due to monotonous lifestyle (AX - TDML) | 41 (5.69%) | 50 |
| 89 | Anxiety - Palpitation (AX - PAL) | 5 (0.69%) | 67 |
| 90 | Anxiety - Worries/ Anxiousness (AX - WOR) | 2 (0.27%) | 70 |
| 91 | Anxiety - Panic (AX - PN) | 12 (1.66%) | 62 |
| 92 | Anxiety - Restlessness (AX - RL) | 159 (22.08%) | 10 |
| 93 | Anxiety - Tightening in chest / hyperventilation (AX - TIC/ HV) | 110 (15.27%) | 23 |
| 94 | Anxiety - Fearfulness (AX - FR) | 39 (5.42%) | 51 |
| 95 | Anxiety - Nervousness (AX - NRN) | 91 (12.64%) | 30 |
| | | | |

***Note:*** *In the above table, Blue colour indicates presence of symptoms in more than 20% of the subjects, while Green colour indicates presence of symptoms in less than 2% of the subjects in present study sample. Nos. in red indicates 1 to 2o ranks of PMS symptoms.*

Also, when examined, in accordance to this classification, it was found that **prevalence of physical symptoms was 98% (707 / 720)** *(GRAPH - 4)* **whereas that of Psychological – behavioural was 85%** (615 / 720) *(GRAPH - 5).* The history of medicine is replete with the explanations linking gynecological problems like premenstrual syndrome to that of psychiatric pathology (Berek *et al.,* 2001; Stotland, 2001). This is very much evident from above results, where probably due to psycho-somatic effect on the subjects, physical, behavioural and psychological symptoms are closely linked with each other and number of physical problems is noted more in the individuals. Even, *GRAPH – 6* supports this conclusion wherein it shows maximum and minimum number of physical and psychological symptoms age wise. Moreover, *GRAPH – 6* also reveals that PMS symptoms, particularly physical symptoms are more concentrated in-between age groups 24 to 34 years. Further, while referring *TABLE – 25,* occurrence of atleast 2 to 7 symptoms (physical and psychological – behavioural) was found to be mostly high with all the age groups. But it's worth considering that no. of subjects showing 14 to 25 numbers of psychological – behavioural symptoms is more as compared to number of subjects with physical symptoms.

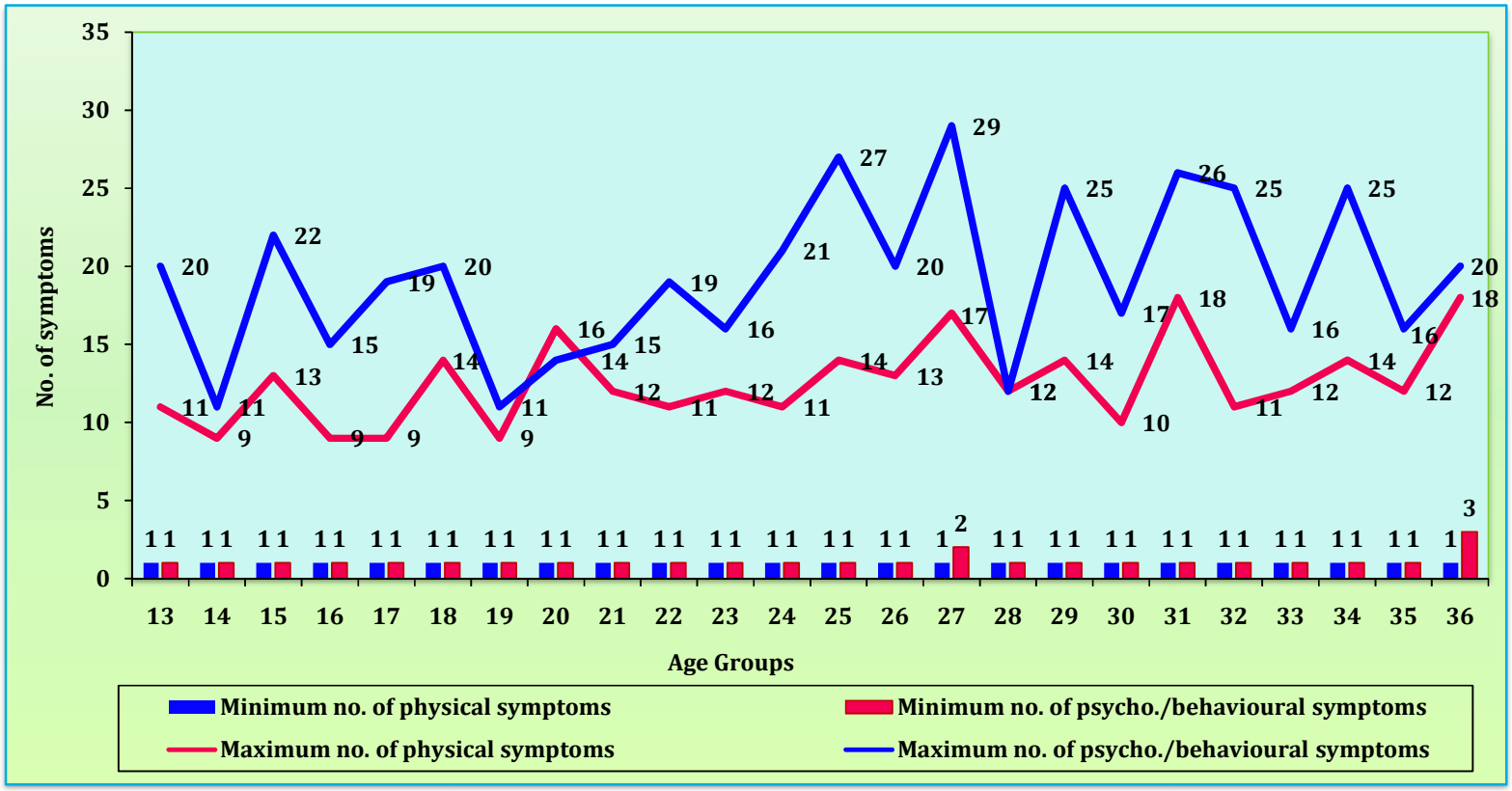



**Graph - 4 Prevalence of Physical Symptoms in Study Sample**




**Graph - 5 Prevalence of Psychological / Behavioural Symptoms of PMS in Study Sample**

Thus, it clearly indicates that may be the overall number of psychological – behavioural symptoms is less than that of number of physical symptoms *(GRAPH – 4 and 5).* But whenever present may be even in less number, these psychological-behavioural symptoms show much higher intensity than physical symptoms, making PMS more severe for the patient to bear and experience.




**Graph – 6 Minimum and Maximum number of PMS symptoms in age groups 13 to 36 years**

| Table – 25 Number of subjects showing no or at least one PMS symptom per age group. | | | | |
|---|---|---|---|---|
| Age | No. of subjects not showing any physical symptoms | No. of subjects not showing any psycho./ behavioural symptoms | No. of subjects showing only one physical symptoms | No. of subjects showing only one psycho./ behavioural symptoms |
| 13 | 4 | 3 | 5 | 4 |
| 14 | 6 | 8 | 6 | 3 |
| 15 | 1 | 5 | 6 | 5 |
| 16 | 0 | 2 | 5 | 2 |
| 17 | 4 | 3 | 2 | 2 |
| 18 | 1 | 4 | 1 | 3 |
| 19 | 4 | 11 | 6 | 3 |
| 20 | 1 | 4 | 2 | 2 |
| 21 | 2 | 5 | 3 | 2 |
| 22 | 2 | 3 | 4 | 7 |
| 23 | 4 | 3 | 4 | 3 |
| 24 | 0 | 6 | 4 | 4 |
| 25 | 2 | 7 | 5 | 2 |
| 26 | 2 | 2 | 3 | 3 |
| 27 | 0 | 3 | 1 | 0 |
| 28 | 0 | 7 | 6 | 3 |
| 29 | 0 | 9 | 3 | 2 |
| 30 | 4 | 6 | 6 | 2 |
| 31 | 0 | 5 | 2 | 5 |
| 32 | 3 | 10 | 4 | 4 |
| 33 | 2 | 4 | 2 | 4 |
| 34 | 3 | 7 | 2 | 2 |
| 35 | 2 | 7 | 2 | 4 |
| 36 | 1 | 7 | 3 | 0 |

It's worth mentioning at this juncture, the conclusion of Martin *et al.* (2006) that, "presence of PMS symptoms could represent a marker for a predisposition to the development of depression".

To add more validity to the existence of these 95 symptoms during premenstrual time and to rule out the irrationality related with this phenomenon, all these symptoms were analyzed for three menstrual cycles in 142 respondents. When evaluated, 48 symptoms (30 physical symptoms and 18 psychological – behavioural symptoms) showed their presence during all three menstrual cycles while 63 symptoms (39 physical symptoms and 24 psychological – behavioural symptoms) were observed during two menstrual cycles *(TABLE – 26).* Inspite of the fact that the assessment of these 95 symptoms in the follow ups of 142 subjects was not done consecutively for 3 menstrual cycles, yet, the output of the number of symptoms at the end inevitably proves prevalence of PMS and also shows its intensity. Again we get an apparent conclusion that physical symptoms are more as compared to psychological - behavioural symptoms with this study sample. *TABLE – 26* also enlist those symptoms who showed their presence repeatedly in 2

and 3 menstrual cycles. From *GRAPHS 7 to 22*, one gets the perfect view of not only the presence but also the intensity of all these 95 symptoms.

Studying and assessing PMS through 3 menstrual cycles definitely put PMS as a stable syndrome with a broad continuum of many physical and psychological – behavioural symptoms. From this pool of symptoms depending on the individual, many symptoms are also quiet stable from one cycle to the other. This inference is in consistence with the findings of Bloch *et al.,* (1997). Although there is no certainty which symptoms will be repeatedly seen in an individual in her different menses cycles.

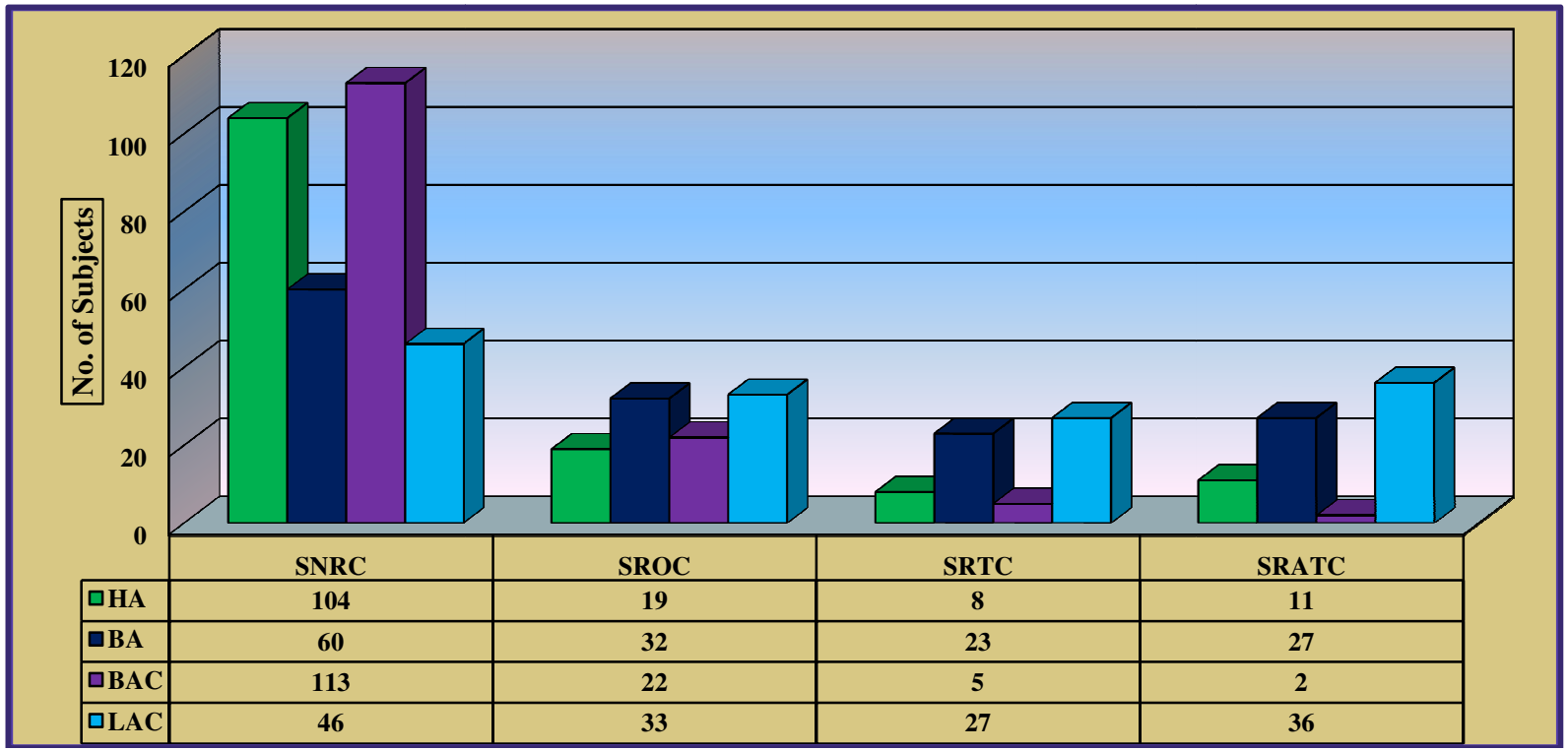
**Table – 26 Prevalence of 95 PMS symptoms during 3 and 2 menstrual cycles of the subjects.**

| Sr. No. | PMS Symptoms | PMS Symptoms experienced during 3 menstrual cycles | PMS Symptoms experienced during 2 menstrual cycles |
|---|---|---|---|
| | **A) Physical Symptoms** | | |
| 1 | Headache (HA) | √ | √ |
| 2 | Backache (BA) | √ | √ |
| 3 | Body ache (BAC) | √ | √ |
| 4 | Acidity (ACD) | √ | √ |
| 5 | Fever (F) | √ | √ |
| 6 | Change in Appetite - Increase (CAP - I) | √ | √ |
| 7 | Change in Appetite - Decrease(CAP –D) | √ | √ |

| | | | |
|---|---|---|---|
| 8 | Change in Appetite - Total Loss (CAP - T.L.) | - | √ |
| 9 | Recurrent cold sores (RC) | √ | √ |
| 10 | Skin Problems - Darkening/ Dullness (SP-DR) | - | √ |
| 11 | Skin Problems - Shine of skin (SP-SS) | - | - |
| 12 | Skin Problems - Acne - one (SP-AC-1) | √ | √ |
| 13 | Skin Problems - Acne - Few (SP-AC-F) | √ | √ |
| 14 | Skin Problems- Acne - Many (SP - AC - M) | √ | √ |
| 15 | Dizziness (DZ) | - | √ |
| 16 | Low Sugar (LS) | - | √ |
| 17 | Nausea (N) | √ | √ |
| 18 | Hot flush (HF) | √ | √ |
| 19 | Weakness (WK) | √ | √ |
| 20 | Urine - Less (U - L) | - | √ |
| 21 | Urine - More (U - M) | √ | √ |
| 22 | Eye Complaints (EC) | - | - |
| 23 | Breast Problems - Pain (BR - P) | √ | √ |
| 24 | Breast Problems - Mastalgia (BR - MSG) | √ | √ |
| 25 | Weight gain (WTG) | √ | √ |
| 26 | Swelling - Face (SW - FA) | √ | - |
| 27 | Swelling - Finger (SW - FIN) | - | - |
| 28 | Swelling - Body (SW - BOD) | - | √ |
| 29 | Swelling - Abdomen (SW - ABD) | √ | √ |
| 30 | Swelling - Hand (SW - H) | - | √ |
| 31 | Swelling - Leg (SW - L) | - | √ |
| 32 | Swelling - Breast (SW - BR) | √ | - |
| 33 | Pain in joints - Body joints (PJ- BJ) | - | √ |
| 34 | Pain in joints - Knee joints (PJ - KJ) | - | √ |
| 35 | Pain in legs - Full legs (PIL - FUL) | √ | √ |
| 36 | Pain in legs - Thighs to knees (PIL - THKN) | - | - |
| 37 | Pain in legs- Only thighs (PIL - OTH) | - | √ |
| 38 | Pain in legs - Knees to toes (PIL - KT) | - | √ |
| 39 | Pain in legs - Only soles (PIL - OSO) | - | - |
| 40 | Pain in legs - Calf muscles (PIL - CAM) | √ | √ |
| 41 | Pain in hands (PIH) | - | √ |
| 42 | Lower abdominal cramps (LAC) | √ | √ |

| | | | |
|---|---|---|---|
| 43 | Gas retention (GR) | √ | √ |
| 44 | Indigestion (IDI) | √ | √ |
| 45 | Constipation(CO) | √ | √ |
| 46 | Diarrhoea (DIA) | √ | - |
| 47 | Abdominal Fullness (ABF) | √ | √ |
| 48 | Exacerbation of disease (EXC) | √ | - |
| | **B) Psychological / Behavioural Symptoms** | | |
| 49 | Feeling low (FL) | - | - |
| 50 | Worthlessness (WLN) | - | - |
| 51 | Loss of interest in routine activites / hobbies (LIN) | - | - |
| 52 | Tension (TEN) | - | - |
| 53 | Violent crimes (VC) | - | - |
| 54 | Loneliness (LOL) | - | - |
| 55 | Mood swing (MS) | - | - |
| 56 | Confusion (CF) | - | - |
| 57 | Cry spells (CRS) | - | - |
| 58 | Clumsiness (CLS) | - | - |
| 59 | Irritation (IRB) | √ | √ |
| 60 | Anger (AR) | √ | √ |
| 61 | Sleep - More (SP - M) | √ | √ |
| 62 | Sleep - Less (SP - L) | √ | √ |
| 63 | Sleep - Disturbed (SP - D) | - | - |
| 64 | Sleep - Bad dreams (SP - BD) | √ | - |
| 65 | Loss of self control (LSC) | - | √ |
| 66 | Altered interest in sex - increase (AIS - I) | - | - |
| 67 | Altered interest in sex - decrease (AIS - D) | - | - |
| 68 | Food craving - increase (FC - I) | √ | √ |
| 69 | Food craving - decrease (FC - D) | - | - |
| 70 | Craving for food items - sweet (FIT - SW) | √ | √ |
| 71 | Craving for food items - cold (FIT - CO) | √ | √ |
| 72 | Craving for food items - sour (FIT - SO) | √ | √ |
| 73 | Craving for food items - salty (FIT - SA) | √ | √ |
| 74 | Craving for food itmes - spicy (FIT - SP) | √ | √ |
| 75 | Boredom (BOR) | √ | √ |
| 76 | Forgetfulness (FGF) | - | - |
| 77 | Poor judgement (PDG) | - | √ |

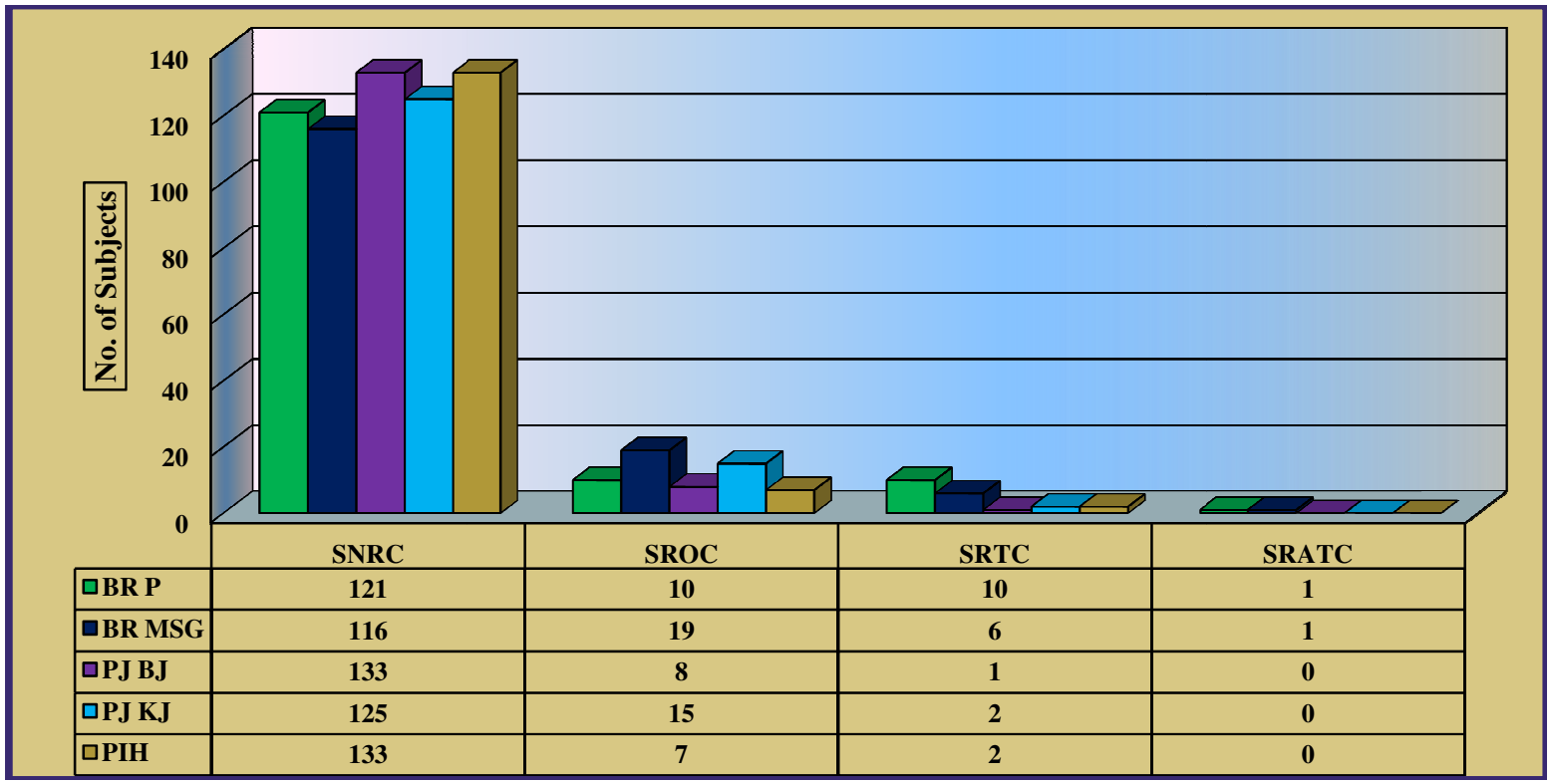
| | | | |
|---|---|---|---|
| 78 | Increased guilt feeling (IGF) | - | - |
| 79 | Doubtfulness (DBT) | - | - |
| 80 | Want to remain alone (WRA) | - | √ |
| 81 | Less tolerance - Light (LTL) | - | - |
| 82 | Less tolerance - Noise (LTN) | - | √ |
| 83 | Less tolerance - Light & Noise (LTLN) | √ | √ |
| 84 | Insecurity (INS) | - | - |
| 85 | Hyperactvity (HYP) | - | √ |
| 86 | Feeling Sad (FS) | √ | √ |
| 87 | Anxiety - Uneasiness (AX - UE) | √ | √ |
| 88 | Anxiety - Tension due to monotonous lifestyle (AX - TDML) | √ | - |
| 89 | Anxiety - Palpitation (AX - PAL) | - | √ |
| 90 | Anxiety - Worries/ Anxiousness (AX - WOR) | - | - |
| 91 | Anxiety - Panic (AX - PN) | - | - |
| 92 | Anxiety - Restlessness (AX - RL) | √ | √ |
| 93 | Anxiety - Tightening in chest / hyperventilation (AX - TIC/ HV) | - | √ |
| 94 | Anxiety - Fearfulness (AX - FR) | - | √ |
| 95 | Anxiety - Nervousness (AX - NRN) | √ | √ |




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| HA | 104 | 19 | 8 | 11 |
| BA | 60 | 32 | 23 | 27 |
| BAC | 113 | 22 | 5 | 2 |
| LAC | 46 | 33 | 27 | 36 |

**Graph-7 Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects-(a)**

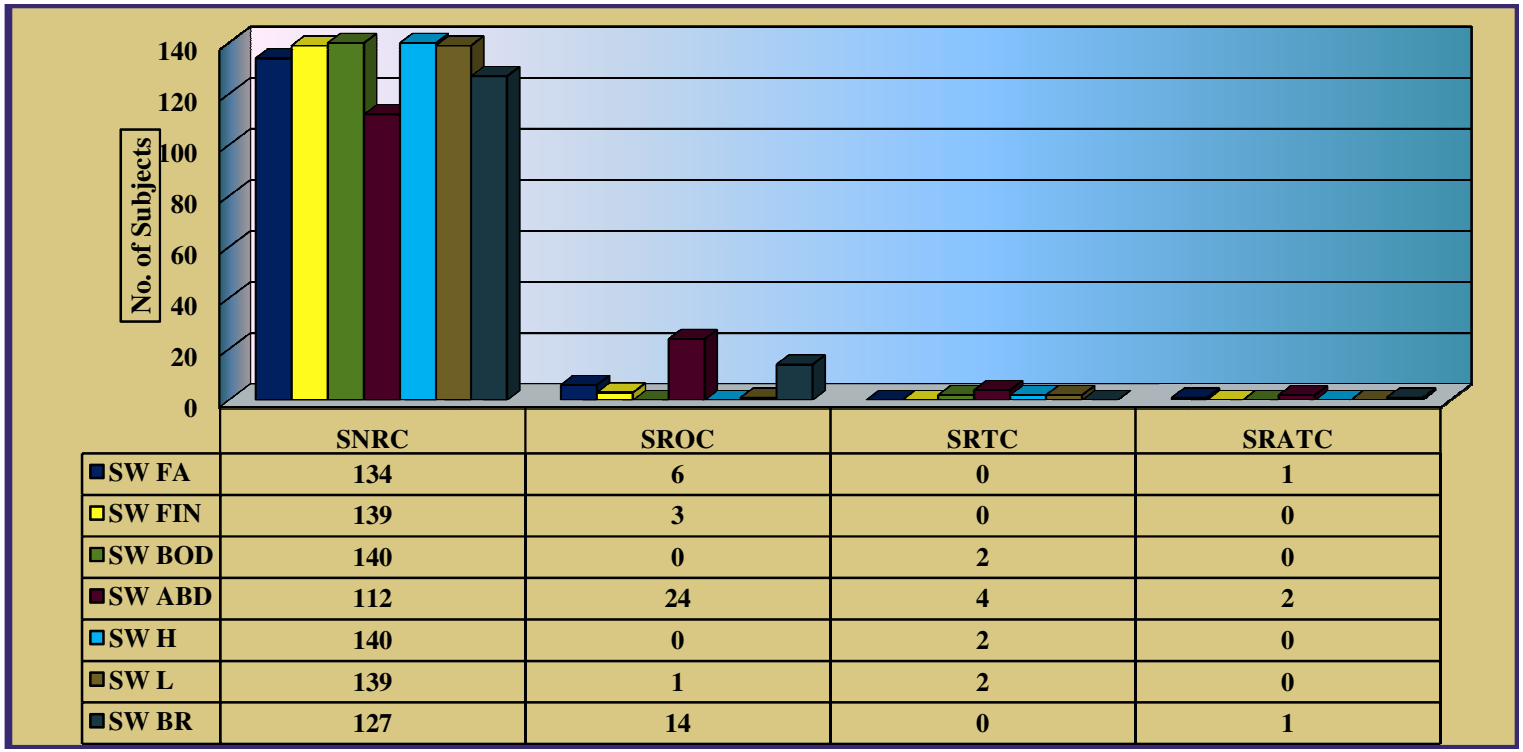
***(HA = Headache, BA = Backache, BAC = Body ache, LAC = Lower Abdominal Cramps, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| BR P | 121 | 10 | 10 | 1 |
| BR MSG | 116 | 19 | 6 | 1 |
| PJ BJ | 133 | 8 | 1 | 0 |
| PJ KJ | 125 | 15 | 2 | 0 |
| PIH | 133 | 7 | 2 | 0 |

**Graph-8 Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects-(b)**

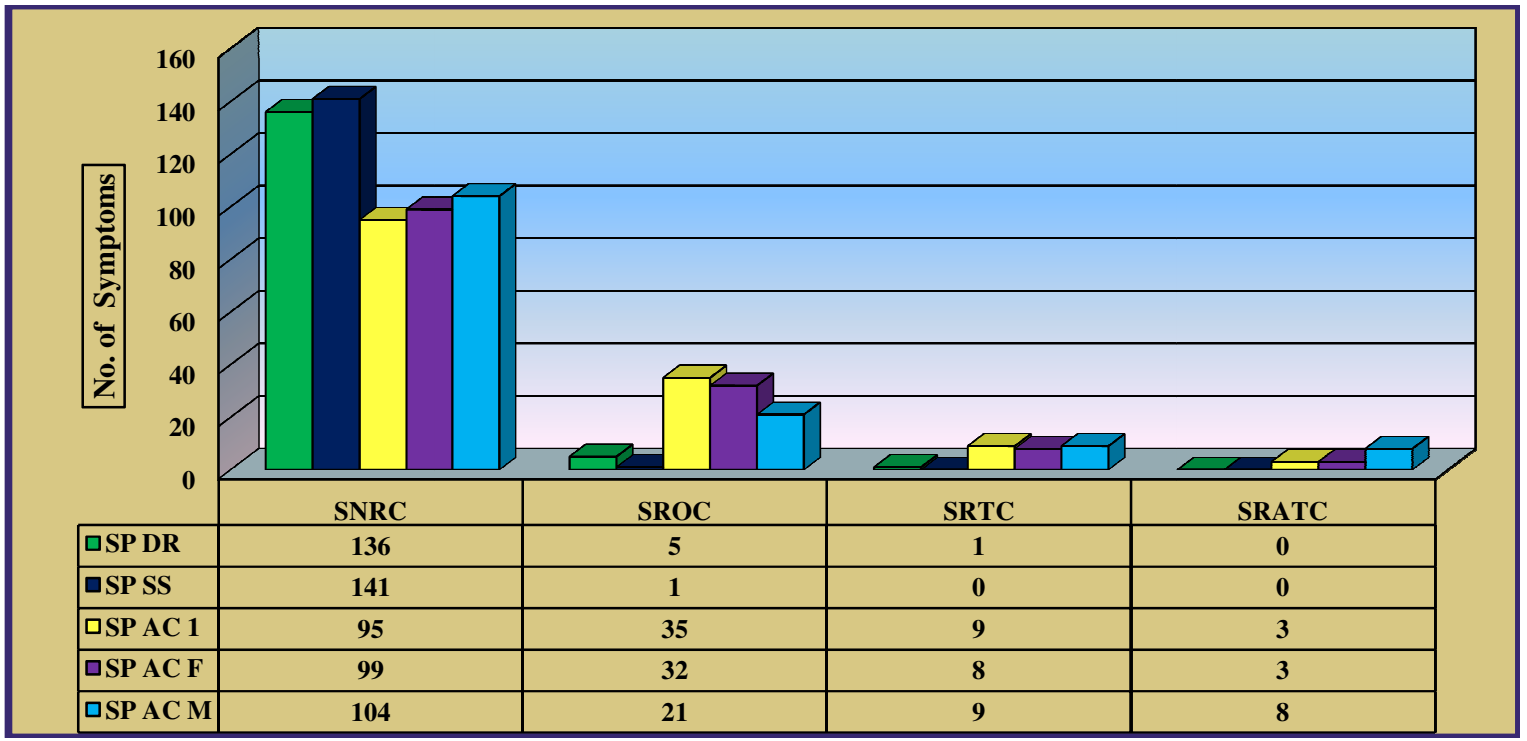
***(BR-P =Breast problems-pain, BR-MSG =Breast problems-mastalgia, PJ BJ =Pain in joints-body joints, PJ KJ =Pain in joints-knee joints, PIH =Pain in hands, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| SW FA | 134 | 6 | 0 | 1 |
| SW FIN | 139 | 3 | 0 | 0 |
| SW BOD | 140 | 0 | 2 | 0 |
| SW ABD | 112 | 24 | 4 | 2 |
| SW H | 140 | 0 | 2 | 0 |
| SW L | 139 | 1 | 2 | 0 |
| SW BR | 127 | 14 | 0 | 1 |

**Graph-9 Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(c)**

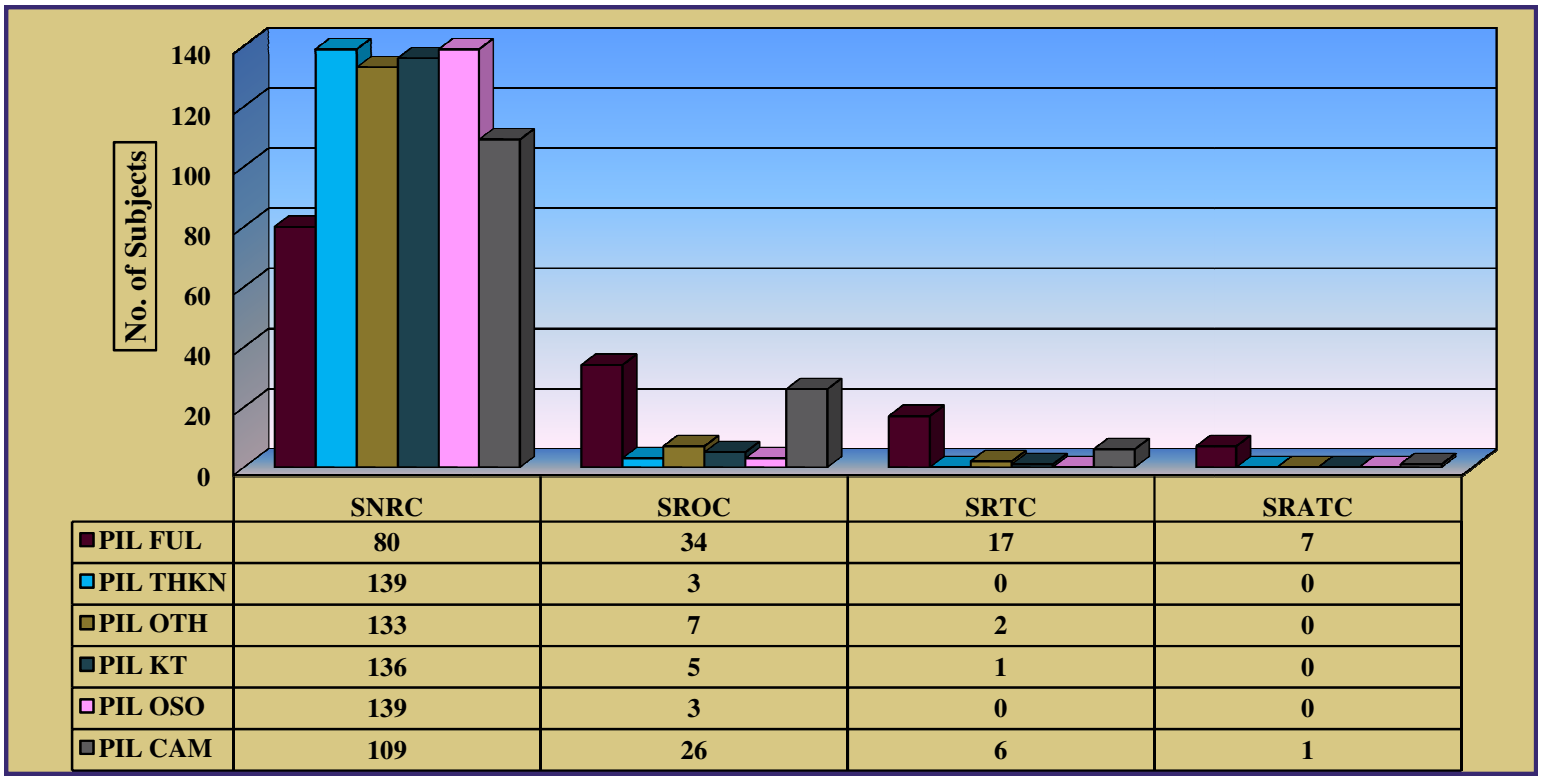
***(SW-FA =Swelling-Face, SW-FIN =Swelling-Fingers, SW-BOD = Swelling-Body, SW-ABD =Swelling-Abdomen, SW-H=Swelling-Hand, SW -L =Swelling-Legs, SW -BR =Swelling-Breast, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| SP DR | 136 | 5 | 1 | 0 |
| SP SS | 141 | 1 | 0 | 0 |
| SP AC 1 | 95 | 35 | 9 | 3 |
| SP AC F | 99 | 32 | 8 | 3 |
| SP AC M | 104 | 21 | 9 | 8 |

**Graph-10Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(d)**

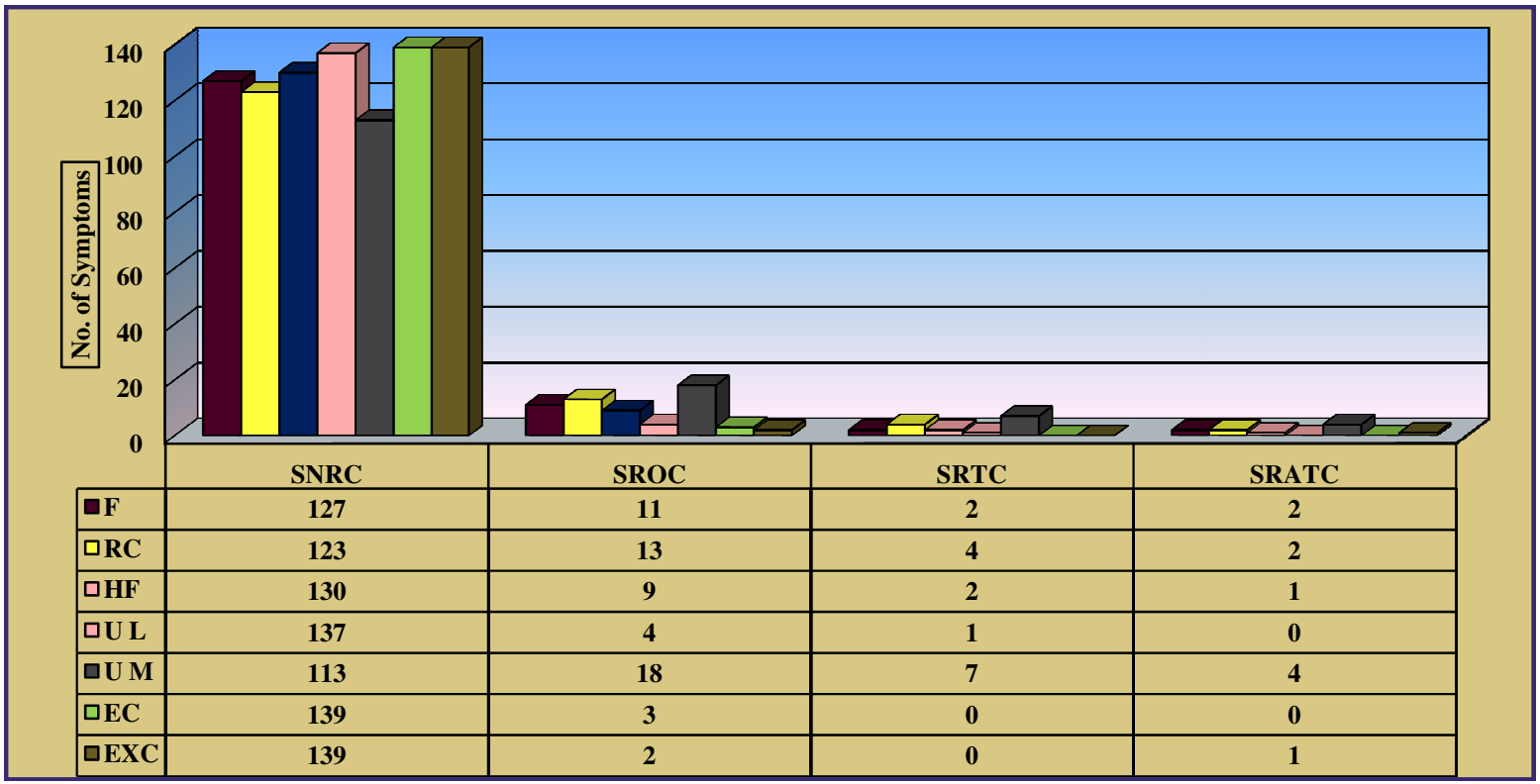
***(SP- DR =Skin problems-Darkening/Dullness, SP- SS =Skin problems-shine of skin, SP-AC-1=Skin problems-acne-one, SP- AC -F =Skin problems-acne-Few, SP-AC- M=Skin problems-acne-many, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| PIL FUL | 80 | 34 | 17 | 7 |
| PIL THKN | 139 | 3 | 0 | 0 |
| PIL OTH | 133 | 7 | 2 | 0 |
| PIL KT | 136 | 5 | 1 | 0 |
| PIL OSO | 139 | 3 | 0 | 0 |
| PIL CAM | 109 | 26 | 6 | 1 |

**Graph-11Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(e)**

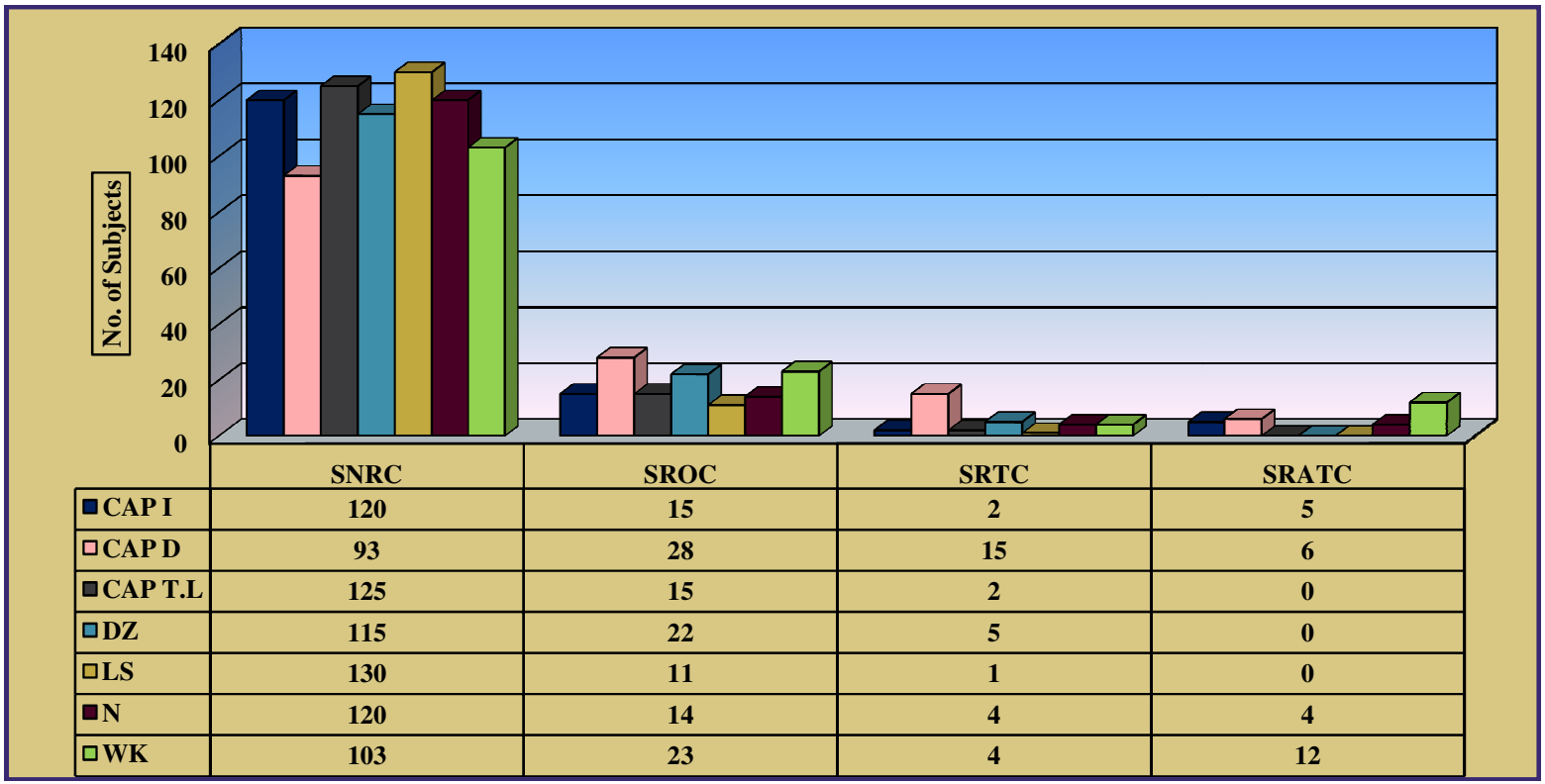
***(PIL-FUL=Pain in legs-full legs, PIL-THKN =Pain in legs-thighs to knees, PIL-OTH=Pain in legs-only thighs, PIL KT=Pain in legs-knees to soles, PIL-OSO=Pain in legs-only soles, PIL-CAM=Pain in legs-calf muscle, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| F | 127 | 11 | 2 | 2 |
| RC | 123 | 13 | 4 | 2 |
| HF | 130 | 9 | 2 | 1 |
| U L | 137 | 4 | 1 | 0 |
| U M | 113 | 18 | 7 | 4 |
| EC | 139 | 3 | 0 | 0 |
| EXC | 139 | 2 | 0 | 1 |

**Graph-12Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(f)**

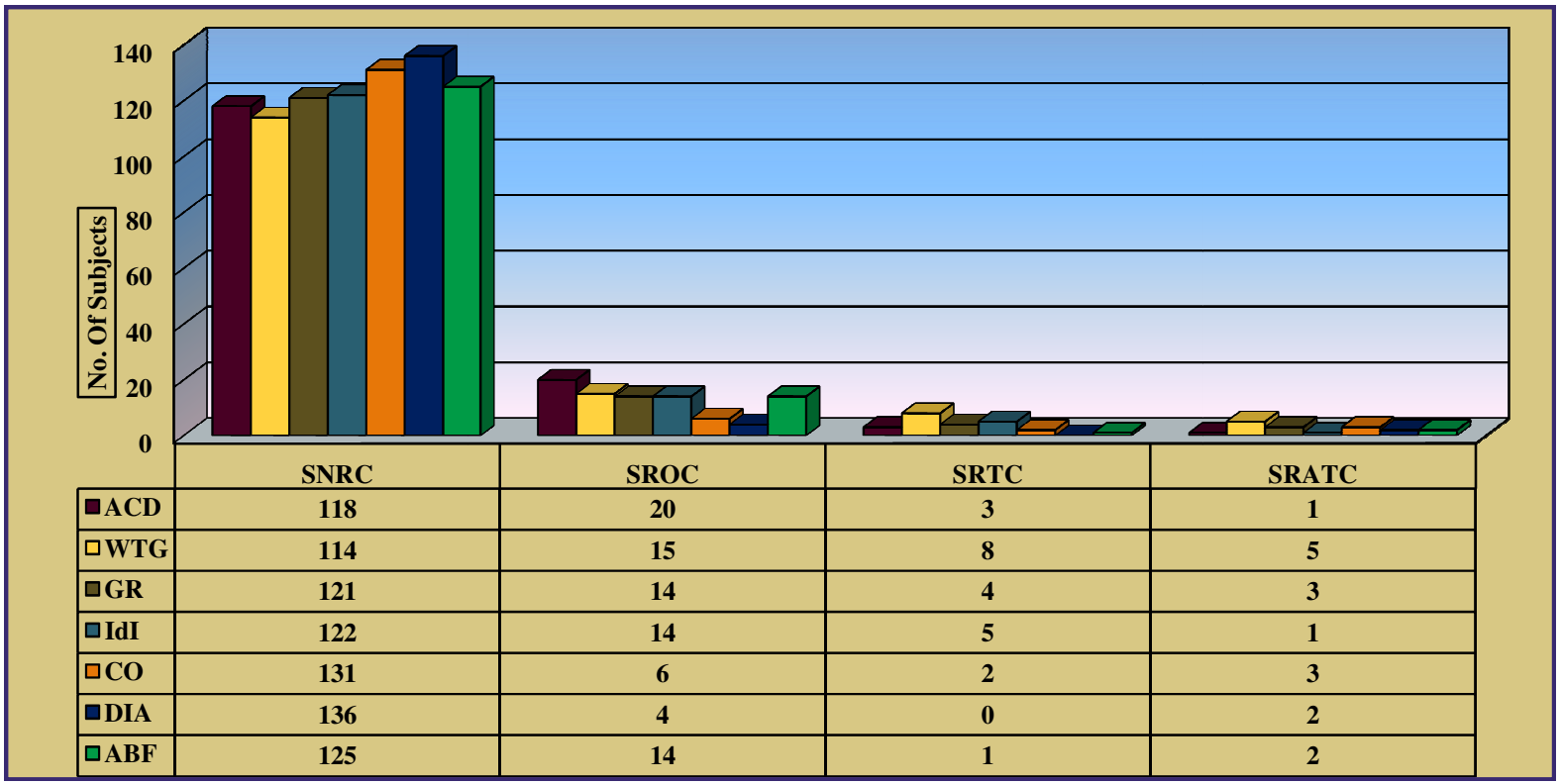
***(F =Fever, RC =Recurrent cold sores, HF =Hot flush, U-L =Urine-Less, U-M =Urine-More, EC =Eye complaints, EXC =Exacerbation of disease, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| CAP I | 120 | 15 | 2 | 5 |
| CAP D | 93 | 28 | 15 | 6 |
| CAP T.L | 125 | 15 | 2 | 0 |
| DZ | 115 | 22 | 5 | 0 |
| LS | 130 | 11 | 1 | 0 |
| N | 120 | 14 | 4 | 4 |
| WK | 103 | 23 | 4 | 12 |

**Graph-13Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(g)**

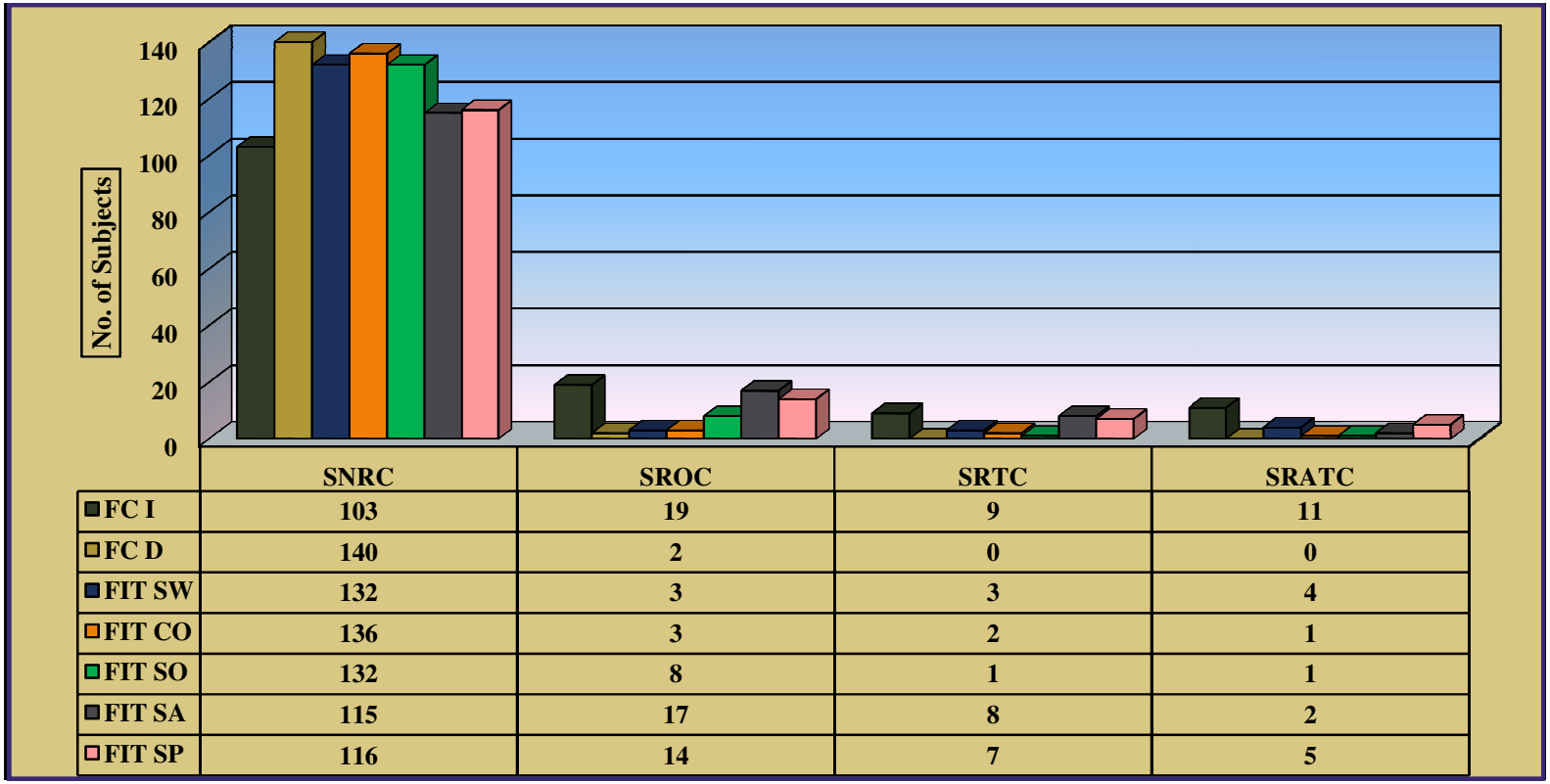
***(CAP- I =Change in Appetite-Increase, CAP-D =Change in Appetite-Decrease, CAP T.L.=Change in Appetite-Total Loss, DZ=Dizziness, LS=Low Sugar, N=Nausea, WK=Weakness, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| ACD | 118 | 20 | 3 | 1 |
| WTG | 114 | 15 | 8 | 5 |
| GR | 121 | 14 | 4 | 3 |
| IdI | 122 | 14 | 5 | 1 |
| CO | 131 | 6 | 2 | 3 |
| DIA | 136 | 4 | 0 | 2 |
| ABF | 125 | 14 | 1 | 2 |

**Graph–14Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(h)**

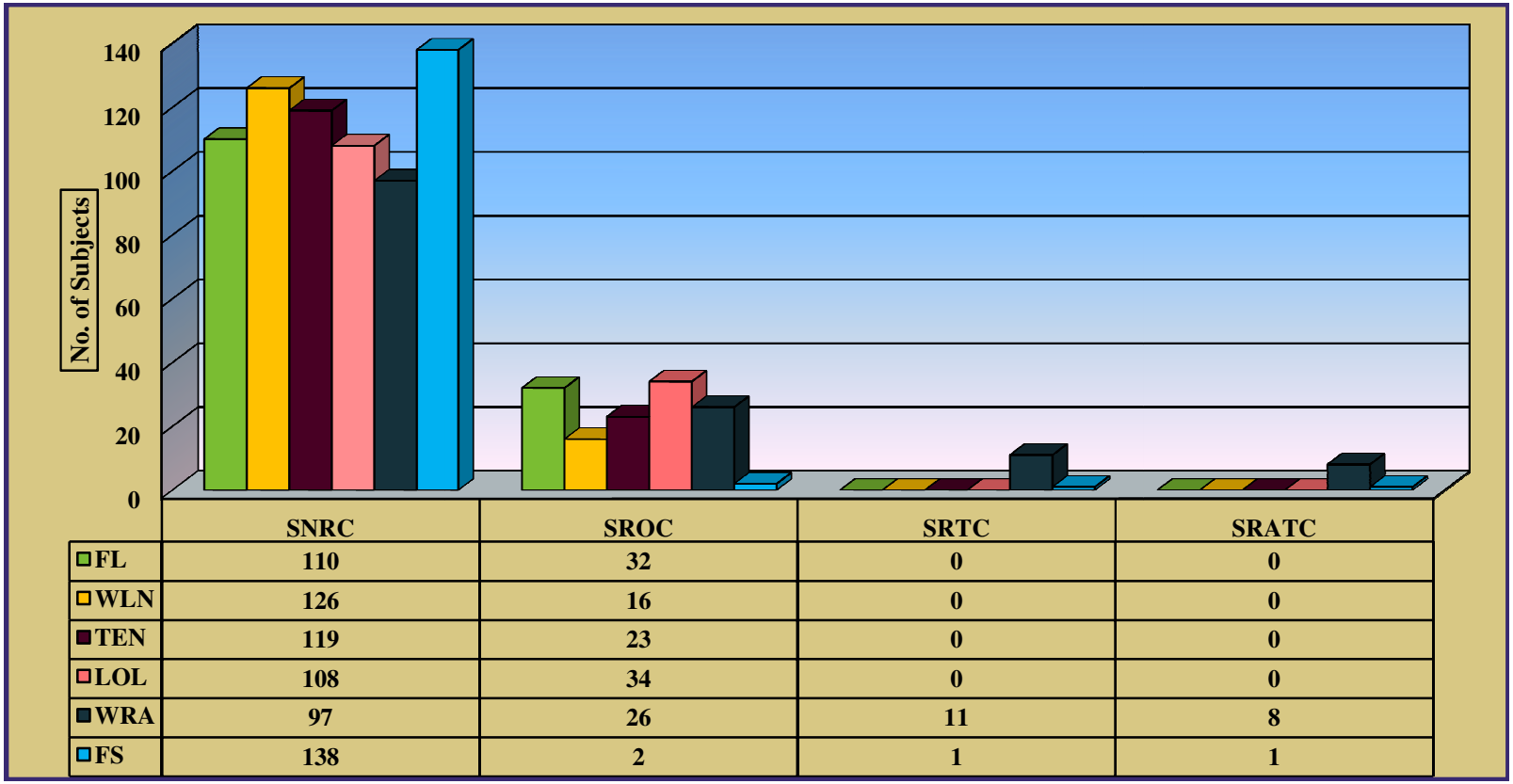
***(ACD=Acidity, WTG=Weight Gain, GR=Gas Retention, IdI =Indigestion, CO=Constipation, DIA=Diarrhoea, ABF=Abdominal Fullness, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| FC I | 103 | 19 | 9 | 11 |
| FC D | 140 | 2 | 0 | 0 |
| FIT SW | 132 | 3 | 3 | 4 |
| FIT CO | 136 | 3 | 2 | 1 |
| FIT SO | 132 | 8 | 1 | 1 |
| FIT SA | 115 | 17 | 8 | 2 |
| FIT SP | 116 | 14 | 7 | 5 |

**Graph–15Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(i)**

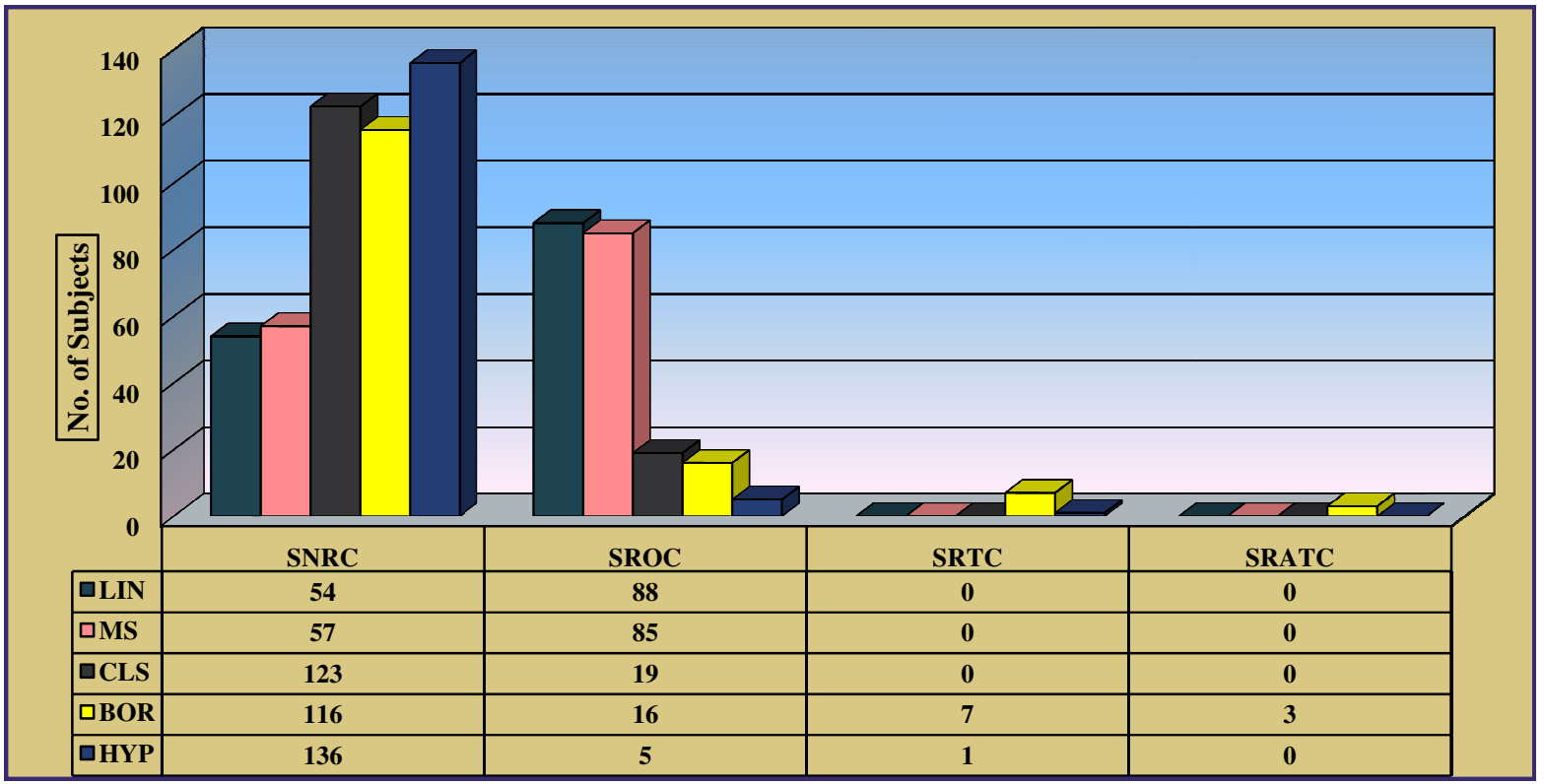
***(FC -I=Food Craving-Increase, FC-D=Food Craving-Decrease, FIT -SW=Craving for food items-sweet, FIT-CO=Craving for food items-cold, FIT- SO=Craving for food items-sour, FIT-SA=Craving for food items-salty, FIT-SP=Craving for food items-spicy, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| FL | 110 | 32 | 0 | 0 |
| WLN | 126 | 16 | 0 | 0 |
| TEN | 119 | 23 | 0 | 0 |
| LOL | 108 | 34 | 0 | 0 |
| WRA | 97 | 26 | 11 | 8 |
| FS | 138 | 2 | 1 | 1 |

**Graph-16Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(j)**

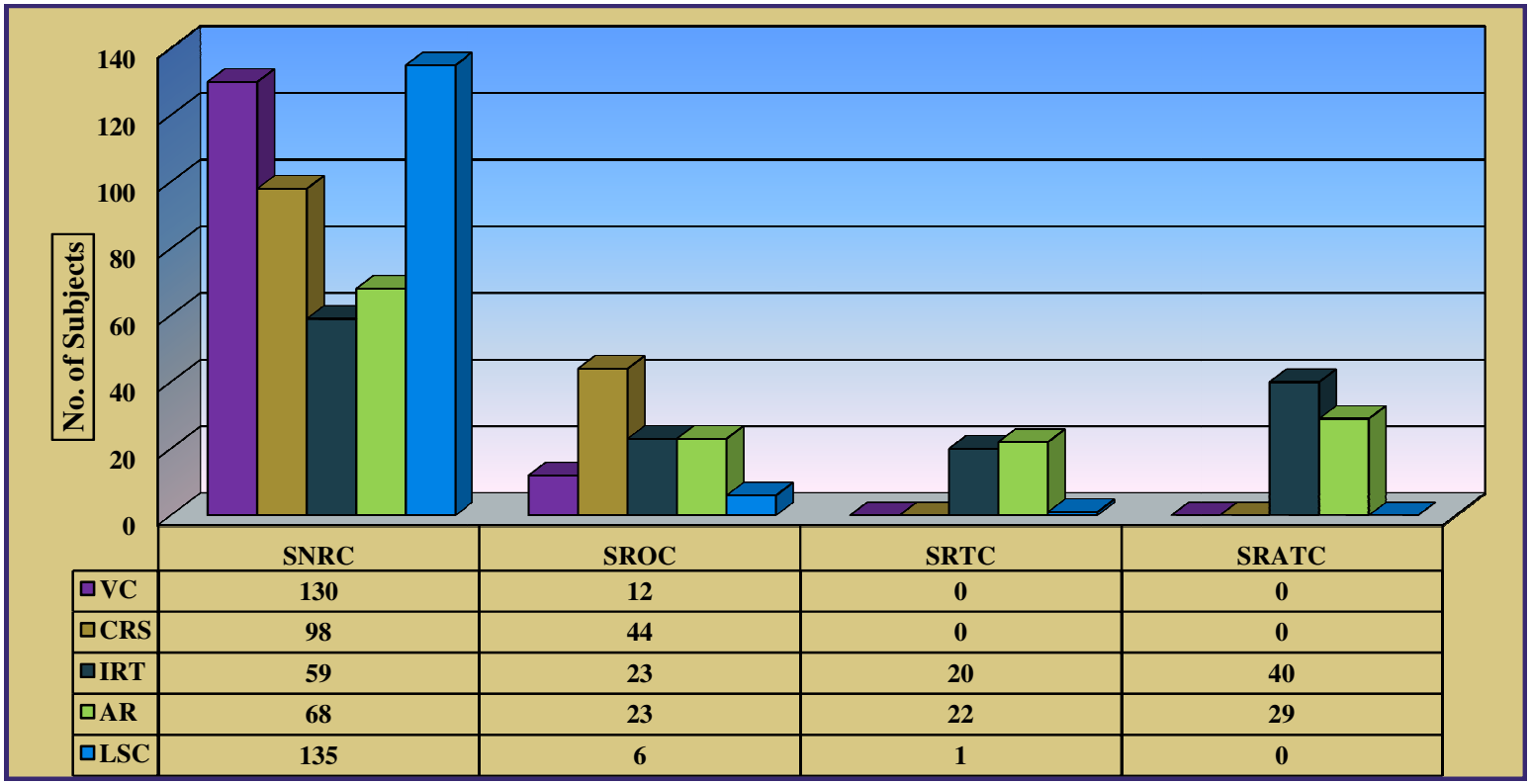
***(F=Feeling Low, WLN=Worthlessness, TEN=Tension, LOL=Loneliness, WRA=Want to remain alone, FS=Feeling Sad, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| LIN | 54 | 88 | 0 | 0 |
| MS | 57 | 85 | 0 | 0 |
| CLS | 123 | 19 | 0 | 0 |
| BOR | 116 | 16 | 7 | 3 |
| HYP | 136 | 5 | 1 | 0 |

**Graph-17 Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(k)**

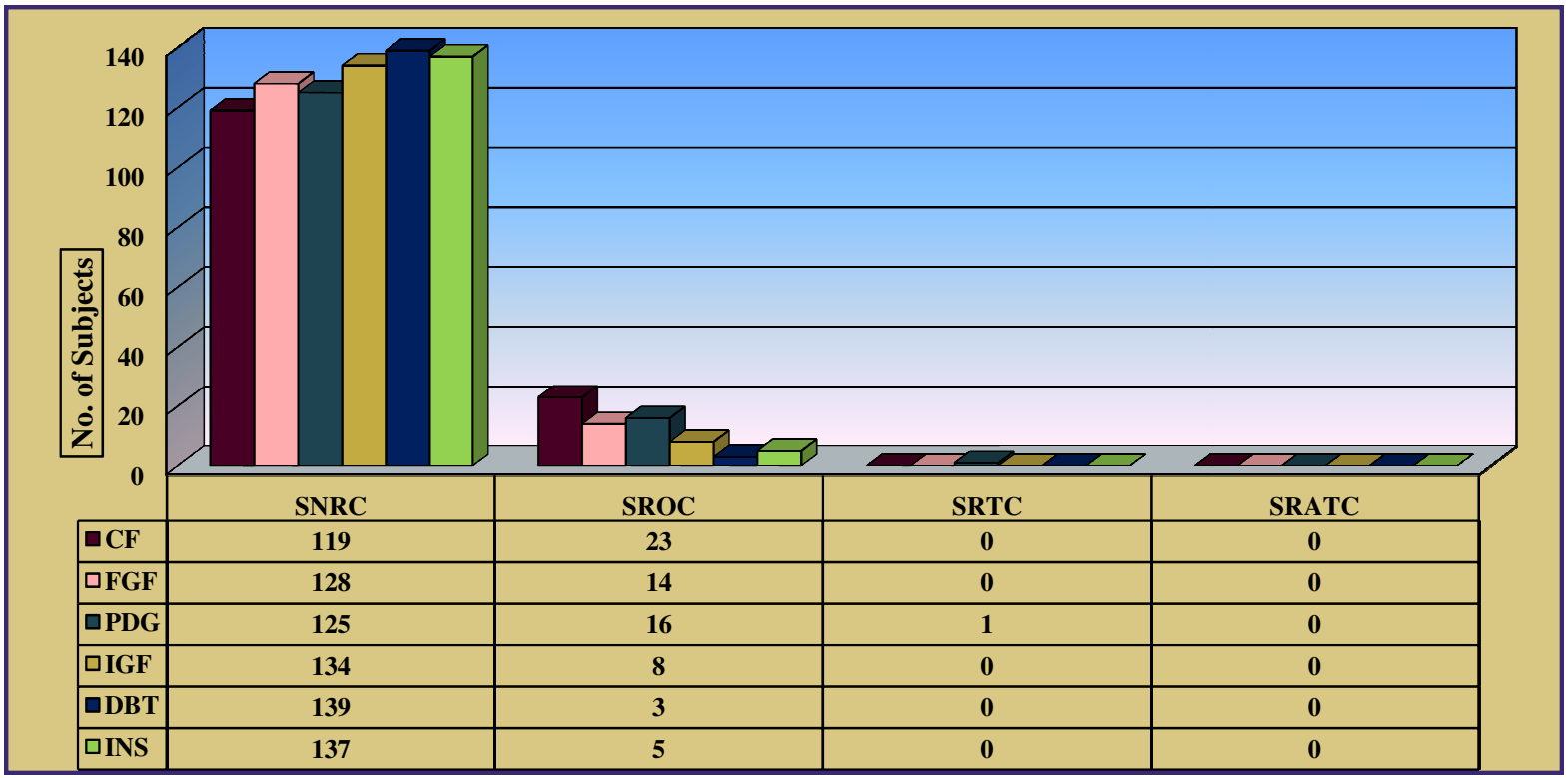
***(LIN=Loss of interest in routine activities/hobbies, MS=Mood Swing, CLS=Clumsiness, BOR=Boredom, HYP=Hyperactivity, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| VC | 130 | 12 | 0 | 0 |
| CRS | 98 | 44 | 0 | 0 |
| IRT | 59 | 23 | 20 | 40 |
| AR | 68 | 23 | 22 | 29 |
| LSC | 135 | 6 | 1 | 0 |

**Graph-18 Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects(l)**

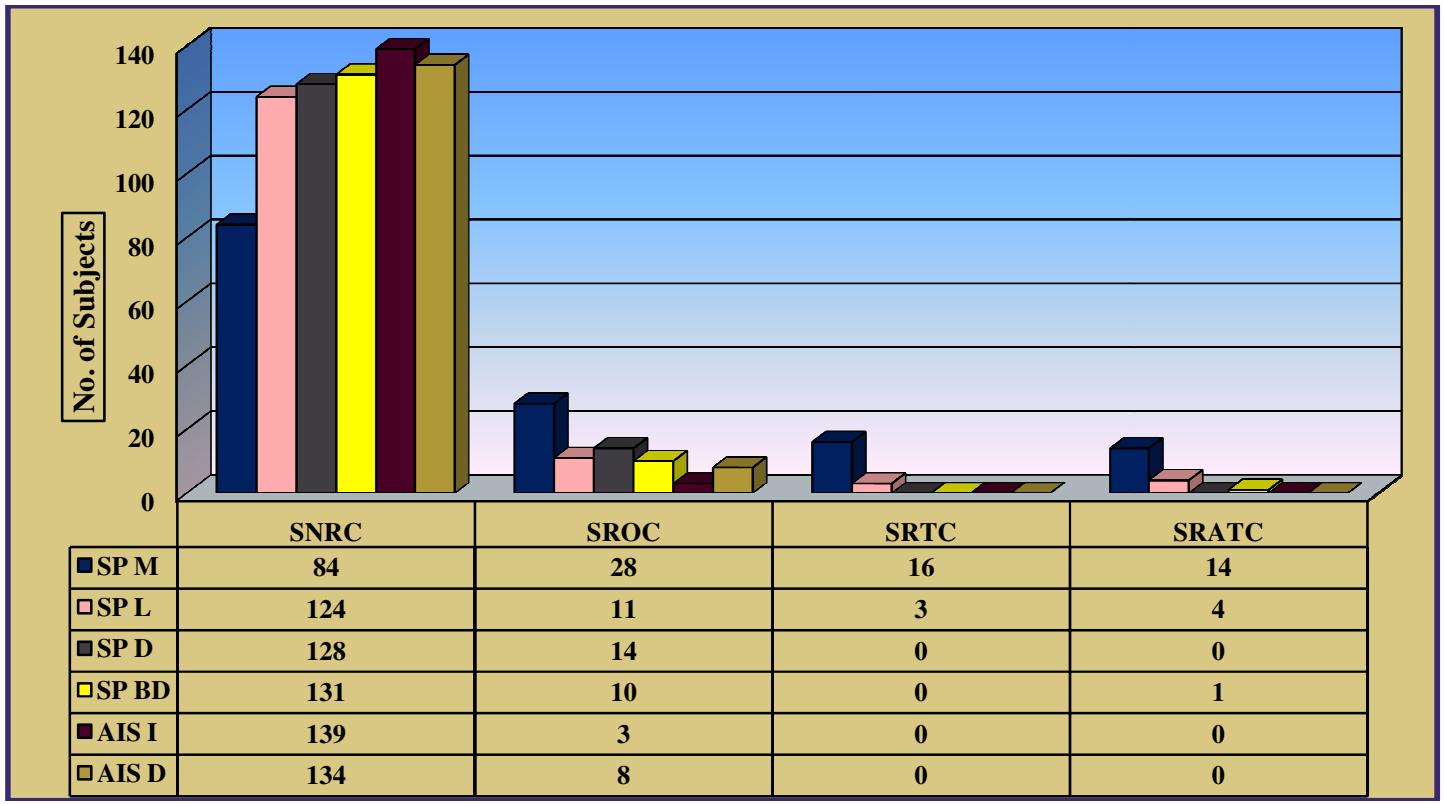
***(VC=Violent Crime, CRS=Cry Spells, IRT=Irritation, AR=Anger, LSC=Loss of self control, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| CF | 119 | 23 | 0 | 0 |
| FGF | 128 | 14 | 0 | 0 |
| PDG | 125 | 16 | 1 | 0 |
| IGF | 134 | 8 | 0 | 0 |
| DBT | 139 | 3 | 0 | 0 |
| INS | 137 | 5 | 0 | 0 |

**Graph-19 Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects –(m)**

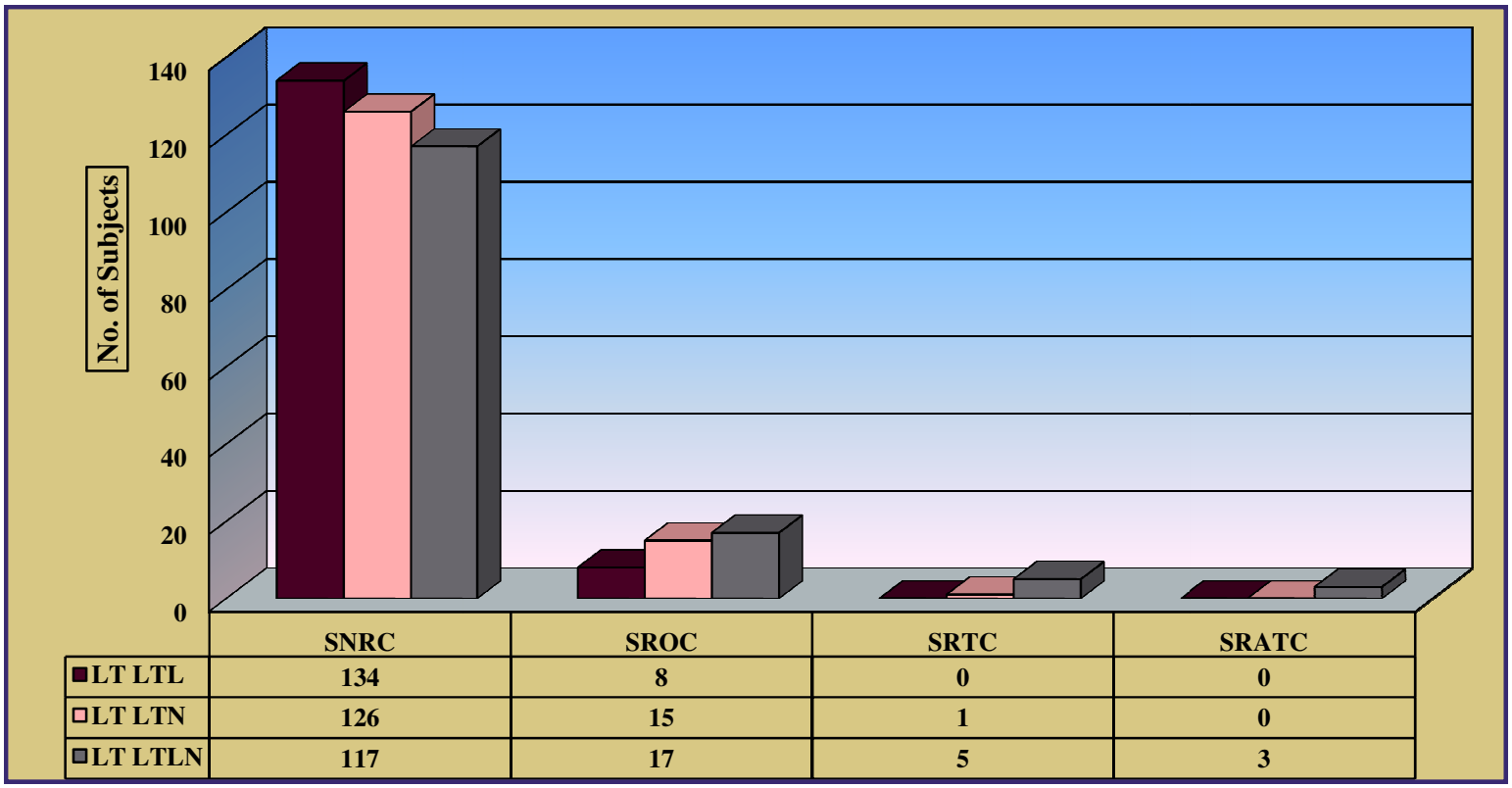
***(CF=Confusion, FGF=Forgetfulness, PDG=Poor Judgment, IGF=Increased guilt feeling, DBT=Doubtfulness, INS=Insecurity, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| SP M | 84 | 28 | 16 | 14 |
| SP L | 124 | 11 | 3 | 4 |
| SP D | 128 | 14 | 0 | 0 |
| SP BD | 131 | 10 | 0 | 1 |
| AIS I | 139 | 3 | 0 | 0 |
| AIS D | 134 | 8 | 0 | 0 |

**Graph-20 Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects-(n)**

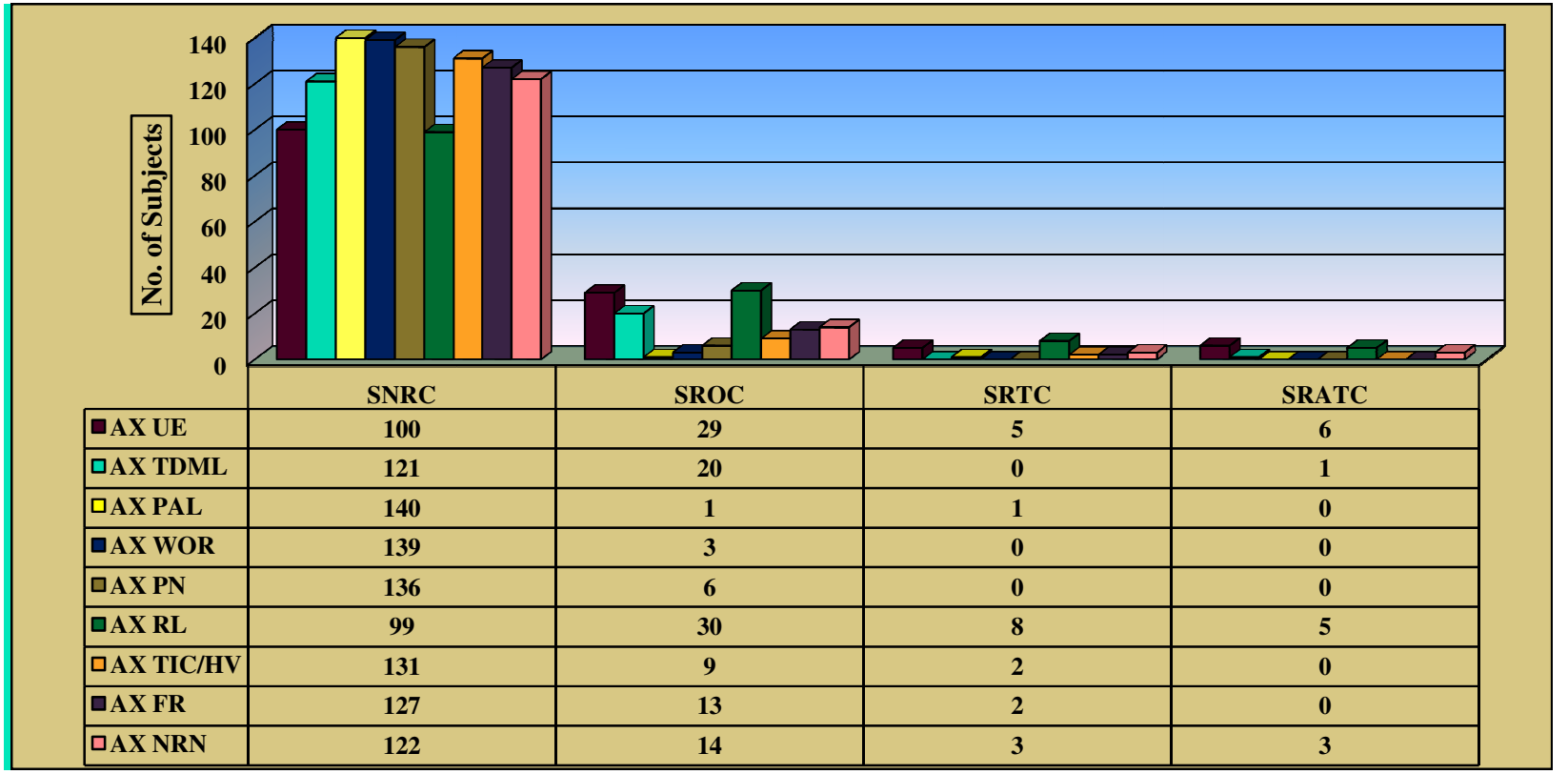
***(SP-M=Sleep-More, SP-L =Sleep-Less, SP-D=Sleep-disturbed, SP-BD=Sleep Bad Dreams, AIS-I=Altered interest in sex-increase, AIS- D=Altered interest in sex-decrease, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| LT LTL | 134 | 8 | 0 | 0 |
| LT LTN | 126 | 15 | 1 | 0 |
| LT LTLN | 117 | 17 | 5 | 3 |

**Graph-21 Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects-(o)**

***(LT=less tolerance, LTLTL=Less tolerance to light, LT LTN=Less tolerance to noise, LT LTLN=Less tolerance to light &noise, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***




| | SNRC | SROC | SRTC | SRATC |
|---|---|---|---|---|
| AX UE | 100 | 29 | 5 | 6 |
| AX TDML | 121 | 20 | 0 | 1 |
| AX PAL | 140 | 1 | 1 | 0 |
| AX WOR | 139 | 3 | 0 | 0 |
| AX PN | 136 | 6 | 0 | 0 |
| AX RL | 99 | 30 | 8 | 5 |
| AX TIC/HV | 131 | 9 | 2 | 0 |
| AX FR | 127 | 13 | 2 | 0 |
| AX NRN | 122 | 14 | 3 | 3 |

**Graph-22 Prevalence and Intensity of PMS symptoms during 3 menstrual cycles of the subjects-(p)**

***(AX=Anxiety, AX-UE=Uneasiness, AX-TDML=Tension due to monotonous lifestyle, AX-PAL=Palpitation, AX-WOR=Worries, AX-PN=Panic, AX-RL=Restlessness, AX-HV/TIC=Hyperventilation/tightening in chest, AX-FR=Fearlessness, AX-NRN=Nervousness, SNRC = Symptoms not reported in any cycle, SROC = Symptoms reported in any one cycle, SRTC = Symptoms reported in any two cycles, SRATC = Symptoms reported in all three cycles)***

Apart from the selected 95 symptoms in this study, there were number of such symptoms which were discovered during the personal dialogue with the subjects. A brief list of these is provided in *CHART – 2*. Also, number of ladies had noticed that when their menses delayed from the expected dates, they suffered more PMS symptoms like abdominal cramps and acne, along with heavy bleeding. This should also be a matter of further studies to know the nature of PMS.

**Chart – 2 Few PMS symptoms observed during survey besides the study of selected 95 symptoms**

**Following are few of the indicators prior to menses which were also mentioned by subjects during their personal interviews and are novel to this research and perhaps an addition to the list of PMS symptomatology.**

**Physical Symptoms**

(1) Ulcers in mouth

(2) Itching in vagina

(3) White discharge

(4) Any one leg pain

(5) Any one hand pain

(6) Body itching

(7) Feels excessively thirsty

(8) Vaginal pain / spasm

(9) Ankle pain

(10) Skin blisters

(11) Dark circles around the eyes

(12) Leg stiffness and muscular pain

(13) Stickiness in lower parts of body

(14) Blood pressure fluctuates (usually show rise in B.P.)

(15) Itchy soles

(16) Skin darkness around lips and chin

(17) Grip of fingers and hands is not strong, so number of things fall down or skip from hands.

**Psychological / Behavioural Symptoms**

(1) Come across negative thoughts

(2) Come across too many thoughts

(3) Dreams related to menses

(4) Maximum achievement during PMS in Sports

(5) Becomes more creative during PMS

(6) Come across strange unreal thoughts

For further in - depth study , investigator adopted a popularly accepted classification pattern of PMS symptoms suggested by a leading Obstetrics and Gynecologic Endocrinologist Dr. Guy E. Abraham, of UCLA School of Medicine of University of California, at Los Angeles,

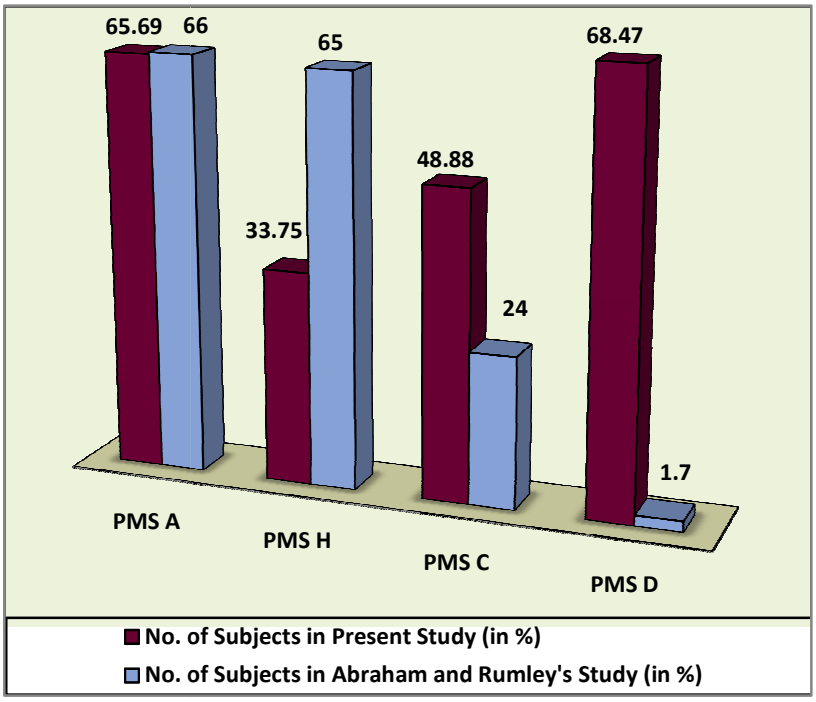
USA. He had conducted extensive investigation into this disorder and once noted that 'PMS is the major cause of divorce'. He gave four subgroups namely PMS - A, PMS - C, PMS - H and PMS - D. Each subgroup is linked with specific PMS symptoms, hormonal patterns and metabolic abnormalities. Besides this, he considered the most common symptoms for this classification. These symptoms were also the ones which PMS patients seek medical advice and relief for. These can occur singly or in combination with other subgroups and are characterized by typically occurring symptoms (Abraham, 1983; Lark, 1989; www.drkaslow.com/html/premenstrual_syndromes.html, Abraham and Rumley, 1987). Even though the concept of defining sub groups of PMS based on symptom patterns is appealing, in present time there is no evidence to suggest that these subgroups represent different etiologies or different pathophysiological mechanisms. These four categories so described by Abraham (1983) are as follows:

**(1) PMS - A (Anxiety):** wherein irritability, anger, mood swings, decreases in sleep, nervousness, tension due to monotonous life, restlessness, fearfulness and uneasiness are the main responsible symptoms.

**(2) PMS - C (Carbohydrates or Craving):** sugar craving specially chocolates or ice-cream, palpitation, fatigue, headache, dizziness and increase in appetite are the chief symptoms.

**(3) PMS - H (Hyper hydration):** Here, bloating (breast, abdominal and body swelling) and tenderness, weight gain, breast pain and mastalgia and occasionally edema of face and extremities are considered.

**(4) PMS - D (Depression):** Depression (feeling low, worthlessness, loss of interest from routine activities and or hobbies, cry spells, loneliness, want to remain alone, violent crimes) and or hobbies, confusion, clumsiness, boredom, memory loss, suicidal thoughts, lethargy are the major factors of this subgroup.




**Graph – 23 Comparison of PMS types**

In present investigation, with slight modification in the checklist of symptoms, when the presence of the cluster of symptoms of these groups was checked, then **maximum 68.47 % (493/720) respondents fell a part of PMS - D, whereas minimum subjects were a part of PMS – H (33.75%, 243 / 720). Presence of PMS – A was found to be 65.69 % (473 / 720) while 48.88 % (353 / 720) subjects were classified into PMS – C** *(GRAPH – 23)*. But these results were quiet uncommon to the conclusions of Dr. Abraham and Rumley (1987) in their research on 702 PMS sufferers. According to their evaluation

PMS – A is commonly prevalent in women ( in their study 66%) , followed by PMS – H (with their study 65%) which is the second – most – common PMS subgroup, thereafter PMS – C ( 24% in their study) and lastly PMS – D (1.7 % with their study) *(GRAPH – 23).*

It is a matter of serious concern that the least expected sub syndrome PMS - D (Depression) ranks first here! Moreover, when one looks at the rate of PMS – A (Anxiety) which is very close to PMS – D in prevalence, the thought that psychological and mental health of Indian subjects demand immediate attention and action becomes even stronger. On further study, from *TABLE –27* one derives that on an average in subgroup PMS – D, subjects' show 7-8 symptoms out of 12 and with PMS – A, 6-7 out of 9 symptoms. Maximum number of symptoms observed in case of PMS – D is 10 / 12 while for PMS – A its 9 /12. But, in case of PMS – H and PMS – C, both shows on an average 3 out of 6 symptoms. Also, it is worth revealing that respondents in present study might be showing combination of more than two sub groups, or might be prone to become a part of such combinations, which is a matter of further research study.

According to Abraham (2002) and Mertz (1972), patients with PMS – A have elevated blood estrogen and or decreased blood progesterone during the luteal phase of the menstrual cycle. Abraham, (1984) also reveals from his studies that estrogens are central nervous system (CNS) stimulants and associated with neurotransmitters while progesterone is CNS depressant. With such biological profile, micronutrients also play a vital role in triggering certain symptoms (Abraham, 2002). This reasoning seems to be quiet considerable with present study sample as from the dietary habits of all these respondents we already know that they are ought to have a poor state for micronutrients and to some extent even hormones.

**Table - 27 Maximum and minimum number of symptoms as per Abraham's PMS types in each age group**

| Age | Minimum No. of Symptoms | PMS - A (Total 9 symptoms) | PMS - H (Total 6 symptoms) | PMS - C (Total 6 symptoms) | PMS - D (Total 12 symptoms) |
|---|---|---|---|---|---|
| | | Maximum No. of Symptoms | Maximum No. of Symptoms | Maximum No. of Symptoms | Maximum No. of Symptoms |
| 13 | 1 | 7 | nil | 3 | 7 |
| 14 | 1 | 5 | nil | 3 | 6 |
| 15 | 1 | 7 | 2 | 4 | 8 |
| 16 | 1 | 6 | 2 | 3 | 8 |
| 17 | 1 | 7 | 2 | 3 | 7 |

| | | | | | |
|---|---|---|---|---|---|
| 18 | 1 | 7 | 3 | 2 | 8 |
| 19 | 1 | 5 | 2 | 4 | 6 |
| 20 | 1 | 5 | 4 | 2 | 6 |
| 21 | 1 | 7 | 3 | 2 | 7 |
| 22 | 1 | 5 | 3 | 2 | 6 |
| 23 | 1 | 6 | 2 | 3 | 7 |
| 24 | 1 | 6 | 2 | 3 | 8 |
| 25 | 1 | 7 | 3 | 3 | 9 |
| 26 | 1 | 6 | 3 | 3 | 9 |
| 27 | 1 | 9 | 4 | 3 | 8 |
| 28 | 1 | 5 | 3 | 2 | 5 |
| 29 | 1 | 7 | 2 | 2 | 10 |
| 30 | 1 | 5 | 3 | 2 | 9 |
| 31 | 1 | 7 | 4 | 3 | 10 |
| 32 | 1 | 6 | 3 | 2 | 8 |
| 33 | 1 | 6 | 4 | 3 | 8 |
| 34 | 1 | 7 | 4 | 3 | 9 |
| 35 | 1 | 6 | 4 | 3 | 7 |
| 36 | 1 | 6 | 3 | 4 | 6 |

Another possibility for presence of depression and anxiety might be due to the low adjustment capacities of the individuals towards situations in life making them more susceptible to illness (Riche and Milner, 1971; Rao, 1976) and the increase in unpleasantness of the stresses leading to anxiety and its association with illness (Holmes and Masuda, 1972; Rao, 1976). Furthermore, studies have shown that daily stressors are perceived by patients with PMS as more stressful premenstrually and less stressful postmenstrually than similar events experienced by women without symptoms of PMS (Woods *et al.,* 1985;

Whitehead *et al.,* 1986; Daugherty, 1998). In addition to this, as per investigator, depleted degree of adaptability and tolerance capacity might also be playing a pivotal role on the minds of these female participants, which led them to be depressed and anxiety.

In addition to above studies, rating scale Shortened Premenstrual Assessment Form (SPAF) *(ANNEXURE – II)* given by Allen *et al.,* 1991, was applied on 160 subjects, for a quick legitimate conclusion. For interpretation, the 10 symptoms of SPAF are groups in 3 subscales (Omar *et al.,* 2009 and Kathleen *et al.,* 2006) namely:

**(1) Subscale -1 Pain:** (a) Pain, tenderness, enlargement or swelling of breasts (b) Backaches, joint and muscle pain, or joint stiffness (c) Relatively steady abdominal heaviness, discomfort or pain).

**(2) Subscale - 2 Affect:** (a) Feeling unable to cope or overwhelmed by ordinary demands (b) Feeling under stress (c) Outburst of irritability or bad temper (d) Feeling sad or blue

**(3) Subscale - 3 Water retention:** (a) Weight gain (b) Edema, swelling, puffiness, or water retention (c) Feeling bloated.

From descriptive statistics it was discovered that Gujarat based subjects in present investigation showed more **physical symptoms**

**related to pain (SC - 1 Pain) then affect symptoms (SC - 2 Affect) and lastly water retention (SC - 3 Water retention).** These results are quiet pertinent and akin with the conclusions of Tamilselvi (2012) that pain is the major PMS problem when she studied both rural and urban Indian females.

It's clear once again that prevalence of physical symptoms is more than psychological – behavioural. Additionally, as per the grouping given by Abraham (1983) PMS – H (Hydrated) has similar symptoms like that of SC 3 – water retention, and the results obtained in both are also similar. In both these groups number of subjects reporting symptoms is very less. Thus bloating and water retention are surely not major PMS problems for study subjects.

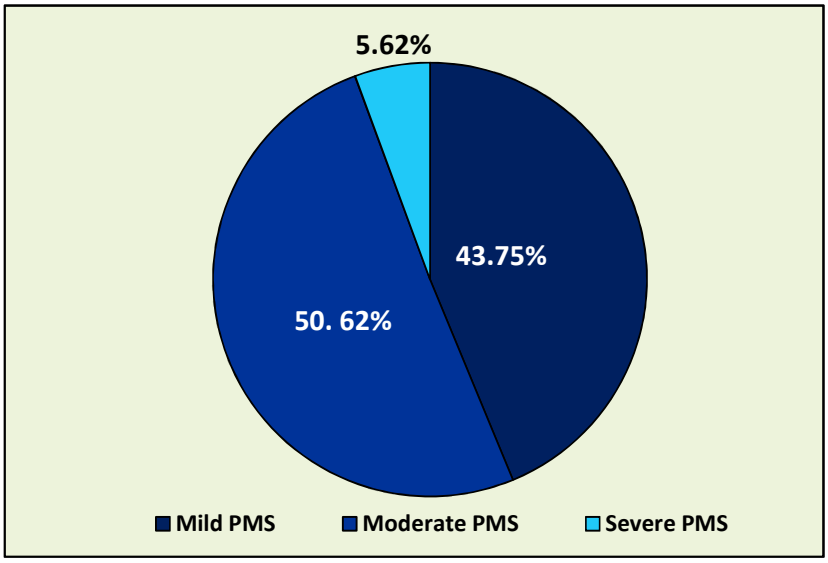
Though the rate of physical symptoms is higher than psychological ones, it is very likely that psychological problems mostly go unnoticed by these subjects unless they are extremely severe, and thus it is very much possible that during the conversation with the investigator, they could not recall many psychological problems that easily, the way they could for physical symptoms. As such psychological issues are very difficult to understand particularly for a layman that to for

these subjects for whom not only PMS or menstrual problems are natural and casual but they also show very little consideration towards their own health.

Additionally, from the survey, literature review and data analysis, another observation was derived that world over women do suffer PMS but perhaps psychological problems during PMS are higher and more common in European countries rather than Asian and African countries. Along with above mentioned possible reason, social security and cultural environment must be playing a critical role here. But of course this needs a deep analysis to establish it scientifically.

## (IV) Intensity and severity of PMS

Along with PMS Questionnaire *(ANNEXURE – I)*, as mentioned previously SPAF *(ANNEXURE – II)* was also used for a quick analysis of most regularly felt 10 PMS symptoms amongst 160 participants of present study. Each symptom had to be scored from 1(minimum or nil) to 6 (maximum or extreme) as per the severity experienced by the subjects making the total score from 60.




**Graph – 24 Intensity of PMS in Study Sample**

When evaluated, **the scores reveal that there exists moderate PMS in about 50.62 % (81 / 160) subjects and mild PMS in 43.75 % (70 / 160) subjects** *(GRAPH – 24).*

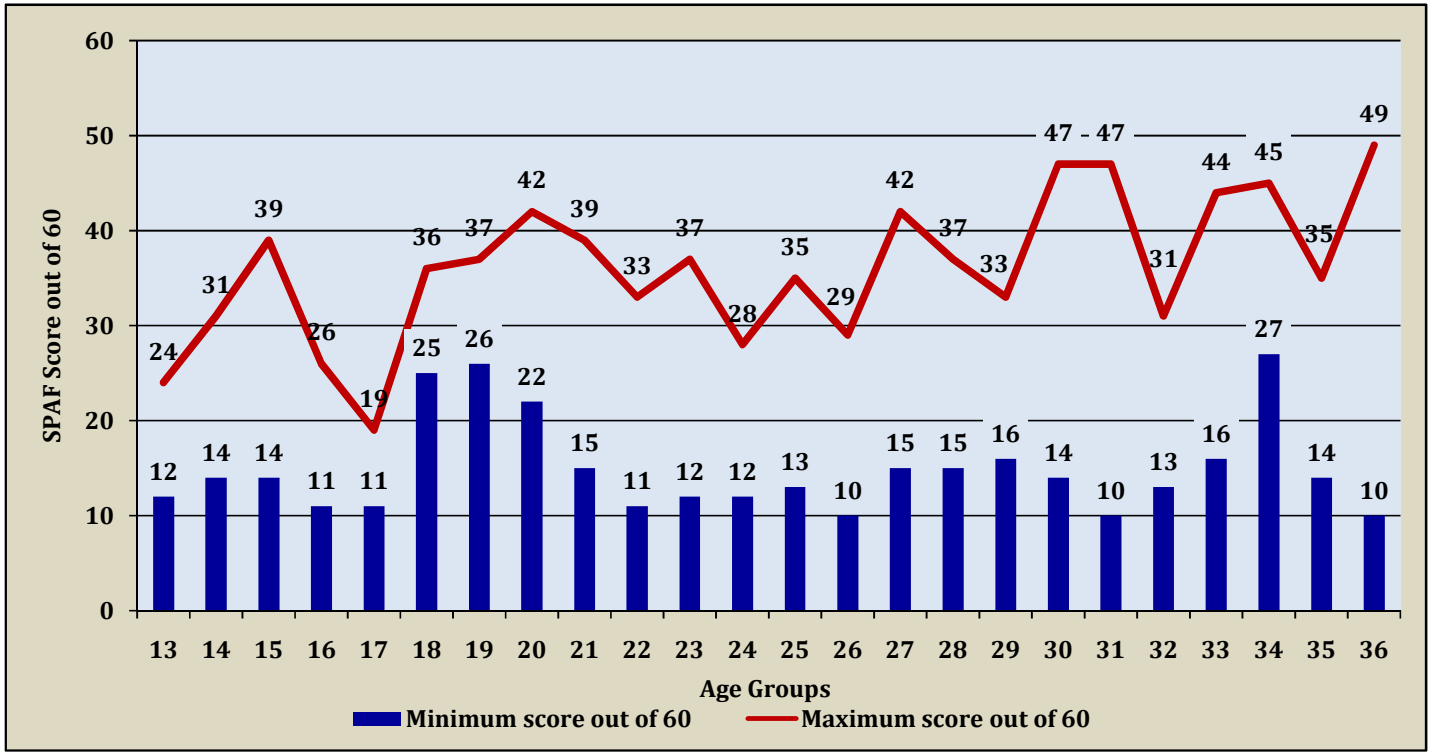
Although one can't neglect still, the fair part was that only **5.62 % (9 / 160) respondents were in the range of severe PMS**. This incidence of severe PMS is close to the findings (6.1 % severe PMS) of Adiguzel *et al.*, (2007) done on 541 women in Manisa, Turkey. Although, when compared to the studies from Manglore, India – 15 % moderate PMS (Mathias, 2006-a) and Peshawar, Pakistan – 18.2% moderate PMS (Tabassum *et al.*, 2005), it was noted that the frequency of moderate PMS is quiet high in present study. This might be as in both these studies only

younger group of females of age group 13 to 24 years were chosen. But, even if we consider the difference of age in all these 3 studies, still Mangalore subjects show a frequency of 7% sever PMS which is very close to the present study while the Pakistanis have 42% mild PMS, which again is close to the mild PMS incidences here.

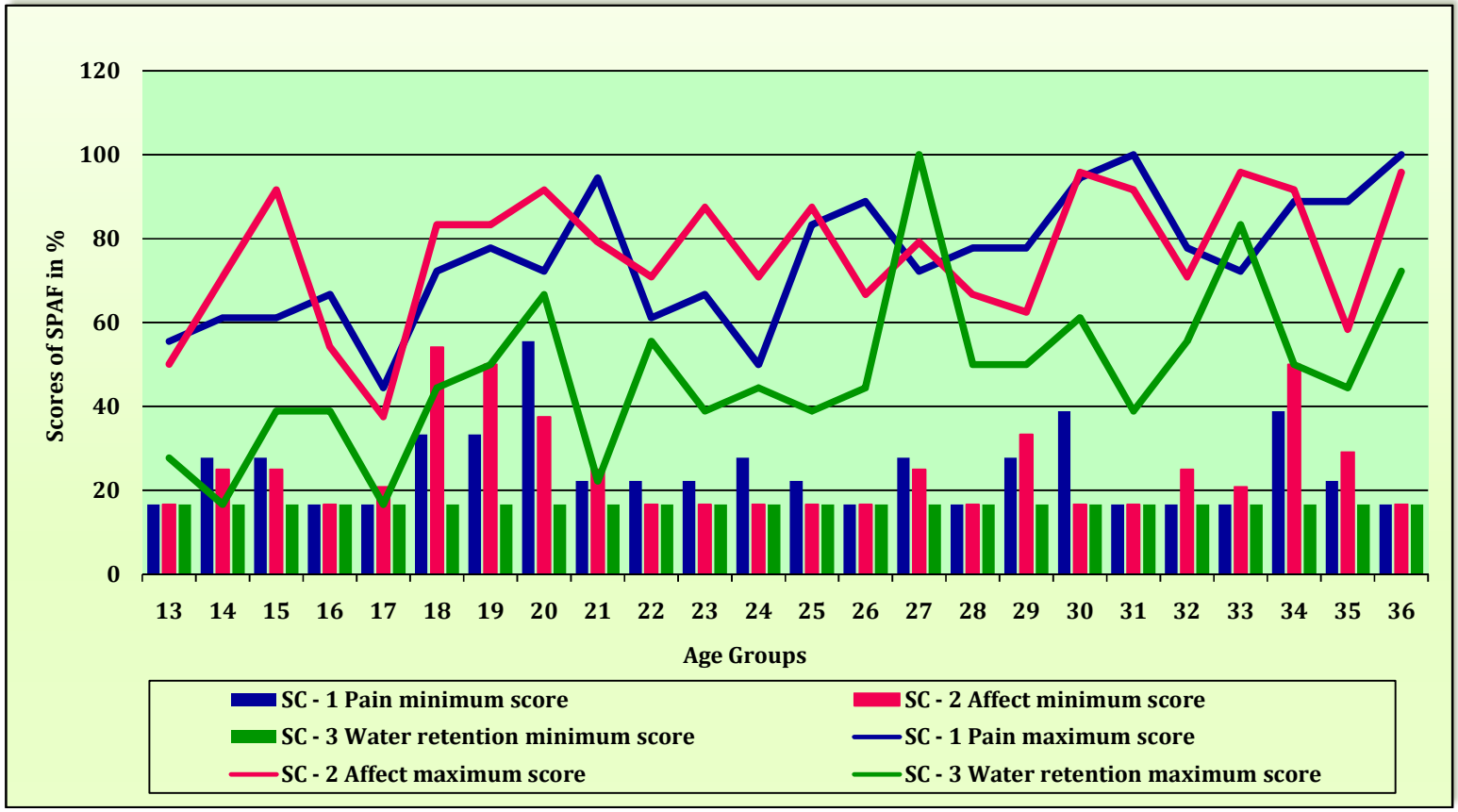
30 % (48 / 160) cases were detected to have scored 30 or more than 30 out of 60 which surely makes them strong candidate who are at high risk of PMS. Lowest score in this group of 160 ladies was 10 / 60 and highest came out to be 49 / 60 *(GRAPH - 25).*

According to Allen's interpretation through 3 subscales as mentioned above, the minimum score of these 160 subjects was 3 for each subscale while maximum was 18 / 18, 23 / 24 and 18 / 18 for SC – 1 , SC – 2 and SC – 3 respectively. This can be studied through *GRAPH - 26.* The individual scores of subjects per age group (from 13 to 36 years) are depicted in *GRAPHS 27 to 50.* Throughout the age groups, as the scores reveal, SC-1 Pain and SC-2 Affect are going almost going parallel but these scores increase after 18 years of age. Also, *GRAPHS 27 to 50* show that SC-3 Water retention is seen to increase after in late twenties and early thirties. This might be related to changing physiology due to

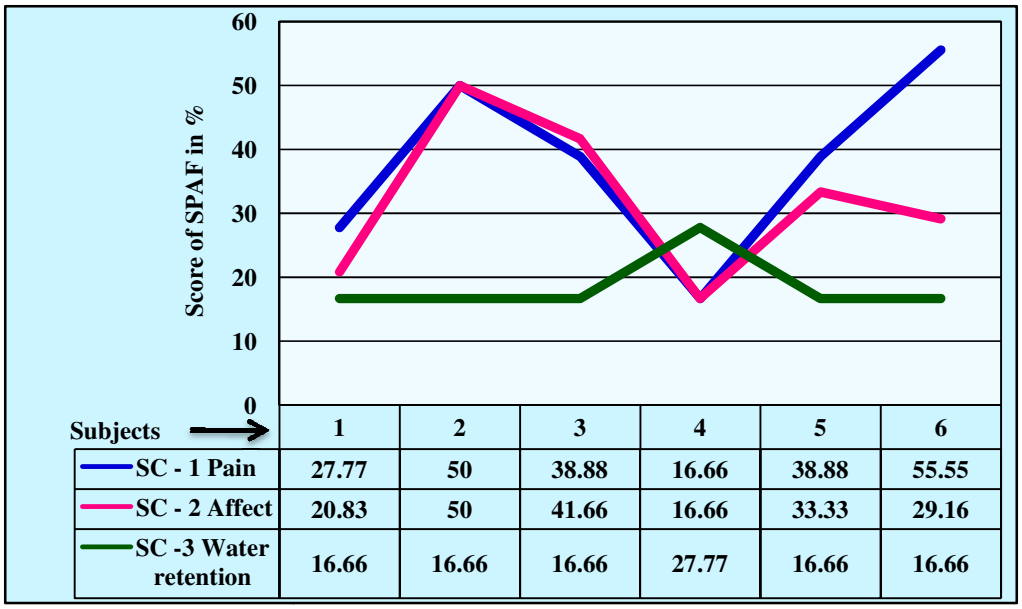
age, marital status, pregnancies etc. However, this rating scale added one more clue about PMS in present study and that was that PMS not only existed but its existence was in variable degrees of severity and intensity in subjects. It would be alarming to note at this juncture, that as severity of menopausal symptoms are directly proportional to the premenstrual symptoms suffered (Abraham *et al.,* 1994) , all these above mentioned subjects might be at higher risk of worst type of premenopausal and menopausal states in future.




**GRAPH – 25 Minimum and Maximum SPAF Scores (in %) in age groups 13 to 36 years**

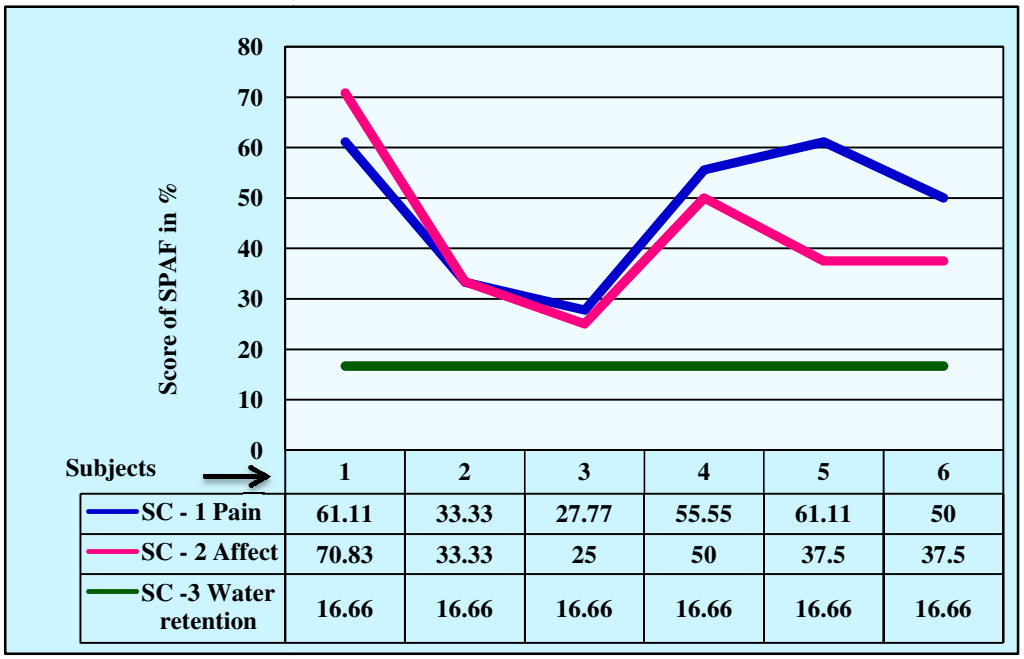



**GRAPH – 26 Minimum and Maximum SPAF Scores with respect to Allen's subscales (in %) in age groups 13 to 36 years**



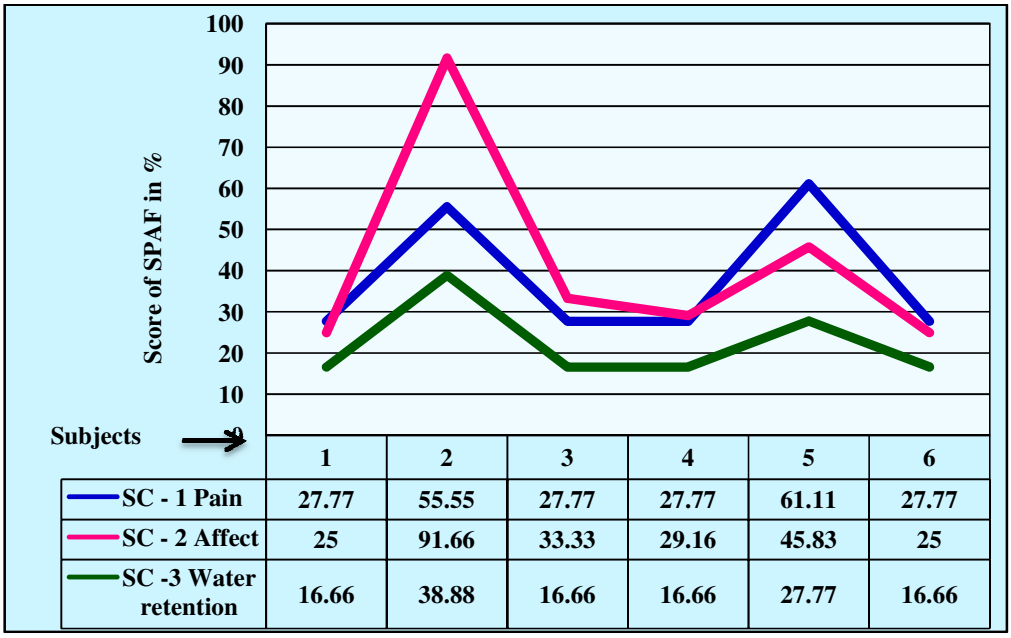

| Subjects → | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| SC - 1 Pain | 27.77 | 50 | 38.88 | 16.66 | 38.88 | 55.55 |
| SC - 2 Affect | 20.83 | 50 | 41.66 | 16.66 | 33.33 | 29.16 |
| SC -3 Water retention | 16.66 | 16.66 | 16.66 | 27.77 | 16.66 | 16.66 |

**Graph - 27 SPAF Score (as per Allen's subscales) of subjects of Age Group 13 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



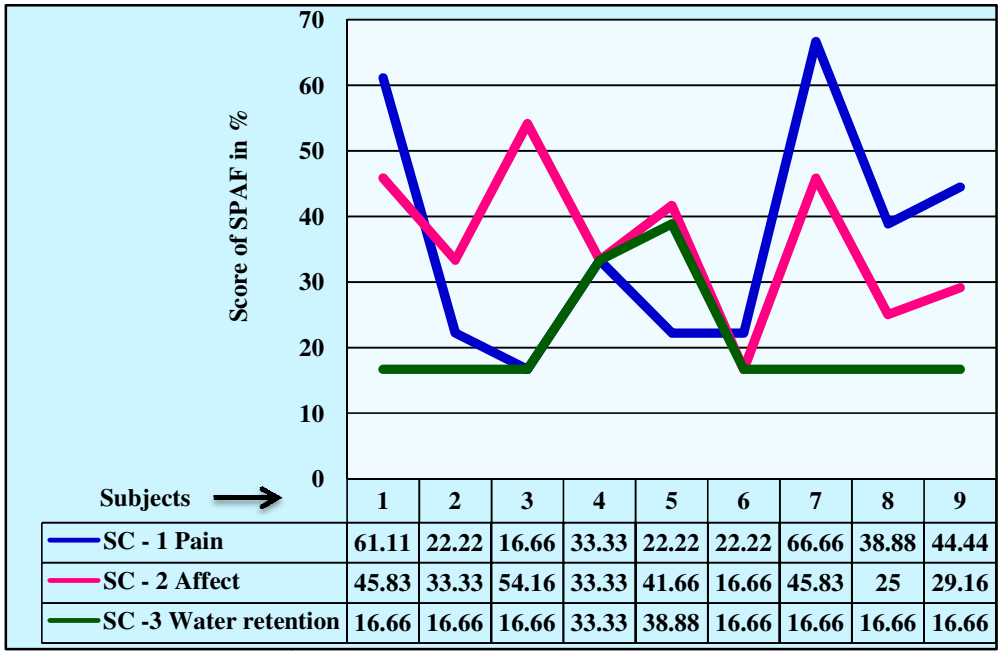

| Subjects → | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| SC - 1 Pain | 61.11 | 33.33 | 27.77 | 55.55 | 61.11 | 50 |
| SC - 2 Affect | 70.83 | 33.33 | 25 | 50 | 37.5 | 37.5 |
| SC -3 Water retention | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 |

**Graph – 28 SPAF Score (as per Allen's subscales) of subjects of Age Group 14 years**



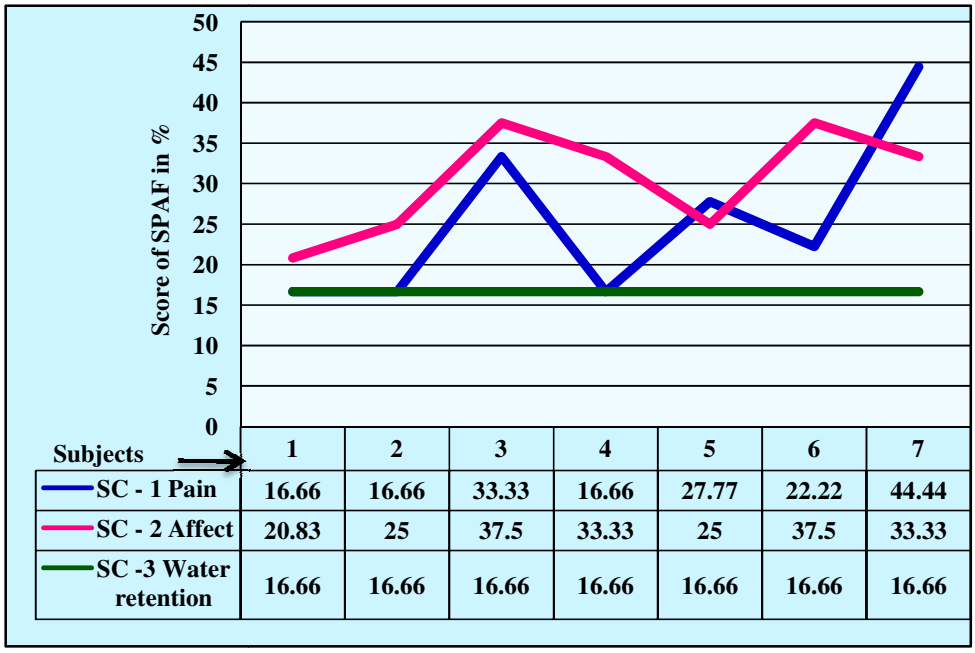

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| SC - 1 Pain | 27.77 | 55.55 | 27.77 | 27.77 | 61.11 | 27.77 |
| SC - 2 Affect | 25 | 91.66 | 33.33 | 29.16 | 45.83 | 25 |
| SC -3 Water retention | 16.66 | 38.88 | 16.66 | 16.66 | 27.77 | 16.66 |

**Graph – 29 SPAF Score (as per Allen's subscales) of subjects of Age Group 15 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



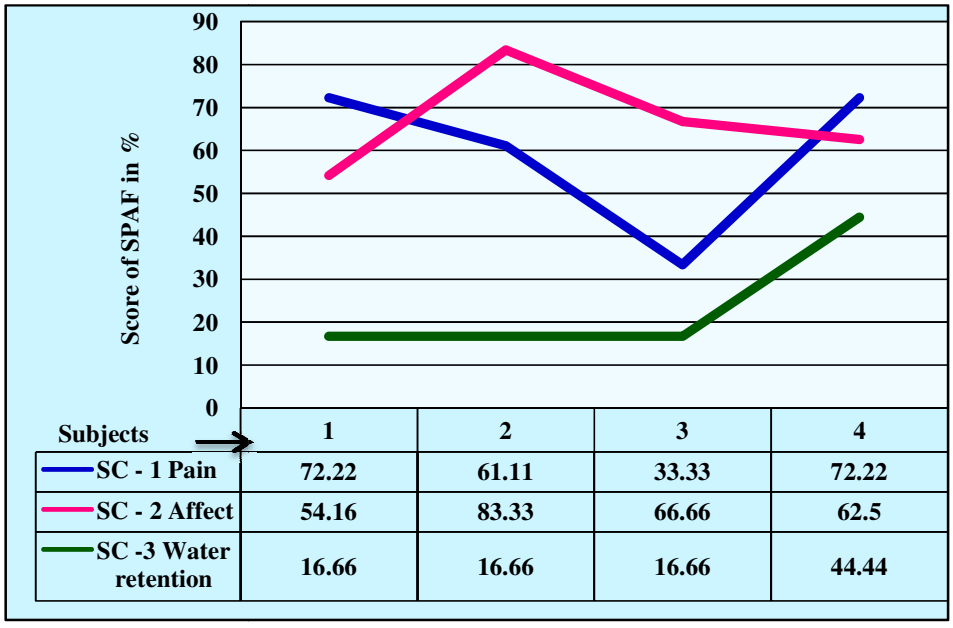

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 61.11 | 22.22 | 16.66 | 33.33 | 22.22 | 22.22 | 66.66 | 38.88 | 44.44 |
| SC - 2 Affect | 45.83 | 33.33 | 54.16 | 33.33 | 41.66 | 16.66 | 45.83 | 25 | 29.16 |
| SC -3 Water retention | 16.66 | 16.66 | 16.66 | 33.33 | 38.88 | 16.66 | 16.66 | 16.66 | 16.66 |

**Graph – 30 SPAF Score (as per Allen's subscales) of subjects of Age Group 16 years**



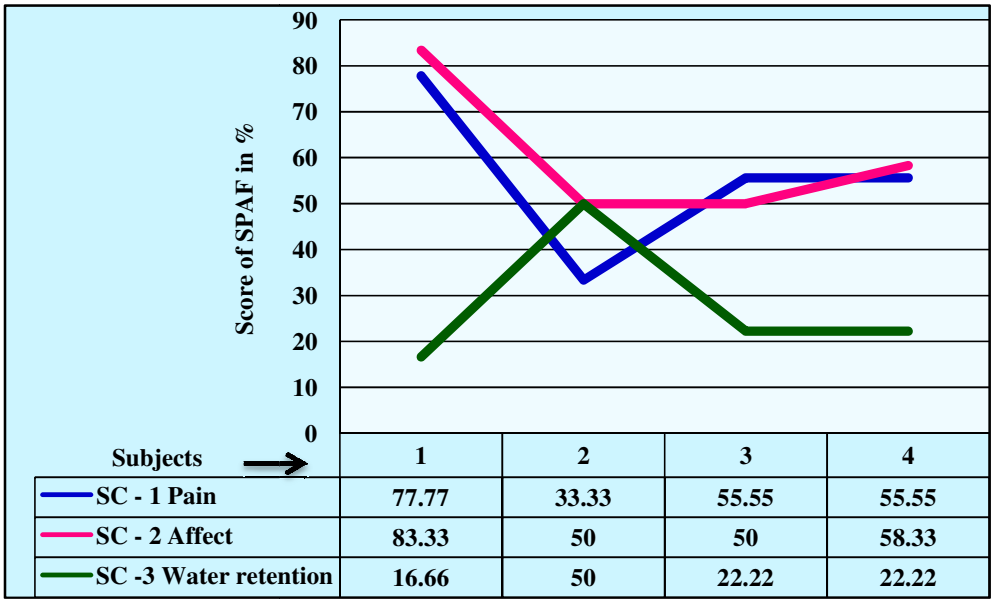

| Subjects | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 16.66 | 16.66 | 33.33 | 16.66 | 27.77 | 22.22 | 44.44 |
| SC - 2 Affect | 20.83 | 25 | 37.5 | 33.33 | 25 | 37.5 | 33.33 |
| SC -3 Water retention | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 |

**Graph – 31 SPAF Score (as per Allen's subscales) of subjects of Age Group 17 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



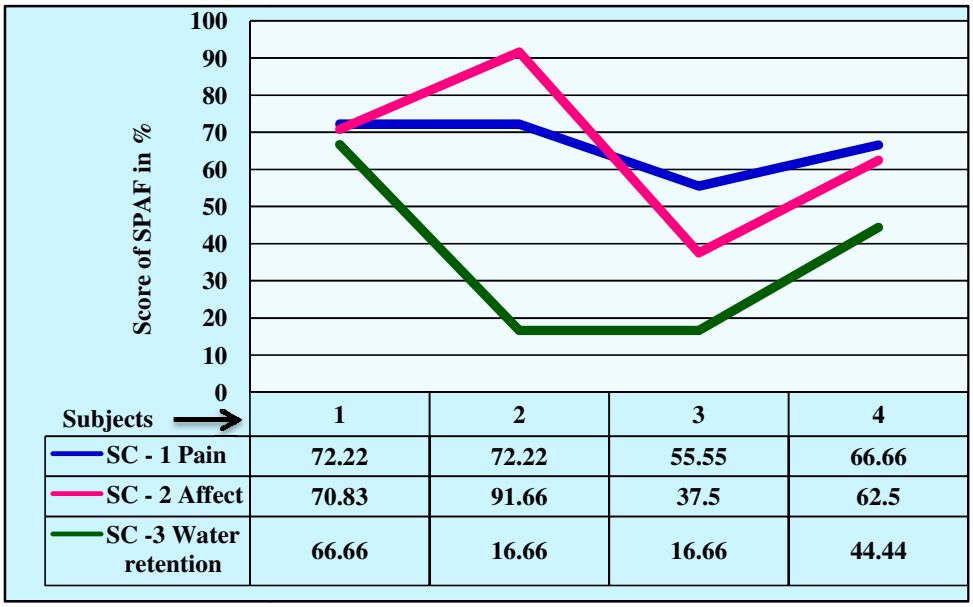

| Subjects | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| SC - 1 Pain | 72.22 | 61.11 | 33.33 | 72.22 |
| SC - 2 Affect | 54.16 | 83.33 | 66.66 | 62.5 |
| SC -3 Water retention | 16.66 | 16.66 | 16.66 | 44.44 |

**Graph – 32 SPAF Score (as per Allen's subscales) of subjects of Age Group 18 years**



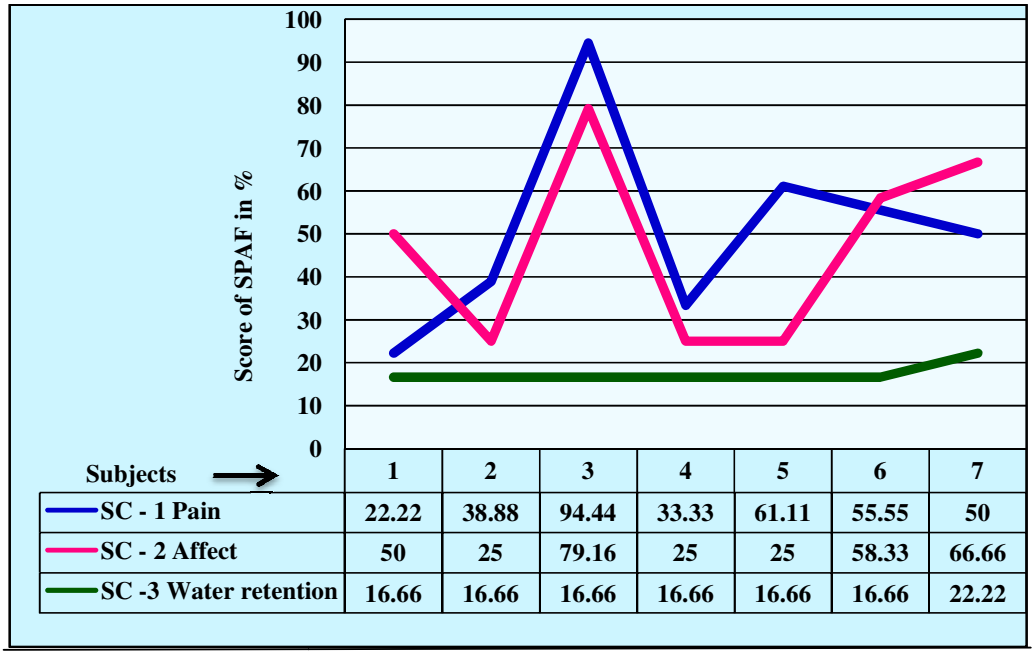

| Subjects → | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| SC - 1 Pain | 77.77 | 33.33 | 55.55 | 55.55 |
| SC - 2 Affect | 83.33 | 50 | 50 | 58.33 |
| SC -3 Water retention | 16.66 | 50 | 22.22 | 22.22 |

**Graph – 33 SPAF Score (as per Allen's subscales) of subjects of Age Group 19 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



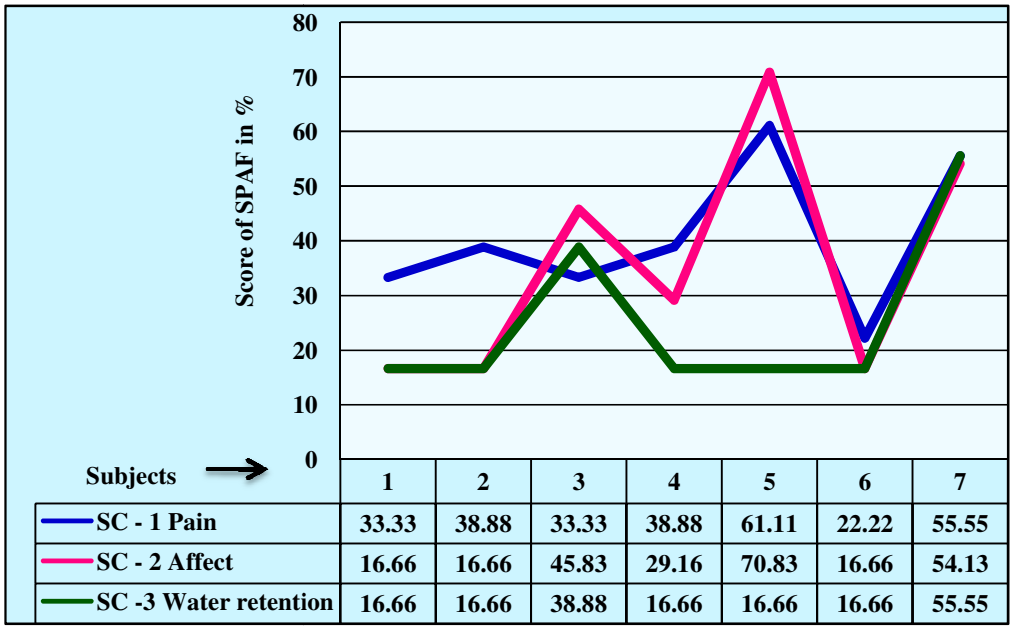

| Subjects → | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| SC - 1 Pain | 72.22 | 72.22 | 55.55 | 66.66 |
| SC - 2 Affect | 70.83 | 91.66 | 37.5 | 62.5 |
| SC -3 Water retention | 66.66 | 16.66 | 16.66 | 44.44 |

**Graph – 34 SPAF Score (as per Allen's subscales) of subjects of Age Group 20 years**



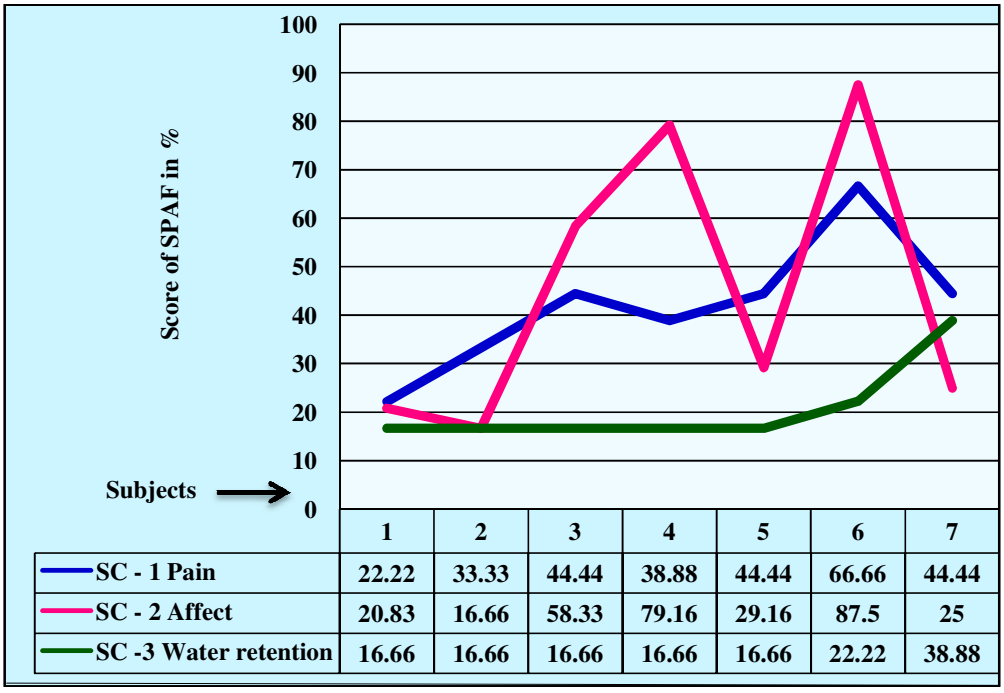

| Subjects → | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 22.22 | 38.88 | 94.44 | 33.33 | 61.11 | 55.55 | 50 |
| SC - 2 Affect | 50 | 25 | 79.16 | 25 | 25 | 58.33 | 66.66 |
| SC -3 Water retention | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 | 22.22 |

**Graph – 35 SPAF Score (as per Allen's subscales) of subjects of Age Group 21 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



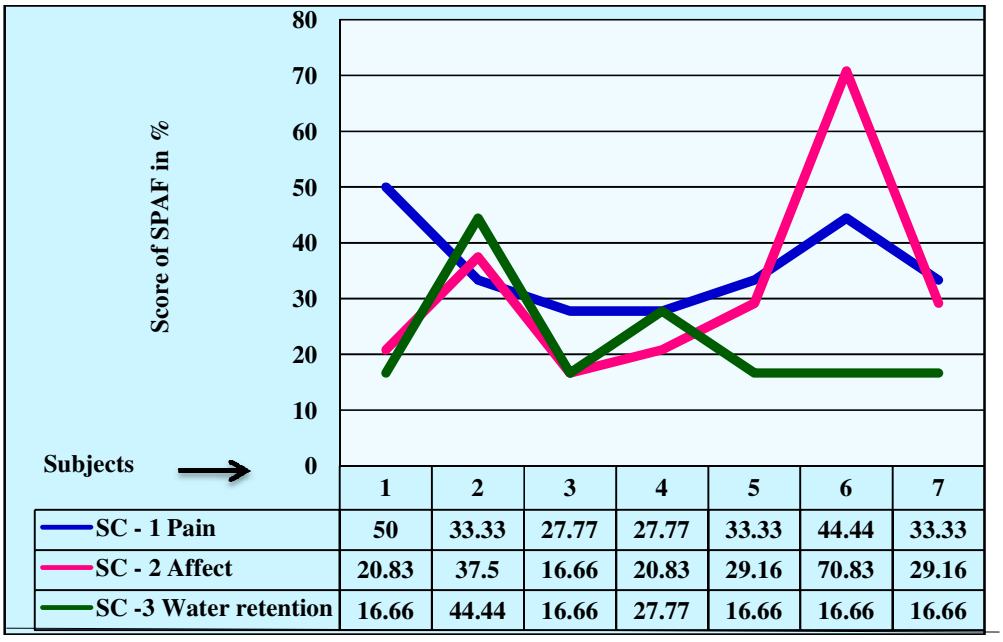

| Subjects → | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 33.33 | 38.88 | 33.33 | 38.88 | 61.11 | 22.22 | 55.55 |
| SC - 2 Affect | 16.66 | 16.66 | 45.83 | 29.16 | 70.83 | 16.66 | 54.13 |
| SC -3 Water retention | 16.66 | 16.66 | 38.88 | 16.66 | 16.66 | 16.66 | 55.55 |

**Graph – 36 SPAF Score (as per Allen's subscales) of subjects of Age Group 22 years**



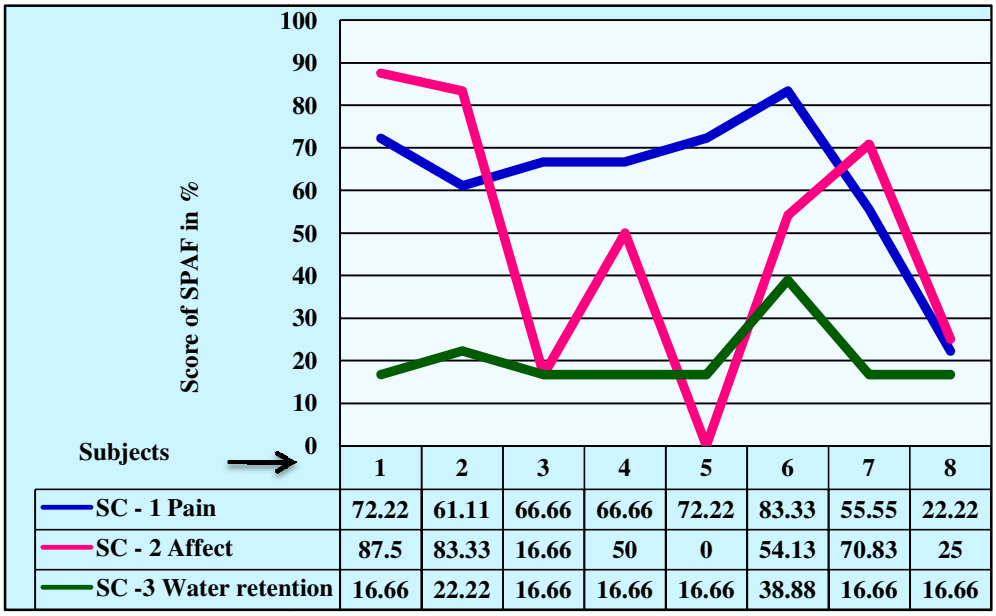

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 22.22 | 33.33 | 44.44 | 38.88 | 44.44 | 66.66 | 44.44 |
| SC - 2 Affect | 20.83 | 16.66 | 58.33 | 79.16 | 29.16 | 87.5 | 25 |
| SC -3 Water retention | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 | 22.22 | 38.88 |

**Graph – 37 SPAF Score (as per Allen's subscales) of subjects of Age Group 23 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



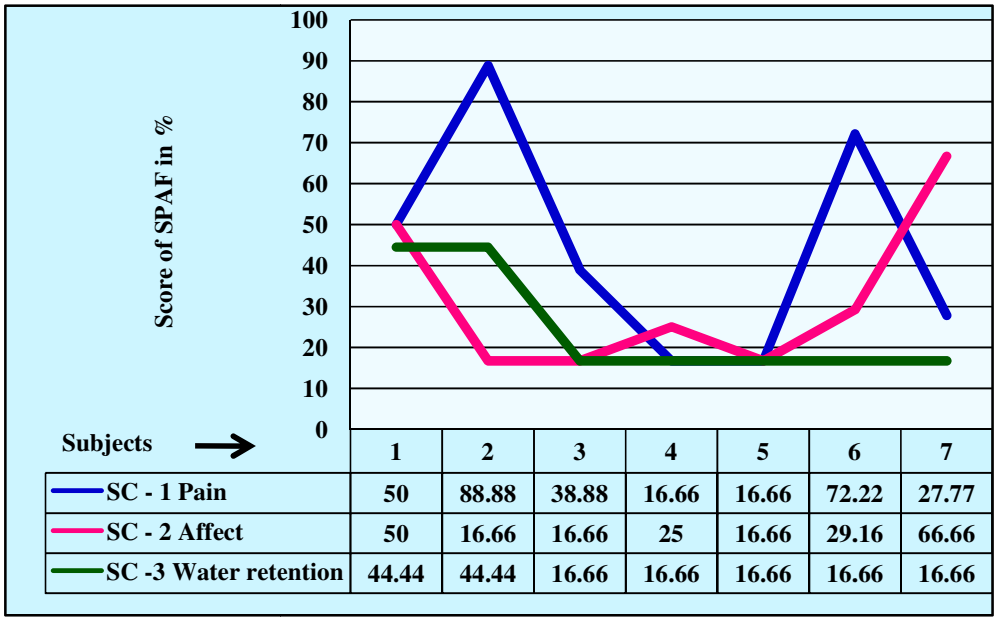

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 50 | 33.33 | 27.77 | 27.77 | 33.33 | 44.44 | 33.33 |
| SC - 2 Affect | 20.83 | 37.5 | 16.66 | 20.83 | 29.16 | 70.83 | 29.16 |
| SC -3 Water retention | 16.66 | 44.44 | 16.66 | 27.77 | 16.66 | 16.66 | 16.66 |

**Graph – 38 SPAF Score (as per Allen's subscales) of subjects of Age Group 24 years**



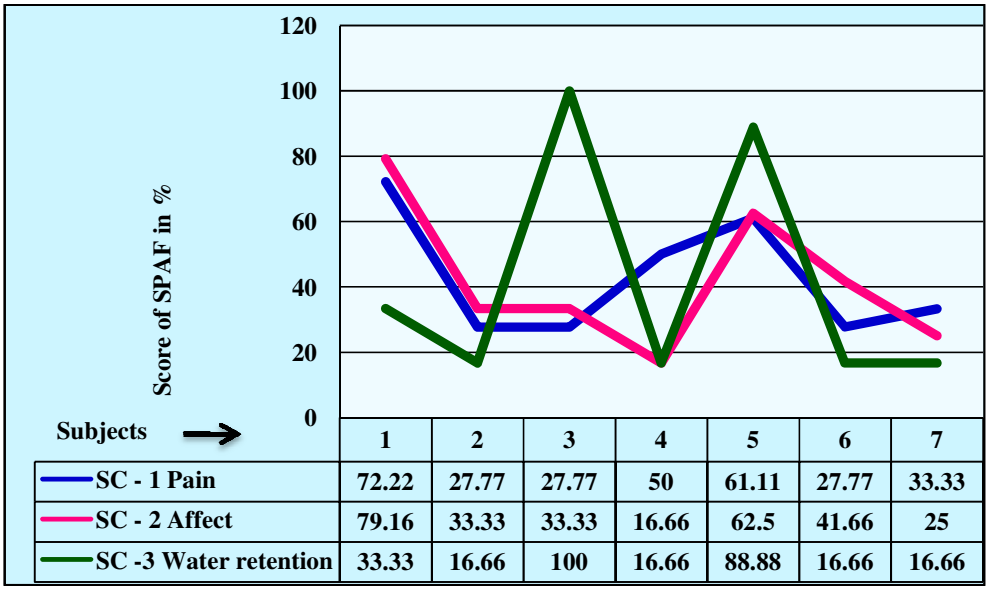

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 72.22 | 61.11 | 66.66 | 66.66 | 72.22 | 83.33 | 55.55 | 22.22 |
| SC - 2 Affect | 87.5 | 83.33 | 16.66 | 50 | 0 | 54.13 | 70.83 | 25 |
| SC -3 Water retention | 16.66 | 22.22 | 16.66 | 16.66 | 16.66 | 38.88 | 16.66 | 16.66 |

**Graph – 39 SPAF Score (as per Allen's subscales) of subjects of Age Group 25 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



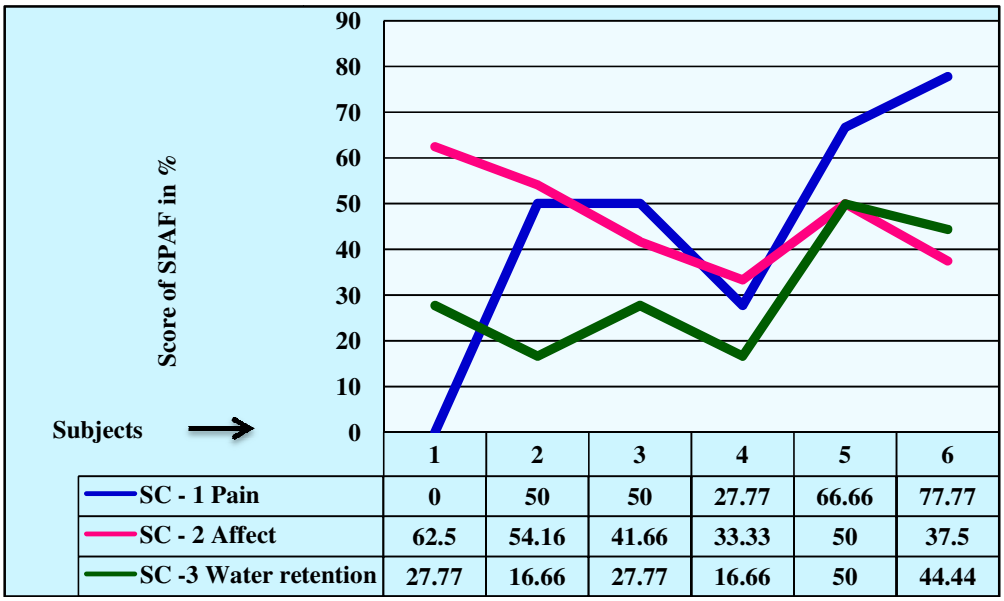

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 50 | 88.88 | 38.88 | 16.66 | 16.66 | 72.22 | 27.77 |
| SC - 2 Affect | 50 | 16.66 | 16.66 | 25 | 16.66 | 29.16 | 66.66 |
| SC -3 Water retention | 44.44 | 44.44 | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 |

**Graph -40 SPAF Score (as per Allen's subscales) of subjects of Age Group 26 years**



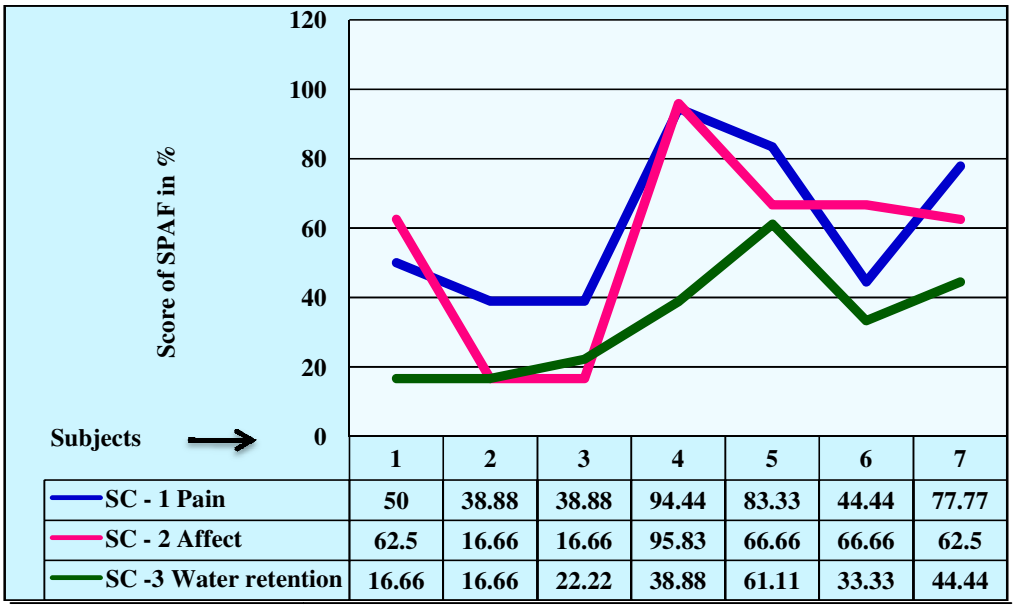

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 72.22 | 27.77 | 27.77 | 50 | 61.11 | 27.77 | 33.33 |
| SC - 2 Affect | 79.16 | 33.33 | 33.33 | 16.66 | 62.5 | 41.66 | 25 |
| SC -3 Water retention | 33.33 | 16.66 | 100 | 16.66 | 88.88 | 16.66 | 16.66 |

**Graph – 41 SPAF Score (as per Allen's subscales) of subjects of Age Group 27 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



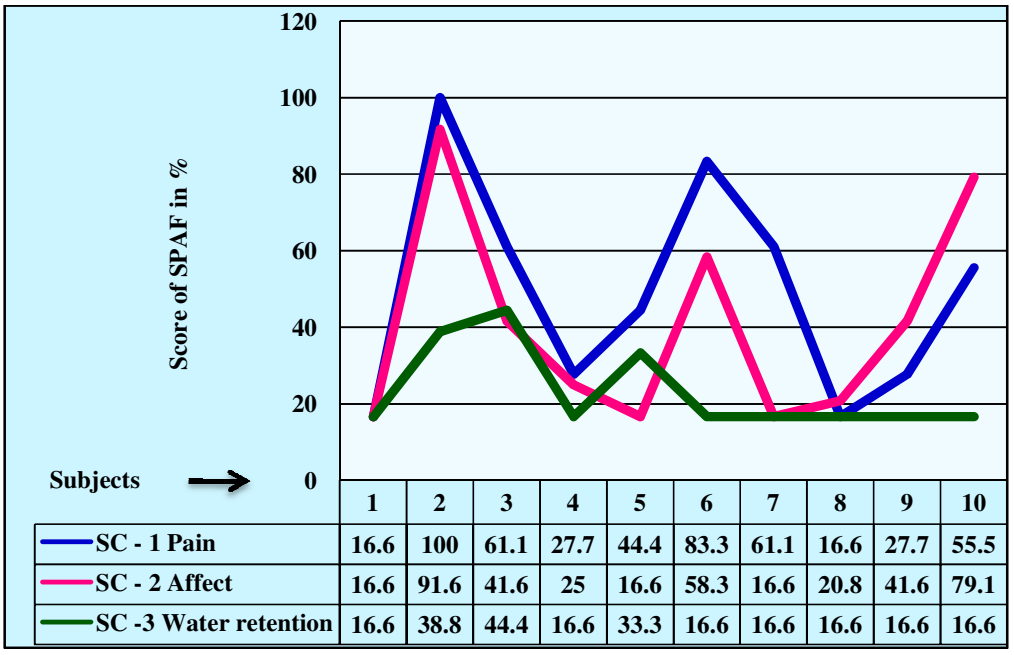

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| SC - 1 Pain | 0 | 50 | 50 | 27.77 | 66.66 | 77.77 |
| SC - 2 Affect | 62.5 | 54.16 | 41.66 | 33.33 | 50 | 37.5 |
| SC -3 Water retention | 27.77 | 16.66 | 27.77 | 16.66 | 50 | 44.44 |

**Graph – 42 SPAF Score (as per Allen's subscales) of subjects of Age Group 28 years**



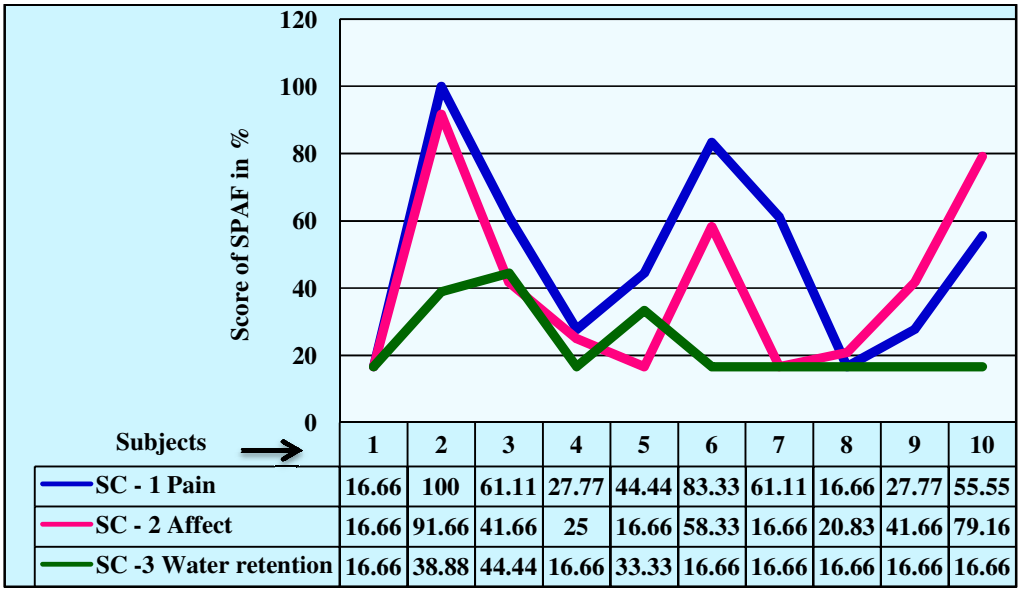

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 50 | 38.88 | 38.88 | 94.44 | 83.33 | 44.44 | 77.77 |
| SC - 2 Affect | 62.5 | 16.66 | 16.66 | 95.83 | 66.66 | 66.66 | 62.5 |
| SC -3 Water retention | 16.66 | 16.66 | 22.22 | 38.88 | 61.11 | 33.33 | 44.44 |

**Graph – 43 SPAF Score (as per Allen's subscales) of subjects of Age Group 29 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



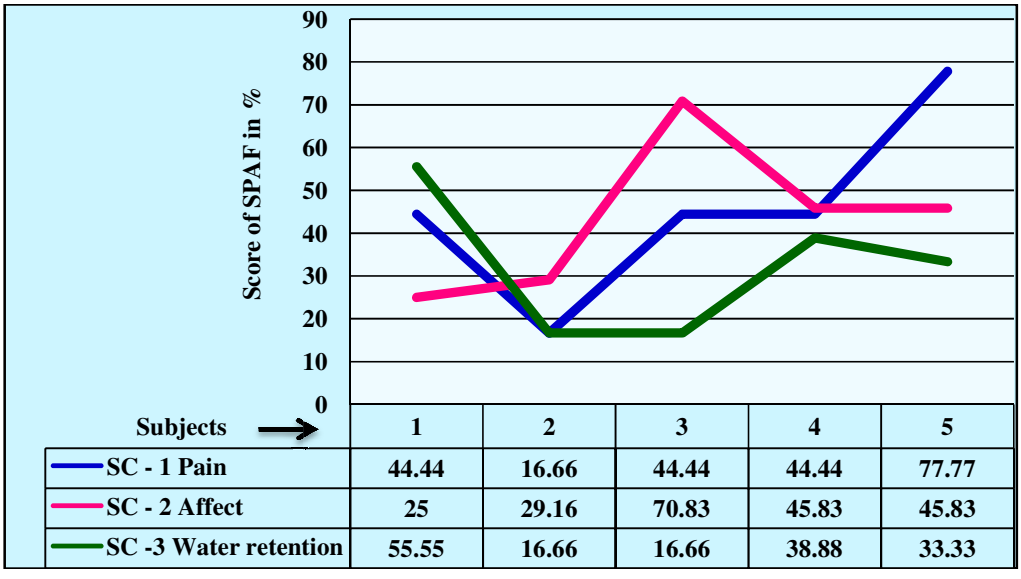

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 16.6 | 100 | 61.1 | 27.7 | 44.4 | 83.3 | 61.1 | 16.6 | 27.7 | 55.5 |
| SC - 2 Affect | 16.6 | 91.6 | 41.6 | 25 | 16.6 | 58.3 | 16.6 | 20.8 | 41.6 | 79.1 |
| SC -3 Water retention | 16.6 | 38.8 | 44.4 | 16.6 | 33.3 | 16.6 | 16.6 | 16.6 | 16.6 | 16.6 |

**Graph – 44 SPAF Score (as per Allen's subscales) of subjects of Age Group 30 years**



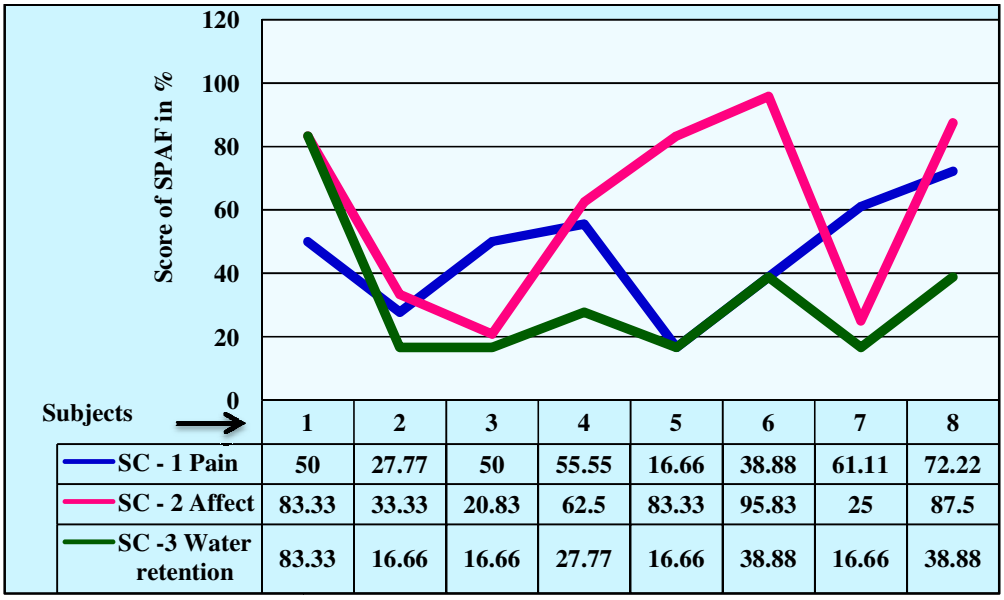

| Subjects → | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 16.66 | 100 | 61.11 | 27.77 | 44.44 | 83.33 | 61.11 | 16.66 | 27.77 | 55.55 |
| SC - 2 Affect | 16.66 | 91.66 | 41.66 | 25 | 16.66 | 58.33 | 16.66 | 20.83 | 41.66 | 79.16 |
| SC -3 Water retention | 16.66 | 38.88 | 44.44 | 16.66 | 33.33 | 16.66 | 16.66 | 16.66 | 16.66 | 16.66 |

**Graph – 45 SPAF Score (as per Allen's subscales) of subjects of Age Group 31 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



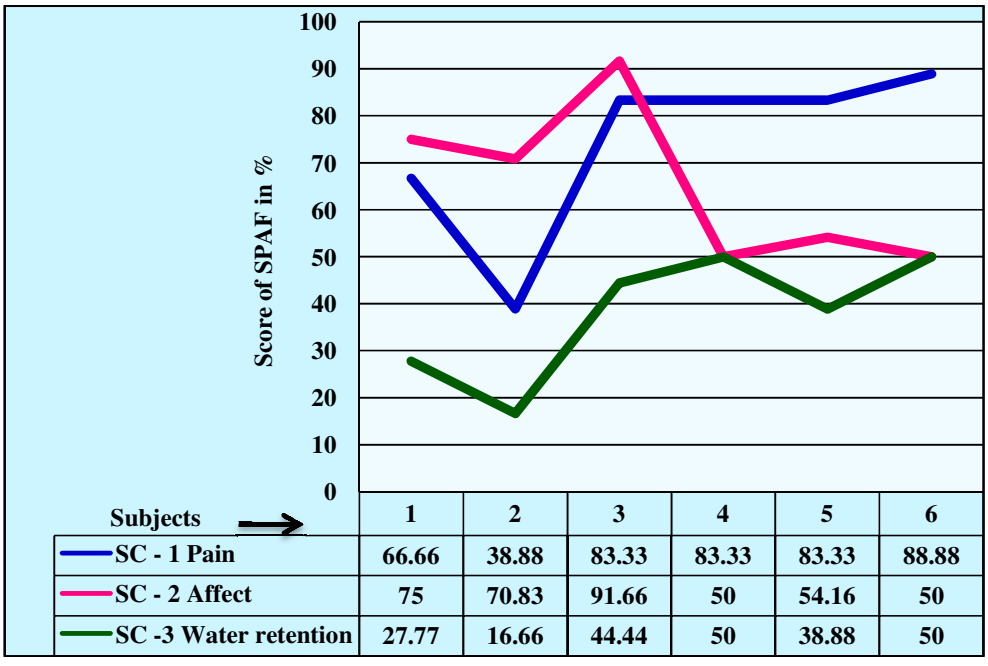

| Subjects → | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| SC - 1 Pain | 44.44 | 16.66 | 44.44 | 44.44 | 77.77 |
| SC - 2 Affect | 25 | 29.16 | 70.83 | 45.83 | 45.83 |
| SC -3 Water retention | 55.55 | 16.66 | 16.66 | 38.88 | 33.33 |

**Graph – 46 SPAF Score (as per Allen's subscales) of subjects of Age Group 32 years**



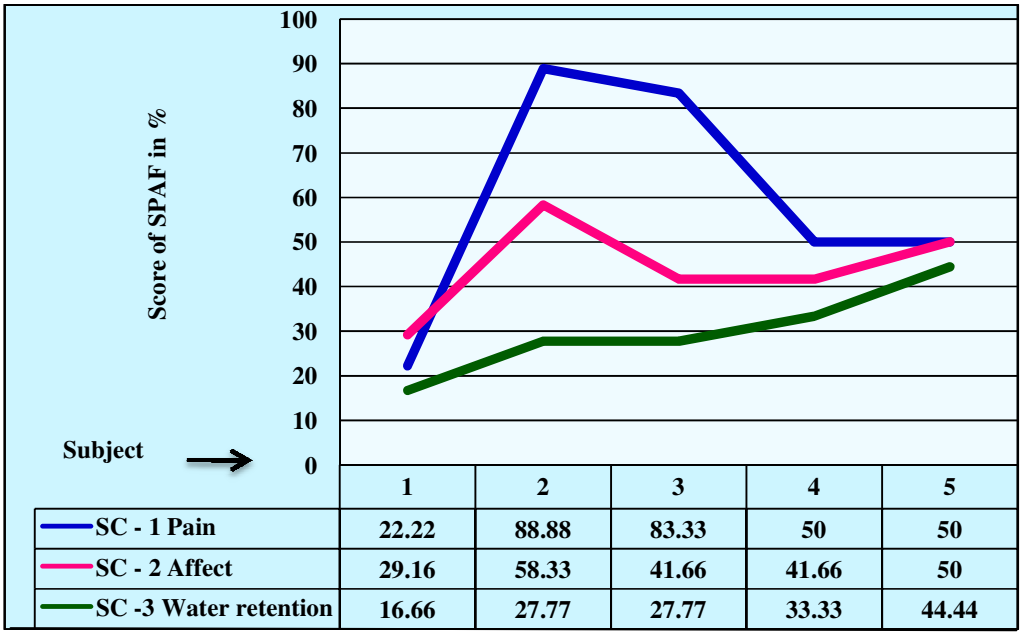

| Subjects → | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 50 | 27.77 | 50 | 55.55 | 16.66 | 38.88 | 61.11 | 72.22 |
| SC - 2 Affect | 83.33 | 33.33 | 20.83 | 62.5 | 83.33 | 95.83 | 25 | 87.5 |
| SC -3 Water retention | 83.33 | 16.66 | 16.66 | 27.77 | 16.66 | 38.88 | 16.66 | 38.88 |

**Graph – 47 SPAF Score (as per Allen's subscales) of subjects of Age Group 33 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**



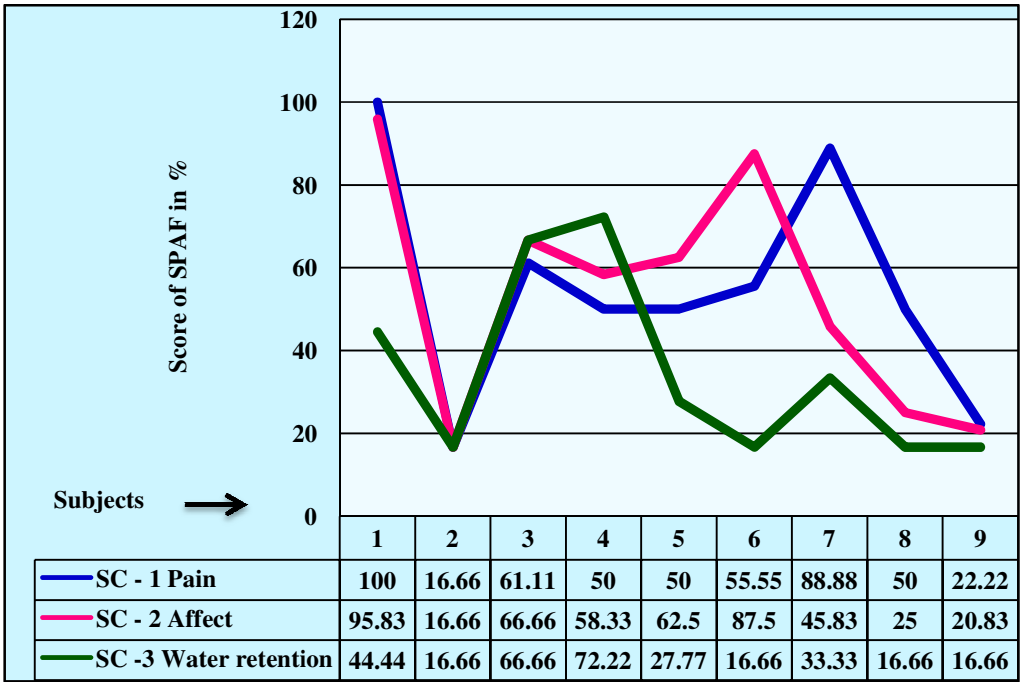

| Subjects → | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| SC - 1 Pain | 66.66 | 38.88 | 83.33 | 83.33 | 83.33 | 88.88 |
| SC - 2 Affect | 75 | 70.83 | 91.66 | 50 | 54.16 | 50 |
| SC -3 Water retention | 27.77 | 16.66 | 44.44 | 50 | 38.88 | 50 |

**Graph – 48 SPAF Score (as per Allen's subscales) of subjects of Age Group 34 years**



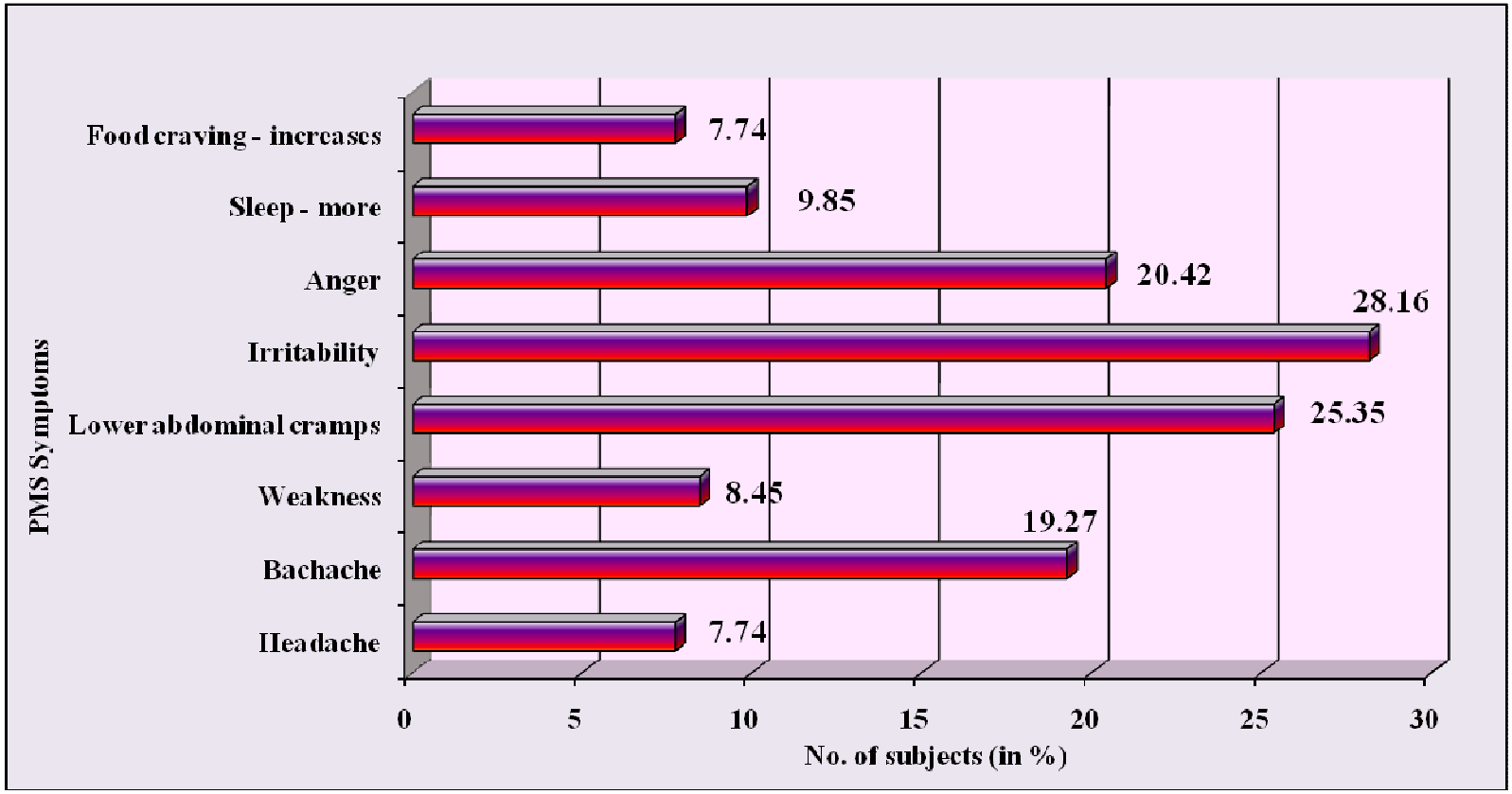

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| SC - 1 Pain | 22.22 | 88.88 | 83.33 | 50 | 50 |
| SC - 2 Affect | 29.16 | 58.33 | 41.66 | 41.66 | 50 |
| SC -3 Water retention | 16.66 | 27.77 | 27.77 | 33.33 | 44.44 |

**Graph – 49 SPAF Score (as per Allen's subscales) of subjects of Age Group 35 years**
**SC = Subscale, SPAF = Shortened Premenstrual Assessment Form**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| SC - 1 Pain | 100 | 16.66 | 61.11 | 50 | 50 | 55.55 | 88.88 | 50 | 22.22 |
| SC - 2 Affect | 95.83 | 16.66 | 66.66 | 58.33 | 62.5 | 87.5 | 45.83 | 25 | 20.83 |
| SC -3 Water retention | 44.44 | 16.66 | 66.66 | 72.22 | 27.77 | 16.66 | 33.33 | 16.66 | 16.66 |

**Graph – 50 SPAF Score (as per Allen's subscales) of subjects of Age Group 36 years**




**Graph 51 Intensity of PMS symptoms observed during 3 menstrual cycles studied in 142 subjects in present study.**

As mentioned earlier, all the 95 PMS symptoms chosen for present study were studied through 3 menstrual cycles of 142 subjects out of 720. There were 8 symptoms *(GRAPH – 51)* which were present in all 3 cycles and thereby showed high intensity amongst the subjects. Amongst these, irritability, lower abdominal cramps (LAC) and anger showed the highest intensity. Similar results of obtaining these symptoms as the most common ones experienced by the subjects were also noted by Mathias (2006-b) in Mangalore subjects, Omar *et al.* (2009) in Malaysian women, Antai *et al.* (2004) in Nigerian women.

Research community is still unaware of why a high proportion of anger and irritation is felt during PMS. This still remains a challenge and unresolved puzzle. But, for lower abdominal cramps science could arrive towards certain possible reasons which are yet to be confirmed. Prostaglandins are believed to play a part for LAC although the exact cause is yet not known (Michaud *et al.,* 1988). One more possibility for the pain of a disease of the pelvic, abdominal or thoracic viscera is often felt in the region of the spine, i.e., it is referred to be the more posterior parts of spinal segment which innervates the diseased organ (Isselbacher *et al.,* 1980; Adams, 1980). In the following section,

investigator shall discuss more about the causative factors behind such PMS symptoms.

## (V) Study of few potential Determinants of PMS

PMS is an amazingly complex disorder making it too wide and elaborate to study as a whole. During this research, investigator made an attempt to probe few of the factors which might be responsible for causing PMS and or its symptoms.

### (1) Age and PMS

Female reproductive cycle is influenced by age to a great extent. Physiological processes like production of ova and hormonal changes are highly under the rule of age. With reference to the same, PMS was screened in present sample for 24 age groups. There are clear indications that age does matter in perceiving physical and psychological symptoms. To be more emphatical and precise, a chi – square test was performed using SPSS version 20 to find a relationship between age and symptoms. All the 95 physical and behavioural symptoms were analyzed with respect to age. As listed in *TABLE - 28*, 21 symptoms (12 physical and 9 psyhological – behavioural symptoms) showed some kind of statistically significant association with that of age which was again an

unusual outcome for this study. There were 2 symptoms – total loss in appetite (CAP – T. L.) and lower abdominal cramps (LAC) which had *p* value close to 0.05 that is for CAP – T.L. $p = 0.059$ while for LAC, $p = 0.052$.These might not be statistically considerable, but looking to many other aspects of a woman's life, these 'nearly close to acceptable values' should also be considered important. All these results certainly define that expression of PMS symptoms must have some connection with age of a woman. In the PMS research carried out on B.Sc. Nursing students of Mangalore city, Mathias (2006-b) found a significant association between age and prevalence of PMS ($X^2=7.026$, $p<0.05$). This certainly is indicative that even in present study prevalence of PMS is somewhere related to age.

**Table - 28**

**Results of Chi - Square Test for Symptoms and Age**

| Sr. No. | Symptom | $X^2$ value | Degree of freedom (df) | Asymp. Sig. (2-sided) P = ( or) < 0.05 |
|---|---|---|---|---|
| 1 | HA | 38.889 | 23 | 0.020 |
| 2 | BA | 78.666 | 23 | 0.000 |
| 3 | CAP -D | 45.627 | 23 | 0.003 |
| 4 | U - M | 45.508 | 23 | 0.003 |
| 5 | BR - P | 57.655 | 23 | 0.000 |
| 6 | WTG | 42.230 | 23 | 0.009 |
| 7 | SW -FA | 35.358 | 23 | 0.048 |
| 8 | SW -ABD | 39.612 | 23 | 0.017 |

| | | | | |
|---|---|---|---|---|
| 9 | SW -BR | 42.450 | 23 | 0.008 |
| 10 | PIH | 46.316 | 23 | 0.003 |
| 11 | GR | 38.900 | 23 | 0.020 |
| 12 | DIA | 38.406 | 23 | 0.023 |
| 13 | WLN | 35.540 | 23 | 0.046 |
| 14 | LIN | 102.219 | 23 | 0.000 |
| 15 | LOL | 39.220 | 23 | 0.019 |
| 16 | CF | 35.539 | 23 | 0.046 |
| 17 | SP - BD | 45.184 | 23 | 0.004 |
| 18 | AIS - D | 60.130 | 23 | 0.000 |
| 19 | BOR | 37.278 | 23 | 0.030 |
| 20 | FS | 47.595 | 23 | 0.002 |
| 21 | AX - RL | 41.300 | 23 | 0.011 |

With age, body physiology will change and surely female reproductive physiology changes. Factors like marital life, pregnancies, and other stresses of life style will also play their role. Perhaps due to these factors, certain PMS symptoms might be relevantly associated with age of a woman. Also, luteal phase levels of FSH, LH, serum immunoreactive inhibin, estradiol and progesterone fell slowly with increasing age (MacNaughton *et al.,* 1992). But for sure, it's a matter of further examination and study. Moreover, these results have definitely opened up a new sphere of research in PMS. We need to investigate further why and how various PMS symptoms are associated with age,

what are the possible reasons behind this association and what can we do for its prevention and cure.

**(2) Hormones and PMS**

Many research studies have concluded that changes in hormonal levels play a vital role as a causative factor of PMS. Besides this, the functioning of menstrual cycle itself is highly controlled by various gonadal and pituitary hormones. Halbreich and Monacelli (2004) have reported that luteal increasing and decreasing levels of estrogen have been implicated in formation of PMS symptoms. Also it's reported that when progesterone and estrogen fluctuated at different rates there was a significant correlation between the difference of rate and severity of symptoms of PMS (Halbreich *et al.,* 1986; Redei and Freeman, 1995; Halbreich, 2004). Further studies have also established that there is a relation between thyroid hormone, progesterone and estrogen. Like, thyroid hormone stimulates progesterone release from human luteal cells (Datta *et al.,* 1998) whereas estrogen affects thyroid economy (Santin and Furlanetto, 2011).

In light of the major influence of hormones as mentioned above, hormonal assays (for LH, FSH, Estradiol (E2), Progesterone,

Thyroid hormones) were undertaken of 60 subjects in present study. The aim was to understand whether hormonal fluctuations are associated with PMS, its symptoms and intensity of PMS. If not directly then do any of these hormones including their metabolites and the influence of these on other hormones show an impact on PMS?! This inquiry has turned out to be perhaps the most demarcating part of the thesis and the results obtained were also quiet unexpected.

*TABLE - 29* provides an overview of the results obtained from hormonal tests carried out in luteal phase of 60 subjects. This table clearly shows that on an average there are more number of subjects who show excess of hormones rather than low levels of the same. When analyzed, no sure distinguishing outcomes were generated with regards to association of PMS in both cases (a) subjects having hormonal disturbances and (b) subjects having normal hormonal profile. However, hormones do fluctuate which is very obvious due to cyclic changes in subjects. In addition, when relations between hormones were statistically co-related using SPSS software, following significant associations were obtained:

1) Ratio of values of estradiol vs. progesterone and ratio of values of LH vs. FSH have statistically significant relation ($p=0.013$)

2) Values of Estradiol vs. Progesterone have statistical significant co-relation ($p=0.003$)

3) There exist a significant correlation between Estradiol and LH hormone ($p=0.002$)

4) There exist significant association between LH and FSH ($p=0.000$)

5) $T_3$ and $T_4$, the thyroid hormones are also associated ($p=0.000$)

Further, Student's t –test was also run with the help of SPSS, between all the hormones (Estradiol, Progesterone, LH, FSH, T3, T4 and TSH) and following PMS symptoms: Headache, backache, body ache, lower abdominal cramps, more sleep, less sleep, disturbed sleep, bad dreams, uneasiness, tension due to monotonous lifestyle, palpitation, worry or anxiousness, panic, restlessness, tightening in chest or hyperventilation, fearfulness, anger, irritation, mood swing, darkening/dullness of skin, shiny skin, pain in breast, mastalgia and food craving increase.

| Table – 29 Overview of hormonal assays of 60 subjects | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sr. No. | Name of Hormone | Normal range of hormones during luteal phase of menstrual cycle | No. of Subjects showing low level of hormones than normal range in luteal phase (n = 60) | No. of Subjects showing high level of hormones than normal range in luteal phase (n= 60) | Minimum value of the hormone obtained during clinical study of 60 subjects | Maximum value of the hormone obtained during clinical study of 60 subjects | Average value of the hormone in the study sample of 60 subjects |
| 1 | Estradiol | 27 - 246 pg/ml | 2 | 4 | 22.67 | 389.55 | 123.97 |
| 2 | Progesterone | 0.95 - 21 ng/ml | 11 | 2 | 0.4 | 24.82 | 5.75 |
| 3 | FSH | 1.5 - 9.1 mIU/ml | 4 | 5 | 0.44 | 91.31 | 6.2 |
| 4 | LH | 0.5 - 16.9 mIU/ml | 1 | 9 | 0.23 | 106 | 11.93 |
| 5 | TSH | 0.35 - 5.5 uIU/ml | 0 | 4 | 0.69 | 7.1 | 2.496 |
| 6 | $T_3$ | 60 - 181 ng/ml | 0 | 0 | 61 | 130 | 101.5 |
| 7 | $T_4$ | 4.5 - 12.6 ng/ml | 0 | 0 | 6 | 11 | 8.5 |

Amongst all these hormones progesterone, T3 and T4 showed some relevant connection with PMS symptoms that to very few as mentioned below:

(1) Students-t test for Progesterone vs. Body ache (*p=0.018*), disturbed sleep (*p=0.000*), feeling sad (*p=0.000*), skin dullness/darkening (*p=0.021*) respectively gave statistically significant results.

(2) Same way, T3 vs. headache (p=0.001), bad dreams (p=0.004), irritation (*p=0.016*) came out as statistically relevant.

(3) And T4 vs. feeling sad (*p=0.024*), skin shine (*p=0.004*) were also obtained as significant outcomes in t- test.

(4) Estradiol vs mood swing (*p = 0.057*), not statistically significant, but very close to the p value cannot be neglected.

Similarly, students t –test was also run to check significant mean differences between ratios of Estrogen / Progesterone, ratios of LH/ FSH and PMS symptoms (headache, lower abdominal cramps, feeling sad, uneasiness, tension due to monotonous lifestyle, panic, restless, anger, irritation, mood swing, breast pain, mastalgia). But no significant results were obtained. Additionally, these ratios did not even show any impact on total number of symptoms of PMS that is its intensity.

**(3) Caffeinated Beverages and PMS**

In regards to impact of caffeinated beverages on health, one can always find mixed opinions and studies in the world of health science. We have always been very much interested in understanding the role of such drinks on human physiology and so does the interest of no. of scientists lie in finding out how they are related with PMS.

A caffeinated drink or caffeinated beverage is a drink which contains caffeine, a stimulant which is legal and popular in most of the countries. Caffeinated drinks are primarily coffee, tea, soft drinks and energy drinks (http://en.wikipedia.org/wiki/Caffeinated_drink). Daily consumption of tea and coffee is a part of Indian culture. But, soft drinks and cold drinks are taken occasionally or generally served at special events, in parties, during festivities etc. While collecting dietary information, intake of caffeinated beverages was recorded as the number of cups (1 cup = 150ml) consumed per day. During this survey it was found that 67.63% (487/720) subjects had tea while very few, only 5.41 % (39/720) had coffee every day. In addition to this, 31.25% (225/720) subjects drink tea once, 27.77 % (200/720) twice and 8.61 % (3/720)

thrice per day whereas 4.16 % (30/720) subjects consume coffee one time 0.97 % (7/720) two times and 0.27 % (2/720) three times per day.

Several reports have suggested health benefits of mild intake of caffeinated drinks particularly coffee. Number of studies also tested effects of such beverages on reproductive health of women and found no noticeable adverse effects (IFIC, 2008). But other way round Tea- Coffee consumption is strongly correlated to the presence of PMS (Rossignol, 1985;www.journal.au.edu/au_techno/2006/jan06/vol9num3_article05.pdf ; Thu *et al.,* 2006). In a research study done in 1989 involving 188 nursing students and tea factory workers in the People's Republic of China, Rossignol and his fellow workers concluded that tea consumption is strongly related to the prevalence of PMS and that the effects are dependent on dosage. Looking to the high prevalence of PMS in study sample and simultaneously high consumption of tea-coffee by the subjects, investigator examined the role of such beverages.

Co-relation between beverages (tea, coffee) and some of the symptoms like headache, acidity, lower abdominal cramps, breast problems (pain and mastalgia), weight gain and swelling which were assumed to be the consequence of intake of such beverages from

literature review, were statistically checked. But the results were contradictory to that of Rossignol's findings. There was no statistical significant association between these symptoms. When association between tea and swelling of body was statistically checked, $X^2$ (3, N = 720) = 7.521, $p$ = 0.057 was obtained. Even though statistically not considered to be significant but yet being close to $p$ value this relation should not be neglected. However, significant association was observed between weight gain (WTG) and intake of coffee, $X^2$ (3, N = 720) =13.308, $p$ = 0.004. This definitely indicates that coffee can be more troublesome for women as compared to tea.

**(4) Type of Food and PMS**

From data collected during survey, it was noted how many subjects had excess intake of spices (Indian hot spices particularly chillies) in their food and how many consumed excess salt as well as how many ate too sweetened food as mentioned in *TABLE - 30.* Also, the table indicates how spicy food ranks first in the list of food types liked by majority of women. In addition to this, it was noted from survey that 22.5% (162/720) ate junk food while 85.83% (618/720) had home-made food daily.

| Table 30 | | | | |
|---|---|---|---|---|
| Type of food eaten and food likings of the subjects | | | | |
| | | | | |
| No. of subjects and the type of food eaten daily | | | | |
| Sr. No. | | Spicy Food | Salty Food | Sweet Food |
| 1 | Moderate | 526 | 562 | 259 |
| 2 | less | 17 | 77 | 221 |
| 3 | excess | 177 | 81 | 61 |
| 4 | not eaten | 0 | 0 | 179 |
| | | | | |
| No. of subjects and their liking for the type of food | | | | |
| Spicy Food | Salty Food | Sweet Food | Sour Food | No specific |
| 417 | 117 | 114 | 154 | 171 |

It's concluded from many studies that Indian food recipes generally make use of more than required spice, salt, sweet and oils which ought to have an adverse effect on their health in long run. Again there are number of studies discussing food and its role in PMS. Being presumptuous, when this investigator tried to analyze various types of diets with reference to PMS and its symptoms, quiet unusual statistically significant inferences were obtained.

Through SPSS, Pearson Chi-square test was conducted to check the association and co-relation between types of diet (spicy, salty and sweet) with few of the PMS symptoms like headache, acidity, nausea, lower abdominal cramps, skin problems- dullness/ darkening of skin, shine of skin, violent crimes, irritation and anger, as from available

literature they were expected to have some relation with type of food. But again the results were very much astonishing. It was unbelievable to find that symptoms like headache, acidity, violent crimes and hot flush had no association with any of the types of food (spicy, salty, sweet), not even little close to *p* value! Additionally, it was unimaginable to find **anger associated with sweet food, $X^2$ (3, N=720) =8.569, *p=0.036* but having no relation with spicy or salty food.** Again the expected association between irritation and spicy food (p = 0.059) turned out to be statistically negative. It did not show any relation with salty or sweet food either. Similarly **acne was found to be related with sweet food, $X^2$ (9, N=720) =17.198, *p=0.046* but once again was not found connected to spicy or salty food** which is a general belief. Infact people suffering from acne are advised to avoid spicy – salty diet. However, **the unusual glow of skin during PMS showed an association with spicy food, $X^2$ (2, N=720) = 14.872, *p=0.001* and also, lower abdominal cramps, one of the most commonly suffered PMS symptoms showed statistically significant association with spicy diet, $X^2$ (2,N=720 )= 6.514, p=0.038.** But there was no significant relation between skin shine during PMS and salty – sweet diet neither lower abdominal cramps with that of salty and sweet

type of food. These results certainly indicate that there is lot to work over with regards to food / diet and such PMS symptoms.

**(6) Obesity and PMS**

It's known to us that Obesity or being overweight increases the chances of one suffering from high blood pressure, heart stroke or type 2 Diabetes many times as compared to those with normal BMI weight status. Again, as mentioned earlier in this chapter, Obesity rates as a strong risk factor for PMS (Masho *et al.*, 2005) and so do the values of BMI. Going with such facts, researcher studied correlation between BMI values and total number of PMS symptoms with the help of SPSS statistical software. However, no statistically significant correlation was obtained in this test, not even for underweight or overweight subjects. Thus may be BMI might be playing a role in causing PMS but it surely does not play any role in deciding the intensity of PMS.

Therefore the health status - obese, overweight, underweight or healthy might not be directly associated with PMS, but as the facts say, they do affect overall health and physiology, so definitely they have an indirect participation somewhere in enhancing the symptoms. For instance, obesity affects estrogen / progesterone ratios (Mayo, 1999). As

mentioned earlier, 5.69 % respondents were found to be obese in this study and are likely to have disturbed hormonal ratios, which might induce PMS more in them as compared to others.

**(7) Marital Status and PMS**

Marriage can bring adjustment problems leading to high levels of stress and anxiety for a woman. Also, body physiology changes post marriage due to number of reasons like coitus, pregnancy etc. How one perceives this phase of life can be a deciding factor whether PMS will become severe or not. Although, when analyzed with present data, no statistically significant connection was obtained between severity of PMS and being married or unmarried person. Student's t- test also supported this. Even the belief that there must be hormonal difference between these two groups was also not cent percent correct as no statistically significant result was obtained in case of Estradiol, Progesterone, FSH, LH, TSH and $T_4$ except that association of $T_3$ ($p = 0.055$) was significantly differing between married and unmarried groups in present study. Due to marriage body physiology vary between these two groups and it should reflect in all hormonal levels and not just one - $T_3$. Questions like why only $T_3$ differs in these two groups are still unanswerable.

**(8) Hemoglobin and PMS**

The normal range of hemoglobin (Hb) depends on the age and sex of the person. It should be 11.5 – 15.5 g/dL in women (Ahmed *et al.,* 2007). In present research work 33.05 % (238/720) respondents knew of their Hemoglobin status. 60.08 % (143 /238) had low Hb, 31.93 % (76 / 238) had normal and 2.63 % (19/238) had above the normal values of Hb, as per the medically accepted normal standards. From these 720 subjects, 60 subjects' hematological tests were carried out with the help of Desai Metropolis Path. Lab., Surat, which revealed that 30% (18 / 60) had below the normal standards of Hb. **On an average, hemoglobin in study subjects (60/720) was found to be 11.76 g/dL** which is almost on the borderlines of normal ranges! In these group of 60 subjects, investigator noted that the lowest Hb was 8.4 g/dL and highest was 13.9 g/dL which are indeed a matter of worry as this range are not at all satisfactory.

Analysis of Variance (ANOVA) is a statistical test used to determine if more than two population means are equal rather to see is there any difference between groups on some variable. Investigator tried to do one way ANOVA test to find out how low, normal or high levels of

hemoglobin of 60 respondents of study sample are linked to that of severity and prevalence of PMS symptoms. But unfortunately, due to only 2 cases in one of the symptoms (FC – D), posthoc could not be done and results were not obtained.

Even though presently no rational hint can be derived from this investigation about the role of Hb in PMS, yet below normal values of Hb which surely affects the body physiology of a woman, cannot be neglected. Although it's interesting to note that in the study out by Silotry *et al.* (2011) on 50 students of Mumbai city, Hb levels were found to be significantly low in premenstrual stage of cycle of PMS sufferers and non-significant in non- PMS group. This again leads us to the question whether PMS affects levels of hemoglobin or its low hemoglobin intensifying PMS symptoms and or resulting in PMS. This can be answered only through further concrete research.

**(8) <u>Exercise and PMS</u>**

Exercises like walking, swimming, jogging, aerobics, cycling are found to be effective in getting overall relief from PMS (Steege and Blumenthal, 1993; Khademi *et al.,* 2008). In a study by Anandha *et al.* (2011) on 300 medical students of Kattankulathur,

Tamilnadu, a strong association between lack of physical exercise and PMS (p=0.005) was noted. Also, in a cohort study on swimmers and non-swimmers, Khademi *et al.* (2008) noticed that feeling more irritable, tend to eat more than usual or at irregular hours, easily distracted, restless behavior noticeable by others, feeling more angry, physical symptoms, change in mood without obvious reason, significant swelling in breasts, ankles, and abdomen, marked change in sexual desire, avoiding some social commitments, and decreasing desire to have communication with males were significantly lower in swimmers.

Sadly, with present sample, only 7.91% (57 / 720) did exercise (yoga, walking or aerobic exercise) regularly, that too for 30 minutes while majority 92.08% (663 / 720) did not do any exercise at all. From this data related to exercise, the high percentage of prevalence of PMS and the number of physical symptoms obtained in results mentioned earlier in this chapter, there is a clear indication that lack of exercise could be one of the reasons for present study sample. This investigator would like to go with the suggestion of Bianchi – Demicheli *et al.* (2004) who concluded in their study that women who practiced aerobic exercise obtained lower levels of negative mood states, such as anger, contempt,

disgust, hostility, fear, sadness, shame, shyness and guilt therefore aerobic exercise should be recommended as the first line therapy for PMS.

**(9) Uterus – Ovaries and PMS**

Along with hormonal assay, these 60 subjects underwent lower abdominal USG. This helped in analyzing changes of uterus and ovaries during luteal phase. Also it could detect abnormalities like fibroids, cysts, etc, if any and revealed anatomical details of the individual like volume, size, endometrial thickness, position of uterus etc.

Amongst 60 subjects, 38 had endometrial thickness as per normal expected range of 1 – 1.5 cm (Merz, 2006). But at the same time 20 subjects had below this normal range and 2 had more thickness than the normal value that means 36.66% (22/60) had abnormal endometrial thicknesses which are again unanticipated findings. However, due to PCOD and endometrial hyperplasia, those 2 subjects might be possessing above the normal endometrial thickness but why other 20 were having below normal endometrial thickness remains unknown.

Similarly, very unpredicted and startling results were obtained from sonography of ovaries. According to Merz (2006) normal

ovarian size is 3.5 x 2.5 x 1.5cm (length x width x height). Adding one more shocking result, it was noted that 41/60 subjects had ovaries much larger than normal size! Even if we consider that due to PCOD and ovarian cysts, ovaries might be larger in 4 subjects, still 61.66% (37/60) subjects had no medically established reasons to possess large sized ovaries! It's worth mentioning here that the USGs for endometrium and ovaries were carried out in luteal phase of these respondents.

Investigator did not come across any such research finding where during PMS endometrial thickness reduces below normal range or ovarian size increases above normal values. But, as the results were obtained during luteal phase, one cannot deny that may be due to PMS such temporary anatomical changes might be occurring. But due to the limitation of present study no post menstrual USG were conducted which might help to rule out this thought. Apart from this number of other possible reasons like ethnicity might also be playing role. Only a rigorous detailed study can bring us to some authentic new yet very important conclusions. One thing is crystal clear that researchers must pay attention even on the bodily changes of ovaries and uterus during PMS. Negligence

towards these details might make us lose some vital signs and clues in solving this puzzle of PMS.

Additionally when the results were statistically studied, a significant co-relation between endometrial thickness and only the right ovary ($p= 0.027$) was found in SPSS, which was strange and also quiet cynical! At the same time an obvious co-relation between left ovary and right ovary ($p=0.072$) was also obtained. But no co-relation was found between hormones and ovaries or between hormones and endometrial thickness which was again unexpected.

**(10) Stress and PMS**

In recent times stress has become an invisible dreadful element of our lifestyle. Even a school going is easily victimized by stress easily due to fast pace of life. Psychiatrists, Neurobiologists, Psychologists etc are constantly striving to understand the impact of stress as a factor affecting human health. Manifestation of stress might occur in different ways with each individual. Establishing balance between job and home excessively drains women of physical-mental energies and this is supplemented by physical-mental pressures, fatigue, frustrations, anxieties, etc. making a woman's life more vulnerable to

stress which can ultimately lead to various possibilities of becoming 'sick'.

Speroff and Frtiz (2005) have emphatically said that phases of menstrual cycle are vulnerable to life stresses. In present study, although stress was not studied with the help of psychiatry tests, yet there are all chances that number of such symptoms for example as mentioned in *TABLE-24* anger, irritation, headache, mood swing, sleep disturbances, loss of interest in routine and daily activities, anxiety and its related symptoms etc. might have possibly aggravated during PMS due to stress as one of the causative factors. This argument gets direct support from a research done on 145 females by Kathleen *et al.* (2006) where they found that there is statistically significant correlation between increase in stress and increase in PMS. Also, there are reports suggesting that women with PMS perceive stress almost 4-fold more compared to non-PMS ones (Bahamondes *et al*., 2007).Thus, we should neither neglect nor stop researching this unseen veil for woman behind it may be under more grave danger, as she is naturally a more sensitive and emotional entity.

## Comments on few of the most commonly reported PMS symptoms

Out of all 95 symptoms studied during this research, there were few most common symptoms, which are further discussed here. Unfortunately, like many other studies, this study also could not arrive at some definite conclusion regarding cause and occurrence of these symptoms. But from this, it's certain that further intrinsic investigations are very much essential to establish facts related to PMS symptomatology.

### ACNE:

There are estimates that one – third of all women experience premenstrual facial breakouts (Acne), and if very mild manifestations are included, some have placed the incidences as high as 60%, which is found to be 12.77 % (92 / 720) subjects complaining of many acne and 10. 42% (75 /720) experiencing few acne. It was indeed rare and new to this study that 19.72 % (142 / 720) emphatically complaint of suffering only one acne during these days. As a matter of fact, this painful single acne had become a sort of indication that menses is about to come, for most of these subjects.

Again for acne, the general assumption is that in some unknown manner, progesterone is responsible for this premenstrual acne, but few others claim that excess sebum secretion during postovulatory phase is responsible (Sloane, 1980). However, when analysis of variance (ANOVA) test was conducted for checking the differences in level of hormones by Acne (i.e. 1, few and many acne) no statistically significant results were obtained. Thus in present study no association between acne and different hormones was found.

**LOWER ABDOMINAL CRAMPS / PAIN:**

Abdominal pain is often the main event in the ring of PMS symptoms that can include nausea, vomiting, fatigue, diarrhoea, lower backache and headache. Although it is one of the most common complains of any female during their menstrual days we hardly have any clue regarding its occurrence. It's an immediate need to tackle this symptom as most of the epidemiological studies have reported it to be quiet high amongst female of all age groups. In present investigation too, the number of subjects was alarming who complained of suffering LAC during PMS and it was noted to be 43.75%

**HEADACHE (HA):**

Medical science has recognized various forms of headaches like migraine with aura, migraine without aura, cluster headaches, menstrual headache and many more. Yet our understanding about headaches is quiet preliminary. Additionally, headache with respect to PMS remains quiet unexplored. In present study, 15.42 % respondents told of suffering mild to severe HA during PMS at the time of survey. Even though headache is one of the most common symptoms of PMS, yet the exact cause remains unknown. Also with present study, no such clues were obtained as to why HA occurs during PMS except a mysterious result that when analyzed statistically, only $T_3$ was found to be associated with HA during PMS!

The other way round, outcomes of Martin *et al.* (2006) reveal that PMS symptoms might be worsened by the presence of headache in female migraineurs. This puts science in a jumble box to search whether HA leads to PMS or PMS leads to HA?

**ANGER AND IRRITATION:**

Present study sample showed 41.66% respondents with anger while 44.86% respondents suffering of irritation during PMS. Such

edged behavior is a major sign of PMDD which disrupts not only lives of the sufferer but also people around them. There is very thin line of difference between anger and irritation. Infact, they are loosely referred as synonyms of each other. According to Novaco (1975), anger is cognitive (appraisals), somatic-affective (tension and agitations), and behavioral (withdrawal and antagonism). Mild forms of human anger may include displeasure, irritation or dislike. But, irritability is an excessive response to stimuli. Irritability may be demonstrated in behavioral responses to both physiological and behavioral stimuli including environmental, situational, sociological, and emotional stimuli (http://en.wikipedia.org/wiki/Irritability).

Anger, irritation, mood swing, anxiety, cry spell, hormonal fluctuations, change in appetite and change in sleep pattern should be somewhere closely linked with each other, even though presently we don't have any scientific conclusions to prove this. Additionally, without any doubt, it can be said that they surely overlap each other and thus are most obscure to analyze as well as treat. Neuro-endocrinology is the only one to answer the cause and cure for these symptoms!

**DISTURBED SLEEP:**

Sleepless nights or wakefulness, disturbed sleep, feeling sleepy during day time, getting more dreams in sleep, too many thoughts during sleep, etc are popularly reported by large mass of women during their premenstrual days. When analyzed with present subjects, 25.69% were found to have more sleep than normally they use to, 11.25% has less than normal sleep while 1.38% suffered disturbed sleep. There were few (4.16%) subjects who also experienced bad dreams during PMS.

No typical clues were gained during the present study, but the explanation given by Shechter and Boivin (2010) that interaction between hormonal secretions and sleep-wake cycle can influence sleep across menstrual cycle in women with PMS, who experience specific alterations of circadian rhythms during their symptomatic luteal phase along with sleep disturbances during this time. Again, decreased melatonin secretion (Parry *et al.,* 1997, Parry *et al.,* 1990) is also a possibility for disturbance in sleep and day time sleepiness. But consistent reporting and further investigation is needed for the same.

**CHANGE IN APPETITE:**

In study sample, increase in hunger was reported in 11.81% subjects while 20.69% experienced decrease in hunger. There were 6.38% respondents who lost their total appetite. Apart from such changes, it was interesting to find that many showed symptoms of binge eating disorder too. There were 24.03% females who were tempted for specific food items during PMS, for example, 5.83% craved for sweet food, 1.66% wanted to have something cold whereas 1.53% subjects craved for sour items. Such temporary changes in eating behavior and sufferance from binge eating might be related to serotonergic dysfunction (Verri *et al.,* 1997).

**BACKACHE:**

48.33% subjects, which are nearly 50% of the study sample, complained of backache which was quiet high. Although the exact cause of this most common problem is not known to medical science yet according to Chatterjee (2011), prostaglandins, hormones released during menstrual cycle to promote contraction of uterine wall lead to such lower back muscle pain. Also, Investigator agrees with popular reasoning of many researchers that back pain might be a referred pain associated with

spasm in the pelvic floor attached with sacrum. Only further appropriate studies can prove these scientifically.

**LOSS OF INTEREST IN ROUTINE ACTIVITIES/HOBBIES:**

During survey, 36.38% respondents were noted to have lost interest in routine activities. They also suffered a sort of dislike for hobbies. This is one reason apart from pain factor, that in number of studies more absenteeism was noted during PMS time. Those who could not avoid their domestic work did it forcibly or out of compulsion during PMS days. Mood swing, hormonal fluctuations, pain, anxiety and depression could be the underlying causes for such strong feeling of avoiding daily activities and even hobbies.

**MOOD SWING:**

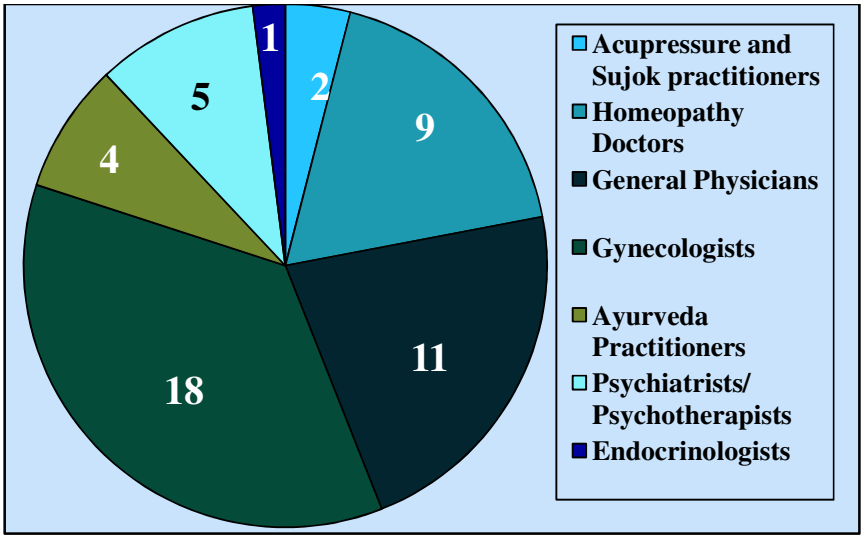
Here, with present study, 31.66% respondents confessed of going through mood swing during their PMS days. One possible reason might be that these females were more sensitive to change in hormonal pattern occurring during PMS which resulted in mood disturbance within them. Like many other symptoms, mood swing also remains unsolved mystery to medical science, as all the previously carried out researches provide quite contradictory conclusions. Although many reports have

favoured two factors (1) Genetics and 2) Neuroticism as a base for this yet large detailed study need to be undertaken with differential diagnosis of these two factors (Payne *et al.,* 2009). According to Verri *et al.,* (1997) and Graze *et al.,* (1990), there is a very strong link between PMDD and mood disorders. Women with premenstrual depression are at risk for mood disorders.

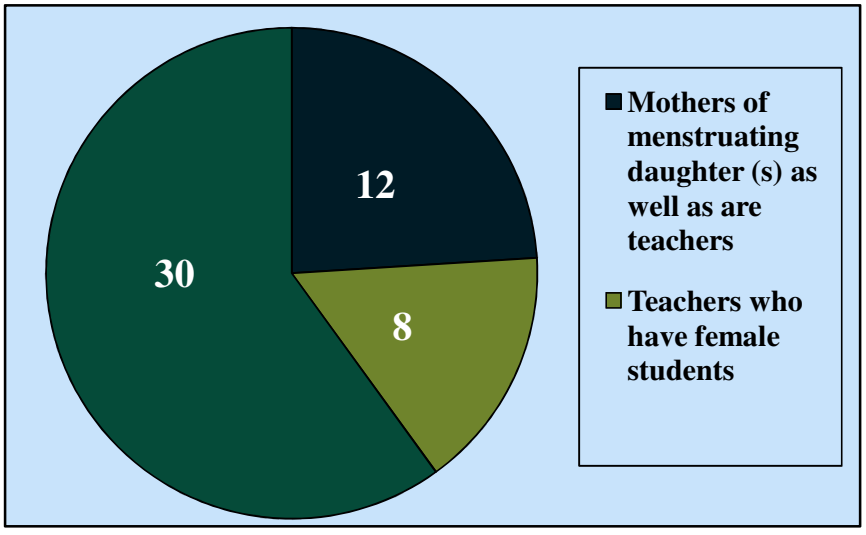
## (VI) Appraisal of the perspectives and experiences of Mothers, Teachers and Doctors on Premenstrual Syndrome

Mothers, Teachers and Doctors are those members of a society which can contribute tremendously in building a healthy society. Mothers can impart best education of all kinds most easily, while teachers can bring awareness in a methodic and scientific way. Any health problem is directly linked to a doctor and he is looked upon to bring proper solutions for the same. With all these beliefs, 50 Health Practitioners from various fields of medicine like Gynecology, General Medicine, Homeopathy, Ayurveda, etc., *(GRAPH – 52),* 30 Mothers and 20 Teachers *(GRAPH – 53)* revealed quite relevant information regarding PMS symptoms, complaints of woman during those days, medicines

taken, alternative therapies used etc. which are valuable to this study. Co-incidentally, 12 / 20 teachers were also mothers of daughter(s), which was an advantage for this study to gain double experience out of same participants.




**Graph – 52 No. of Health Practitioners interviewed for present study**




**Graph – 53 No. of Mothers and Teachers interviewed for present study**

Even though there were only 30 mothers for this study, yet much variation was noted in their approach towards menstrual disorders. This reflects their nurturing, how they were brought – up and education. Those who were educated were more out-spoken about these matters as compared to others. Undoubtedly, teachers who had their own daughters were naturally more sensitive towards the problems of their girl students in those days. However, very few mothers and teachers could answer questions like – (1) *How do girls deal with PMS problems and (2) Share your observations and views regarding such issues.* This shows that they are equally ignorant about the core health issues of a female but are enough puzzled about the same.

Most of the Physicians believe that PMS is an obscure phenomenon. It is a state that shows some physical and psychological discomforts which disappear when menses start. Mixed attitudes were noted with reference to the seriousness of a doctor in treating PMS. For many, it seems to be a problem just like some common ailment for example stomach ache, viral fever etc.!! There were 8 who didn't wanted to talk about PMS at all as for them it was 'no matter" of discussion, not their area of treatment or simply felt wastage of time talking about it as it

was not a disease ! Few doctors particularly the allopaths consider it to be a Gynecological problem and ask their patients to consult a gynecologist. Lot of apposition and bias was noted for other medical disciplines by allopathic practitioners and vice – versa. Very few medical practitioners educate their patients about PMS and menstrual disorders. It is sad to note that hardly any health professional had their own in depth study or understanding on this subject. This observation got enough support from the interviews as most of the doctors did not answer the question - *guideline for studying PMS.*

Certain end results of the conversation with mothers, teachers and health professionals are as follows:

(1) Mothers – Teachers agree that many physical and psychological – behavioural changes are seen during premenstrual stage, but none of them know that this phenomenon is known as Premenstrual Syndrome.

(2) None of these mothers or teachers consulted Doctors for basic understanding of PMS nor did they refer any such scientific literature or sources which can provide information on PMS. Infact it seemed that such matters are so much unnoticed that parents don't realize that they

should remain updated. This is even true for menses and its other disorders.

(3) Young girls were never educated about PMS or menses by mothers or teachers before they set in menarche and they only provided information on managing menses. Other physiological details related to menses were only provided if girls ever asked. Actually its quiet doubtful how much they themselves know of menses!?

(4) Even mothers – teachers hardly notice PMS and menstrual problems as a subject of discussion, education or concern. They too consider it to be a natural phenomenon which every girl has to bear anyhow.

(5) Health Professionals do agree to the fact that Premenstrual Syndrome does exist, although for them too, it is not a major disorder of any concern.

(6) Ladies do consult Doctors for PMS problems even though presently the number is very less. Mostly those, for whom certain physical symptoms like headache, lower abdominal cramps, backache, nausea – vomiting, weight gain, breast problems and acne become unbearable, approach a doctor for medication.

(7) There is no clarity related to the etiology of PMS amongst Health Practitioners.

(8) Doctors provide only symptomatic treatment as per the complaints made by the patients. As they find it to be a common health problem, so they don't even do proper counseling of such patients. In severe cases they ask their patients to approach Gynecologists.

(9) Just like others, Gynecologists too, provide symptomatic treatment, but they were found to suggest tips for food, exercise, etc.

*CHART - 3* mentioned below gives a detail listing of all the PMS symptoms observed by mothers, teachers and doctors, list of suggested treatments and medications, possible causative factors of PMS as told by the medical professionals.

## Chart – 3 List of various details of PMS obtained from doctors, mothers and teachers

**(A) List of common complaints of respondents during premenstrual and menstrual days shared with their mother or teacher.**

(1) Lower abdominal pain (at times severe in few cases)
(2) Backache
(3) Headache
(4) Feeling sleepy
(5) Feeling giddy
(6) Feeling uncomfortable
(7) Doesn't want to go anywhere
(8) Loss of interest from routine activities
(9) Dislike for food and demand for certain food items like sweets, etc.
(10) Boredom

**(B) List of common lifestyle and behavioural changes during premenstrual and menstrual days of the respondents observed by mothers and teachers.**

(1) Irritability and anger
(2) Mood swing
(3) Feeling low and nervous
(4) Feeling sad and sorrowful
(5) Confused and clumsy
(6) Feeling dirty
(7) Becomes lazy
(8) Feels shy
(9) Loses interest from activities
(10) Looks upset
(11) Gets tired soon and loss of agility
(12) Doesn't eat well, skips meals

(13) Becomes conscious particularly of opposite gender
(14) Absentia from school, college, tuition classes or hobby classes.

**(C) List of common complaints experienced during PMS for which patients approach Doctors for treatment.**

(1) Pain in lower abdomen
(2) Heaviness of body
(3) Headache
(4) Nausea
(5) Uneasiness
(6) Heaviness in breast
(7) Irritability
(8) Anger
(9) Depression
(10) Fatigue
(11) Insomnia
(12) Cry spell
(13) Backache
(14) Feeling sad
(15) Decreased Libido
(16) Loss of interest from activities
(17) Mental disturbance
(18) Quarrelsome
(19) Urinary tract infection (UTI)
(20) Anxiousness
(21) Breast pain
(22) Weight gain
(23) Palpitation
(24) Leucorrhoea
(25) Tension
(26) Hot flush
(27) Abdominal heaviness
(28) Bloating
(29) Diarrhoea
(30) Body pain
(31) Leg and thighs pain
(32) Suicidal thoughts
(33) Problems in marital relations
(34) Loneliness
(35) Breast swelling
(36) Frequent micturation
(37) Irregular period
(38) Increased intolerance to things happening around

**(D) List of determinants (causative factors) as told by Physicians (Allopath, Ayurveds, Homeopaths, Psychiatrists and Gynecologists), which might be responsible for the occurrence of PMS.**

**(1) Hormonal disturbances and fluctuations**

(a) Decreased levels of serotonin

(b) Decreased levels of endorphin

(c) Rise in Prolactin

(d) Fluctuations in Progesterone and Estrogen

**(2) Dietary Problems**

(a) Vitamin deficiency

(b) Mineral deficiency

(c) Undernourishment and Malnourishment

(d) Anemia

**(3) Psycho-somatic problems due to the following**

(a) Social and family issues

(b) Marital maladjustments

(c) Lack of communication with parents, family, husband etc.

**(4) Depression**

**(5) Lack of time management**

**(6) Lifestyle alteration and maladjustments**

**(7) Hereditary**

**(8) Stress**

**(9) Anxiety**

**(10) Lack of exercise**

**(11) Nature**

**(12) Person's brought up, family background and culture**

**(13) Body physiology**

**(E) List of alternative therapies suggested by Physicians (Allopaths, Gynecologists, Psychiatrists, Ayurvedic and Homeopathic Practitioners) to their patients to deal with PMS symptoms.**

(1) Meditation
(2) Yoga
(3) Exercise
(4) Relaxation therapy
(5) De-stress techniques
(6) Aerobics
(7) Pranayam
(8) Walking
(9) Acupressure
(10) Magnet therapy
(11) Enough rest
(12) Psychotherapy
(13) Counseling
(14) Intake of protein, vitamin and calorie rich diet
(15) Decreasing salt, sugar and caffeine intake
(16) Sharing, discussing and talking to the right person about mental and physical problems
(17) Mother can play vital role in help deal with psycho-somatic problems

**(F) List of symptomatic medication prescribed to patients suffering from PMS and menstrual problems by Doctors.**

(1) Diuretics
(2) Muscle relaxants
(3)Oral contraceptive pills (OC pills)
(4) Anti - spasmodic
(5) Anti – anxiety
(6) NASAIDS
(7) Sleep promoters
(8) Multi – vitamins
(9) Vitamin B – complex
(10) Isoflavonoids

It seems as if the whole panorama about Menstrual Disorders needs an urgent, swift and radical change for the better in India. From the stake holders of health, education and civil society to that torchbearers of the young generations, all need a thorough shake-up if we want India and Indians to be at par with developed countries in the areas of women health.

## (VII) Prevalence of PMDD in present study sample – a preliminary study.

Premenstrual Dysphoric Disorder (PMDD) is a premenstrual condition defined by a combination of severe moods, behavioural, cognitive and / or somatic symptoms that repeatedly occur only in the luteal phase of the menstrual cycle (Teng *et al.*, 2005). As mentioned earlier in *CHAPTER – 1 Introduction*, PMDD is a severe variant of PMS. It is the extreme, predominantly psychological end of PMS spectrum (O' Brien *et al.*, 2003; Shaw *et al.*, 2003). Change in appetite, irritability, insomnia, feeling of hopelessness, anxiety, depression, lethargy, feeling of out of control, decreased interest in usual activities and mood swing are the common diagnostic symptoms of PMDD that interfere in the daily life of these sufferers to a very great extent.

American Psychiatrist Association (APA) listed four diagnostic criteria in Diagnostic and Statistical Manual of Mental Disorder fourth edition (DSM – IV). Accordingly **(a)** atleast 5 symptoms listed in DSM – IV should be present during premenstrual week and absent during postmenstrual week and at least one out of affective lability, anger or irritability, mood symptoms, anxiety must be present in those 5 symptoms **(b)** these symptoms must be severe enough to cause functional impairment **(c)** they must not be an exacerbation of another disorder and **(d)** the symptom changes must be documented by prospective daily records in two menstrual cycle (Teng *et al.*, 2005; Di Giulio and Reissing, 2006). In the recently proposed revision of DSM – IV on 29th April'2012, that is in DSM – V, another point (**e**) that symptoms are not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication or other treatment) or another medical condition (e.g., hyperthyroidism) is also added.

(http://www.dsm5.org/proposedrevision/pages/proposedrevision.aspx?rid=484#)

Although DSM – IV criteria is largely accepted world over, the fact is that PMDD is yet not understood well till date and its

diagnostic criteria are not consistently followed (Fryer *et al.*, 1999). Literature related to this multifaceted PMDD also reveal that just the way science is struggling at arriving to the truest facts about PMS, same way, it's still in an ambiguous state regarding definition, diagnosis as well as differential diagnosis with other diseases and treatment of PMDD. There exists not only difference of opinions between researchers but also contradictory data with respect to PMDD and its existence.

Here, the investigator has tried to take up quiet an elementary, somewhat superficial analysis of prevalence of PMDD in two different ways as PMDD was secondary to this study and not the main focus. Firstly, following the guidelines of DSM-IV as meticulously as possible 15 physical – psychological symptoms were selected namely (1) Anxiety (2) Tension (3) Loss of interest in routine activities and / or hobbies (4) Weakness / fatigue (5) Change in Appetite (increase /decrease / total loss) (6) Food craving (7) Irritability (8) Anger (9) Breast problems ( pain / mastalgia / swelling) (10) Sleep problems (disturbed sleep / decreased / increased / bad dreams in sleep) (11) Headache (12) Mood swing (13) Want to remain alone (14) Weight

gain(15)Worthlessness(http://www.dsm5.org/proposedrevision/pages/proposedrevision.aspx?rid=484#).

Further these symptoms were studied in present study sample and the result was, **43.05 % (310 / 720) respondents showed presence of at least 5 out of these 15 symptoms during their premenstrual days.** Secondly, to be more precise, the same group of symptoms was checked with 142 subjects for their 3 menstrual cycles. **2.36 % (17/142) subjects showed presence of atleast 5 of these symptoms for 3 menstrual cycles** which is quiet relevant when compared with study of Iceland (2.70%) (Epperson *et al*., 2012*; TABLE - 31).* However, it should be noted that these three menstrual cycles were not consecutively studied nor any daily symptom rating was done.

**Table 31 - Comparative Overview of Prevalence of PMDD in various study samples of India and other nations**

| India and other nations | Prevalence of PMDD (in %) |
|---|---|
| Present Study Sample (single menses cycle in 720 cases) | 43.05 |
| Present Study Sample ( as per DSM IV criteria) in 142 cases | 2.36 |
| New Delhi, India[1] | 6.40 |
| Mumbai, India[2] | 10.00 |
| Karachi, Pakistan[3] | 5.50 |

| | |
|---|---|
| **Peshawar, Pakistan[4] (as per DSM IV criteria)** | **18.20** |
| **Switzerland [5]** | **3.10** |
| **Osaka, Japan [6]** | **1.2** |
| **Korea[7]** | **2.80** |
| **Nigeria (as per DSM IV criteria)[8]** | **36.10** |
| **Qatar (as per DSM IV criteria)[9]** | **16.00** |
| *1 Banerjee et al.(2000), 2 Joshi et al.(2011) , 3 Pal et al. (2011), 4 Tabassum et al. (2005), 5 Tschudin et al.( 2010), 6 Takeda et al.(2006), 7 Choi et al.(2010), 8 Issa et al.( 2010), 9 Bakhshani et al.(2009)* | |

However as shown in *TABLE – 31* these PMDD results in present study are less to the close counterparts of New Delhi (6.4%) (Banerjee *et al.,* 2000), and Karachi – Pakistan (5.50%) (Pal *et al.,* 2011). Similarly the percentages are low as compared to the results of study in Switzerland conducted by Tschudin *et al.,* (2010).

Halbreich (2004) mentioned that prevalence of PMDD is widely cited amongst 3 – 8% women of reproductive age. PMDD sufferers are substantially at a greater risk of developing full- blown major depression (Halbreich and Endicott, 1985; Graze *et al.,* 1990; Seifer and Kennard, 1994). On one side it is a matter of little relief at the same time on other side it is a huge concern that prevalence of PMDD in study sample is 2.36%, which is less when equated to above range but can increase in coming years if no action plans undertaken for its awareness.

Also, decades of research suggest that PMDD may contribute to the risk for Major Depressive Disorder (MDD) (Hartlage *et al.,* 2001) and thus its prevalence cannot be underestimated.

## (VIII) Novel hypotheses derived from the present study

From the experiences gained during this research work as well due to the personal understanding of managing premenstrual syndrome since years as well as because of the follow ups for many menstrual cycles of the subjects and as a result of the data collected plus analyzed, the investigator could ascertain below mentioned hypotheses. The present work can be considered only an effort towards some possible findings and is not enough to justify these hypotheses, but further in-depth research in this direction can surely give some fruitful results in solving this mysterious phenomenon – PMS.

**(A) Hypothesis I – Biological clock of women possess peculiar characteristics associated with age and menstruation.**

*GRAPH - 54* shows a very typical pattern of physical and psychological – behavioural PMS symptoms in various ages. The very first peculiarity is that both types of PMS symptoms show not only their relevant presence in these 23 important years of reproductive phase of a

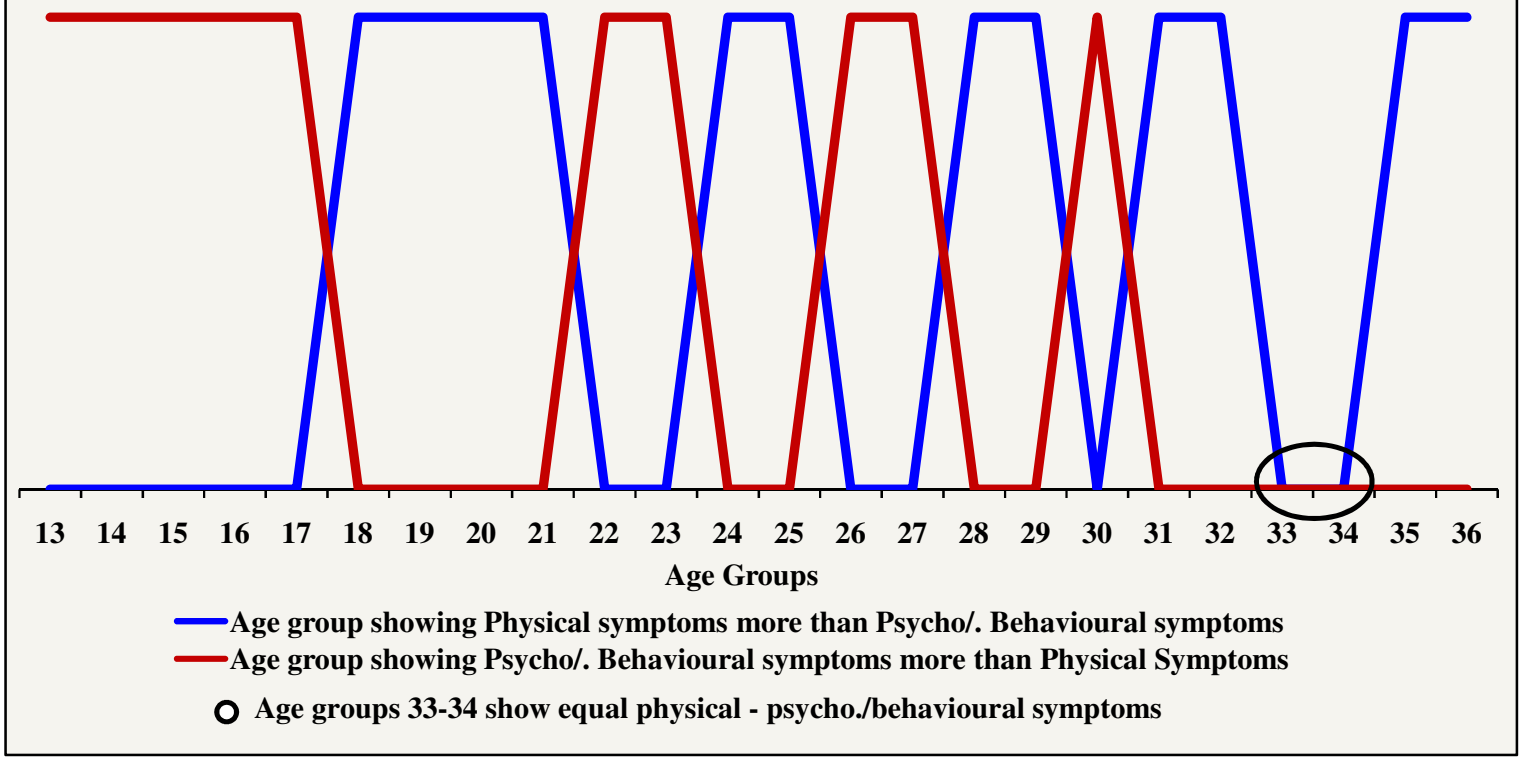
woman (Yonkers and McCunn, 2007; O'Brien and Ismail, 2007) but also alternatively depict their dominance age-wise from age 13 till age 32 years. Only at the ages 33 and 34 years both type of symptoms are experienced equally rather both dominate on the body physiology of a woman. Also when one studies *GRAPH - 55,* from age 22 years to 32 years, every two years the dominating type of symptom changes. It's worth noting here that from age 13years till age 17 years more psychological symptoms are faced rather than physical ones, which may be due the initial years of menses where the girls are stepping in their adolescences and most of them face distress in accepting such bodily change. It's also relevant to notice that the ages from 18 to 21 years show more physical symptoms compared to psychological, may be as these are her valuable peak years biologically as well as for over all development in education, career making etc..

Apart from all this, such a peculiar pattern points out that there should be some inborn cycle within feminine gender which is quite influential. The cycle is directly related to the age of a female and thus age cannot be neglected or underestimated by medical science particularly in case of female bodily problems and reproductive system

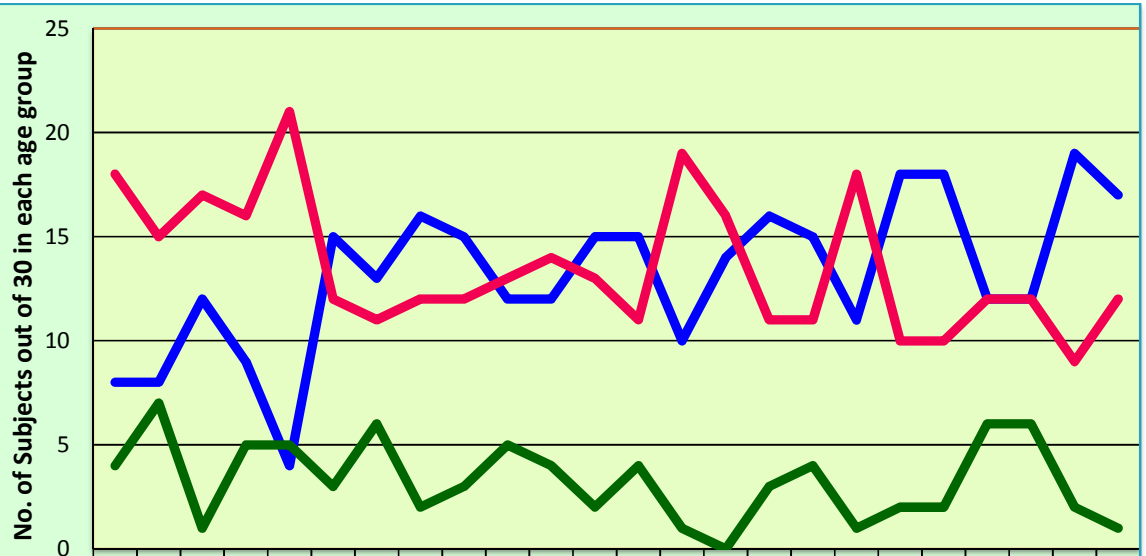
related issues. Of course there are many other factors responsible for woman health issues but for PMS, age might be playing a major role in determining the type of symptom (da Sil*va et al*., 1982) she might suffer! Also, this relationship between age and PMS symptoms might be playing a definite role in the premenopausal and menopausal problems of the woman. This pattern might serve as a predictor for the mental or physical changes that a lady might come across in her coming years. Also it can be a diagnostic tool for treatment.

But, this hypothesis needs to be tested well through more exhaustive research.

**Graph 54 - Pattern showing relationship between age and type of PMS symptoms (Physical or Psychological - Behavioural) experienced by subjects**



**Graph 55 Comparison of Physical-Psychological /Behavioural Symptoms in age groups 13to36 years.**




| | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. of Subjects showing Physical symptoms more than Psycho/. Behavioural symptoms | 8 | 8 | 12 | 9 | 4 | 15 | 13 | 16 | 15 | 12 | 12 | 15 | 15 | 10 | 14 | 16 | 15 | 11 | 18 | 18 | 12 | 12 | 19 | 17 |
| No. of Subjects showing Psycho/. Behavioural symptoms more than Physical Symptoms | 18 | 15 | 17 | 16 | 21 | 12 | 11 | 12 | 12 | 13 | 14 | 13 | 11 | 19 | 16 | 11 | 11 | 18 | 10 | 10 | 12 | 12 | 9 | 12 |
| No. of Subjects showing equal no. of physical - psycho./behavioural symptoms | 4 | 7 | 1 | 5 | 5 | 3 | 6 | 2 | 3 | 5 | 4 | 2 | 4 | 1 | 0 | 3 | 4 | 1 | 2 | 2 | 6 | 6 | 2 | 1 |

**(B) Hypothesis II – Origin of PMS**

Remarkable fluctuation or rather decrease in immunity of a woman during premenstrual days was observed in person and during the survey. This makes woman more prone to various general health ailments like allergy, common cold, flu, viral infections, exacerbation of her already existing diseases etc. (Sadique Begum and Ashwini S., 2012; Hodges and Taylor, 2005).This might be happening due to physiological changes or due to the hormonal fluctuations (particularly Progesterone – estrogen) within the body to facilitate the onset of menstrual cycle (Bouman *et al.,* 2005).On top of this her health status is decided by number of factors like stress, dietary habits, life style and her genetic constitution *(CHART – 4).*This state of the body is more than enough to affect or disturb the metabolism.

As per one's own physiology, certain organ and organ systems might become the first targets or grounds for a disturbed metabolism. As all organ systems and their life processes are interrelated, soon they start influencing other systems and system's functioning. Thus ladies in the premenstrual days show various physical – psychological symptoms and the intensity – severity of these symptoms will depend on

her specific physiology and the organs which responded first to this change.

As shown in *CHART – 4*, the degree of PMS will be defined by the level of sensitivity between any of these stages which is why even though the same process takes place in every woman, their rate of PMS varies. If we can identify that most troublesome part of the process mentioned in *CHART – 4* for an individual PMS sufferer then we can cure PMS from the roots. However, presently no common method of cure is visible.

In any case, from the present study one thing is for sure quiet convincing, that Menstruation Cycle and all - premenstrual stage, menstrual stage and post menstrual stage of the human female biological cycle is the core centre around which female physiology revolves and that which governs her total health. Menstrual disorders like PMS do affect diverse physiologic systems (Halbreich, 2003). Furthermore, her body is entrusted by Nature for the fulfillment of crucial task of reproduction and delivery of healthy progeny which are certainly the crucial bodily acts of a lady. This surely makes it even more essential to resolve health problems of a woman related to PMS and Menses. Besides this,

understanding PMS and menstrual cycle as a whole can provide solutions to number of health problems of women which are gender specific and thus we must take these matters seriously!

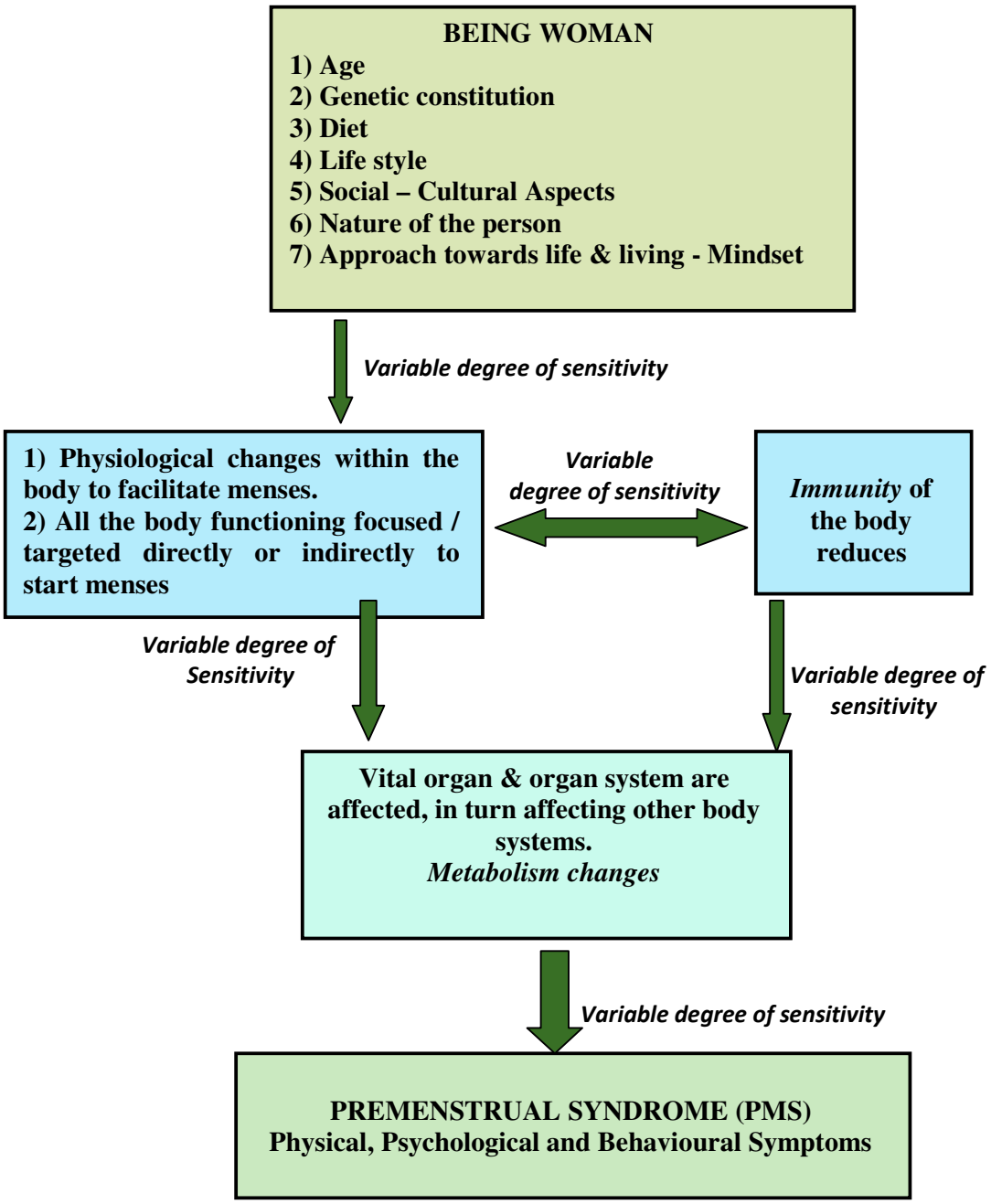



**Chart – 4 Hypothesis II: Origin of PMS**

# Insinuations

# Chapter 6

# INSINUATIONS

# CHAPTER 6

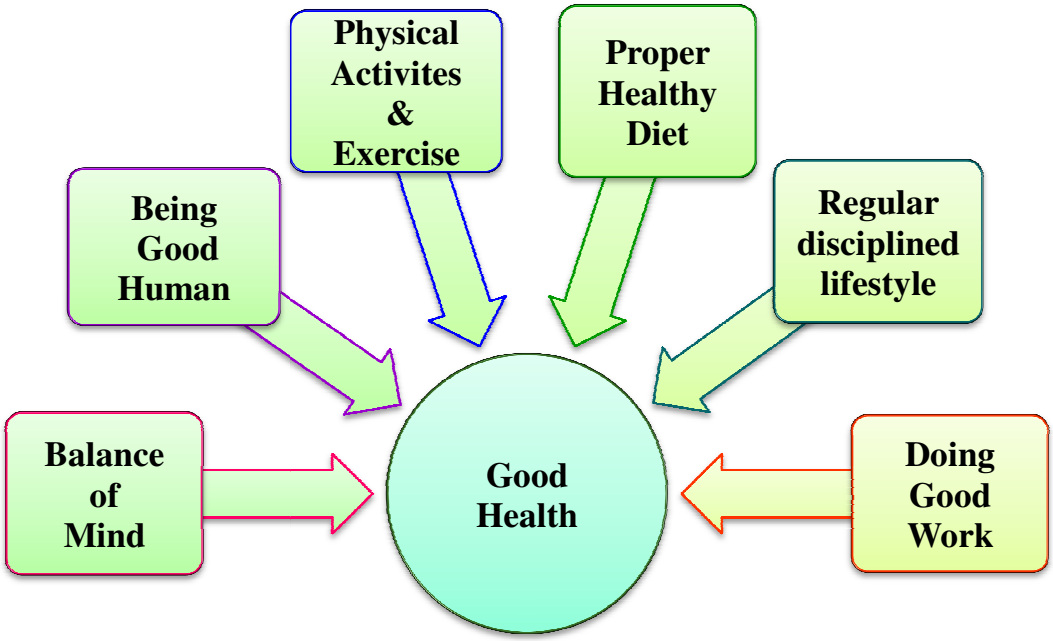



**Chart – 5**

**Model of Healthy Life and Well Being**

It is well said, "He who has health has hope, and he who has hope has everything" and health is multidimensional. For great health and well – being one should always do all that is mentioned in *CHART – 5*. Health is not a single physical or mental identity of your persona, it's a

sum total of all the aspects of what one does. So, for a healthy going one must keep each of these aspects as fit as possible.

## (A) Self – Help Tips against PMS for Women

Any changes that allow individuals to exert greater control over their lives will produce a positive impact. It is for this reason that lifestyle changes are effective in the treatment of PMS (Speroff and Fritz, 2005) and to make appropriate changes in one's daily routine, the following guidelines will surely be helpful. If you obey these guidelines then they will lead you to a happier and disease free life.

**(I) <u>Change your eating habits</u>** - Sir William Osler once said, "We are all dietetic sinners; only a small percent of what we eat nourishes us; the balance goes to waste and loss of energy." Given below are tips, which if followed sincerely will help a person to gain good health and prevent future ailments.

(1) Maintain regularity in your routine.

(2) Eat as much natural foods as you can.

(3) Consume seasonal foods as far as possible.

(4) Eat well but do not over eat.

(5) Avoid excessive salt and spices

(6) Avoid too much sweet, especially sugar.

(7) Eat foods which contain carbohydrates, especially fiber and starch.

(8) Avoid foods that contain large amount of cholesterol and saturated fats.

(9) Watch your weight and maintain ideal weight.

(10) Avoid eating same kinds of foods all the time. Eat a variety of foods.

(11) Avoid canned, processed, preserved, deep fried and refined foods.

(12) Avoid excessive intake of tea, coffee & cold drinks.

(13) Avoid fast food and junk food

(14) Include green leafy vegetables, salads, fruits, whole grains and milk in your meals.

(15) Take enough water.

*(Note: 1 to 15 tips are adopted from the works of Joshi, S. A., 1992).*

**(II) Use of Daily menstrual analysis calendar** - can help one understand PMS symptoms and their severity in a better way. These records will also help your doctor to understand your problem better and provide medical help if needed.

**(III) Routine Body checkups** - One should keep a regular check of and remain aware about one's haemoglobin levels, blood pressure,

hormonal levels particularly thyroid gland hormones ($T_3$, $T_4$, TSH). Also, it is essential to keep a record of one's menstrual dates and menstrual history, mother's menstrual history, family health history, height and weight. Time to time woman above 30 years must check their Sugars, Calcium and Vitamin levels at regular intervals. Any uncommon changes should not be neglected and actions should be taken immediately.

**(IV) Interaction with others** - Communication can work more than a medicine especially for women who are extremely sensitive and emotional beings. Talk to your mother, sister, any close family member or relative, a friend, husband or even doctor about how you feel during PMS days, pain or problems of menses etc. and ask for support. Make them aware of your thoughts and feelings, so as to express your inner self and avoid problems in relationships. This will surely ease your psycho-somatic troubles. If you still can't find an outlet then consider writing a dairy; it can provide psychological relief.

**(V) Doing the following things will help reduce PMS** -

(a) Moderate and regular warm up, breathing and simple yogic exercise, meditation and pranayam. These are effective to enhance general well - being, mood and mental balance.

(b) A daily walk of 30 to 45 minutes will improve functioning of metabolism and circulation.

(c) Indulge and encourage yourself in any of your favorite creative hobbies like music, indoor or outdoor sports, arts, dance, cooking, etc. This will help you develop healthy and positive attitude towards life.

(d) Sound sleep of 6 to 8 hours will help you keep your body calm and relaxed.

**(VI) Don't Neglect** – "Symptoms, then, are in reality nothing but a cry from suffering organs" so very correctly observed Jean Martin Charcot. Deteriorating health should be provided medication at right time. If one is not willing to seek allopathic cure then one can take help of alternative therapies, holistic medicines and herbal medicines under doctor's supervision.

I have personally experienced good results of **Evening Prime Rose Oil**, a herbal formulation **M2- Tone** marketed by Charak Pharma Pvt. Ltd. and a complete women health tonic **Ashokarisht**, which is also an Ayurvedic medicine, in getting relieved of certain PMS symptoms. Homeopathic medicines also work well in menstrual cramps and menstrual migraines. Water soluble vitamins E and K, Fat soluble

Vitamins B6, B5, folic acid, B12 and Vitamin C, minerals like calcium, magnesium, zinc and boron, oils like flaxseed oil and borage seed oil can help control pain and inflammation in the body (Bove and Costarella, 1997). Medication should be tried under strict supervision and guidance of a Doctor.

## (B) Suggestions for Clinicians and Physicians

A reasonable approach of care and treatment for the patients with severe PMS can be as follows.

(1) It is important for doctors to give their patients an attentive ear and should hear even the minor complaints of women. Doctors ought to acknowledge that PMS is a disease and can seriously disturb a woman's health and life to a great extent.

(2) It is the moral duty of clinician to educate and explain such patients making them aware of various aspects of this disorder.

*(3) When a patient shares her complaints, then the doctors should establish the diagnosis by having the patient chart her symptoms throughout the course of the menstrual cycle.

(4) Rule out other medical or underlying psychiatric disorders with a thorough medical history, physical and laboratory examinations.

*(5) Check for symptom patterns and particularly the presence of an increase in symptoms in the premenstrual phase.

*(6) Initially consider non-intrusive interventions such as use of multivitamin with magnesium, increase intake of complex dietary carbohydrates, restrict caffeine intake etc for symptomatic treatment *(TABLE – 8).*

(7) If symptoms persist, consider using hormonal or pharmacological drug therapy *(TABLE - 8).*

(8) Consider referral for cognitive behavioural therapy or relaxation therapy, especially if external stressors exacerbate symptoms.

(9) If symptoms remain refractory to treatment so as to be life – threatening, psychiatric consultation is indicated. Surgical suppression of ovulation is a last resort because of the risks associated with the long term lack of estrogen.

** (Above mentioned points 3, 5 and 6 as suggested by Elliott, 2002).*

## (C) Suggestions for family members, friends and relatives of a PMS sufferer

Warmth, love and care are more effective healers than any medicine. Whether you are a family friend or simply nobody for

someone, always show concern to a woman if she is passing through her PMS or menses days. These are very vulnerable times for her.

Mothers are expected to be more considerate towards their girl child. It is a mother's responsibility to not only nurture her child properly but also nurse her when needed.

A word of caution also goes for husbands too, they must be attentive and sensitive towards their wife's delicate issues rather than neglecting them in such days. Relatives and friends must develop extra patience and tolerance towards her behavior, mental state and health in such days.

**(D) Urgent Need of Counsellors**

Our Society needs counselors with whom young women, mothers and teenagers can communicate and share their problems of PMS. Such counselors can act as a bridge between doctors and PMS patients. They can provide scientific information and guidance to parents, teachers and educators. Women from across age groups can be benefitted through this. Counselors can play key role in bringing awareness regarding PMS.

## (E) RUTUJA – a site devoted to women

To bring awareness about PMS this site is launched (*PLATE - 5)* by the investigator of present research work under the guidance of Dr. A. H. Dholakia. The website has 6 different sections which provide information related to female reproductive organs, information about PMS, self help tips and much more.

There is special section on the website called *Bodhi* – Self Study – Here, women can also take an online 20 questions long self-test about PMS symptoms; the results will indicate whether they are suffering from PMS or not.

The website also offers women an open platform where they can share their experiences by writing articles, PMS stories, etc. There is also a treasure trove of e - books and articles from the experts - **www.rutuja.org** *(PLATE - 5)* - to help women improve their health.

'Experience is a great teacher.' Keeping this in mind, if one vigilantly observes one's own self, then one begins to comprehend the body signals which help us take care, control and improve our physical – mental health.


***Plate-5 Website prepared for awareness of PMS***

# Summary and Conclusion

# Chapter 7

# SUMMARY AND CONCLUSION

# CHAPTER 7

Premenstrual Syndrome is a very mysterious, critical and challenging cluster of physical and psychological – behavioural problems for a woman especially those of reproductive age. PMS often pushes women into a strange and confusing state of mind. As stated by Dutta (2009), "PMS is a psychoneuroendocrine disorder of unknown etiology, often noticed just prior to menstruation". He also says that if (a) it should not be related to any organic lesion. (b) it regularly occurs during luteal phase of each ovulatory menstrual cycle (c) symptoms must be severe enough to disturb the life style of the women or she requires medical help and d) symptom – free period during rest of the cycle, if these criteria are fulfilled and large number of symptoms appear during the last 7-10 days of menstrual cycle, it is PMS. Nearly 90 - 95% of the women all over the world in their reproductive age experience atleast one PMS symptom. However, from the presently available epidemiological survey based studies, 75% women experience some recurrent PMS symptoms, 20-40%

are mentally or physically incapacitated to some degree and 3- 5 % experience severe distress (Silberstein, 1991).

Medical science has recognized more than 200 physical – psychological symptoms of PMS. Several theories have been proposed but none is sufficient in proving the actual etiology of PMS which remains unknown till the date. Similarly there are no diagnostic tools for screening PMS except using a daily symptom chart or menstrual calendar. Additionally, although health practitioners suggest symptomatic treatment to their patients, there are no universally excepted treatments for PMS. The more severe form of PMS is Premenstrual Dysphoric Disorder (PMDD), both are menstrual disorders.

According to Bahamondes *et al.* (2007) "PMS is more common but less severe than PMDD, it is the cyclic occurrence of physical and emotional symptoms that are of sufficient severity to interfere with some aspects of life and that occur for upto 2 weeks prior to menses, ending soon after the onset of the menstrual period, while PMDD is recognized as a cause of severe premenstrual symptoms, which lead to impairment of functioning, and diminished productivity and quality of life".

Here, researcher has attempted to decipher the ever-intriguing PMS in the most analytical manner possible and endeavors to continue the exploration in future. The main objective of the present study was to unravel the true nature and prevalence of premenstrual syndrome (PMS) in respondents of Surat, Gandhinagar and Ahmedabad and to find out which PMS symptoms, including their frequency of occurrence and severity, as experienced by these subjects.

To achieve the aims of this research, 720 respondents from age groups 13 to 36 years (30 subjects from each age group) of various areas of aforesaid mentioned cities were interrogated with due concern through a well prepared questionnaire and their replies diligently noted. Further out of total study sample, 160 respondents were interrogated for three menstrual cycles for in-depth analysis. Again, there were 142 subjects who were asked to rate the intensity of PMS symptoms as per their experience in Shortened Premenstrual Assessment Form (SPAF) framed by Allen *et al.* (1999), this added more substance to this research. 60 respondents were chosen for clinical studies wherein hormonal profile, hematology as well as USG were undertaken during their luteal phase of menstrual cycle. The data collected from all the aforementioned surveys

and tests was compared to international standards wherever needed. Over and above the data was presented in the form of tabulations, graphs, charts, etc and was processed as well as analyzed by different statistical methods in SPSS like chi – square test, student's t- test, ANOVA, etc.

As mentioned in *TABLE -32* socio-demographic aspects of the subjects were studied and noted. Also, health and menstrual details of respondents were obtained to know their health status *(TABLE -32).*But above all this, it was both surprising and shocking when unusual mixed results were obtained in regards to PMS and its symptoms. When evaluated, 97% (698 / 720) subjects experienced PMS with variable number of symptoms while 83% (594 / 720) subjects experienced at least one PMS symptom respectively. PMS in present study sample was also evaluated using ICD – 10 criteria and accordingly existence of PMS in was found to be 82% (589 / 720).

95 symptoms of PMS (48 physical and 47 psychological symptoms) were studied. Physical symptoms like backache (BA) (48.33 %, 348 / 720) and lower abdominal cramps (LAC) (43.75 %, 315 /720) plus psychological - behavioural symptoms like irritation (IRT) (44. 86%, 323 / 720), anger (AR) (41.66%, 300 /720), loss of interest in

routine activities / hobbies (LIN) (36.38 %, 262 / 720) and mood swing (MS) (31.66 %, 228 / 720 ) were the most commonly experienced symptoms with high intensity. On the other side, incidences of physical symptoms like swelling of hands (SW – H) and extra shiny skin (SP – SS) both were 0.42 % (03 / 720) whereas that of swelling of legs (SW - L) and pain in soles (PIL – OSO) both was 0.55 % (04 / 720) were minimum out of all physical symptoms. Similarly very less frequencies of psychological – behavioural symptoms like worries / anxiousness (AX – WOR) and decrease in food craving (FC – D) were 0.27 % (02 /720) and palpitation (AX – PAL) 0.69 % (05 / 720) were obtained .

In addition to this, it was found that prevalence of physical symptoms was 98% (707 / 720) whereas presence of psychological – behavioural symptoms was 85% (615 / 720). Also, occurrence of at least 2 to 7 symptoms (physical and psychological – behavioural) was found to be mostly high with all the age groups. But number of subjects showing 14 to 25 numbers of psychological – behavioural symptoms is more as compared to number of subjects with physical symptoms. This is indicative that may be the overall number of psychological – behavioural symptoms is less than that of number of physical symptoms yet whenever

present, may be in less number, still these psychological-behavioural symptoms show much higher intensity than physical symptoms thereby making PMS more severe for the patient to bear with.

When 142 subjects' were interrogated for 3 times during their 3 menstrual cycles, 48 symptoms (30 physical symptoms and 18 psychological – behavioural symptoms) showed their presence during all three cycles while 63 symptoms (39 physical symptoms and 24 psychological – behavioural symptoms) were observed during two menstrual cycles. This revealed that although there is no certainty which symptoms will be repeatedly seen in an individual in her different menses cycles, yet PMS was found to be quiet stable syndrome with a broad continuum of many physical and psychological – behavioural symptoms. These symptoms were also quiet stable from one cycle to the other. There were 8 symptoms namely: (1) Food craving- increases (2) Sleep-more (3) Anger (4) Irritability (5) Lower abdominal cramps (6) Weakness (7) Backache (8) Headache, which were present in all 3 cycles and thereby showed high intensity amongst the subjects.

Further when the symptoms were categorized into 4 popular groups suggested by Abraham (1983) namely : PMS – A (Anxiety), PMS

– C (Carbohydrates), PMS - H (Hyper hydration) and PMS – D (Depression), it was concluded that 68.47 % (493/720) respondents fell a part of PMS - D, whereas minimum subjects were a part of PMS – H (33.75%, 243 / 720). Presence of PMS – A was found to be 65.69 % (473 / 720) while 48.88 % (353 / 720) subjects were classified into PMS – C which were once again uncommon to the results of Abraham and his group! However, it was very alarming to note high percentage of PMS-D in present study sample.

In addition to above studies, rating scale – SPAF was applied on 160 subjects, for a quick legitimate conclusion. From descriptive statistics it was discovered that Gujarat based subjects in the present investigation showed more physical symptoms related to pain (SC - 1 Pain) then affect symptoms (SC - 2 Affect) and lastly water retention (SC - 3 Water retention). Once again it was clearly proven that prevalence of prevalence of physical symptoms is higher than psychological – behavioural symptoms. Also SPAF scores reveal that there exists moderate PMS in about 50.62 % (81 / 160) subjects and mild PMS in 43.75 % (70 / 160) subjects. The only consoling aspect was that, very less - 5.62 % (9 / 160) respondents were in the range of severe PMS.

As PMS is found to be very complex disorder, an attempt to study it is naturally marred of intricacies. So here the researcher made an attempt to find out whether factors like age, hormones, caffeinated beverages, type of food, obesity, marital status, hemoglobin, exercise, uterus - ovaries and stress are responsible directly or indirectly for causing PMS or aggravating its symptoms. This part of present work was most critical and extremely unexpected results were obtained when statistical tools were applied. These conclusions definitely indicate a strong demand for exhaustive research on the etiology of PMS.

When all the 95 physical and behavioural symptoms were analyzed with respect to age, 21 symptoms (12 physical and 9 psyhological – behavioural symptoms) showed some kind of statistically significant association with that of age which was an unexpected outcome for this study.

Hormonal assays (for LH, FSH, Estradiol (E2), Progesterone, Thyroid hormones) were undertaken during luteal phase of 60 subjects. On an average it was found that there was more number of subjects who showed excess of hormones rather than low levels of the same. When statistically analyzed, no sure distinguishing outcomes were generated

with regards to association of PMS in both cases (a) subjects having hormonal disturbances and (b) subjects having normal hormonal profile.

However, hormones do fluctuate which is very obvious due to cyclic changes in subjects. Although significant associations were obtained between ratio of values of estradiol vs. progesterone and ratio of values of LH vs. FSH (*p=0.013*), values of estradiol vs. progesterone (*p=0.003*), between estradiol and LH hormone (*p=0.002*), between LH and FSH (*p=0.000*) and $T_3$ and $T_4$ (*p=0.000*). Amongst all these hormones progesterone, T3 and T4 showed some relevant connection with PMS symptoms that to very few. Progesterone showed correlation with symptoms like body ache (*p=0.018*), disturbed sleep (*p=0.000*), feeling sad (*p=0.000*), skin dullness/darkening (*p=0.021*). Same way, T3 showed association with headache (p=0.001), bad dreams (p=0.004), irritation (*p=0.016*) whereas T4 showed some statistically significant connection with feeling sad (*p=0.024*), skin shine (*p=0.004*).

Tea-Coffee consumption is strongly correlated to the presence of PMS (Rossignol, 1985). Looking to the high prevalence of PMS in study sample and simultaneously high consumption of tea –coffee by the subjects, investigator examined the role of such beverages.

However in this study no significant association was obtained between PMS symptoms and tea. But, significant association was observed between weight gain (WTG) and intake of coffee, $X^2$ (3, N = 720) =13.308, $p$ = 0.004.

Through SPSS, Pearson Chi-square test was conducted to check the association and co-relation between types of diet (spicy, salty and sweet) with few of the PMS symptoms. Once again the results were very much astonishing. It was unbelievable to find that symptoms like headache, acidity, violent crimes and hot flush had no association with any of the types of food (spicy, salty, sweet), not even little close to *p* value! Additionally, it was implausible to find anger associated with sweet food but having no relation with spicy or salty food. Again the expected association between irritation and spicy food turned out to be statistically negative. Similarly acne was found to be related with sweet food, $X^2$ (9, N=720) =17.198, *p=0.046* but once again was not found connected to spicy or salty food which is a general belief.

Obesity rates as a strong risk factor for PMS (Masho *et al.*, 2005) and so do the values of BMI. Going with such facts, researcher studied correlation between BMI values and total number of PMS

symptoms with the help of SPSS statistical software. However, no statistically significant correlation was obtained in this test, not even for underweight or overweight subjects. Thus may be BMI might be playing a role in causing PMS but it surely does not play any role in deciding the intensity of PMS.

With present data, no statistically significant connection was obtained between severity of PMS and being a married or unmarried person. Student's t- test also supported this. Even the belief that there must be hormonal difference between these two groups was also not cent percent correct as no statistically significant result was obtained in case of hormones except that association of $T_3$ ($p = 0.055$) was significantly differing between married and unmarried groups in present study. Questions like why only $T_3$ differs in these two groups are still unanswerable.

Significant co-relation between endometrial thickness and only the right ovary ($p= 0.027$) was found in SPSS, which was strange and also quiet cynical! At the same time an obvious co-relation between left ovary and right ovary ($p=0.072$) was also obtained. But no co-relation

was found between hormones and ovaries or between hormones and endometrial thickness which was again unexpected.

In the present study, researcher has also considered views of mothers, teachers and doctors looking to their role in the lives of students, adolescents etc. Health practitioners have shown very limited concern with the respondents by simply providing symptomatic treatments as per the complaints. Even the gynecologists also provided medication for physical symptoms like headache, lower abdominal cramps, backache etc. while interrogating mothers and teachers their views were quiet similar with reference to PMS. They agreed that they have experienced definite changes in girls' related to physical and psychological symptoms during PMS but could not do anything. Moreover, they consider it as a very common natural phenomenon. It is important to note that mothers and teachers have helped significantly during first menses and its management. This study shows that gradual awareness is developing in mothers-teachers by reading popular articles in newspapers about PMS and various dogmas and taboos related to it.

The study of PMDD provided a very useful data regarding behavioural, cognitive and somatic symptoms occurring during luteal

phase of menstrual cycle. Very important PMDD symptoms like change in appetite, irritability, insomnia, depression, anxiety etc. affects the daily life significantly and is proved by statistical analysis. The statistical data reveals that 43.05 % (310 / 720) respondents showed presence of at least 5 out of these 15 symptoms during their premenstrual days. To be more precise 2.36 % (17/142) subjects showed presence of at least 5 of these symptoms for 3 menstrual cycles.

From the above study researcher has derived two new hypotheses viz. (a) Biological clock of women possess peculiar characteristics associated with age and menstruation (b) Origin of PMS which further needs to be scientifically approved.

However, PMS does exist in present study sample to such an extent that it cannot be underestimated. Improper food habits, lack of balanced diet, disturbed hormonal and hematological profile, depressive social – cultural – religious backgrounds, life style, lack of freedom of expression, geographical location, lack of exercise, etc created an conducive atmosphere for these women to be at high risk of PMS.

The facts that have come out of this study highlight the very pathetic scenario about women's physical and mental conditions during

PMS days which must be immediately addressed for the sake of healthier present and future of our nation.

| Table 32 Socio-demographic and health profile of study sample | |
|---|---|
| | |
| No. of Subjects completed studies | 58.75%(423/720) |
| No. of Subjects pursuing education | 41.25% (297/720) |
| No. of Working Women | 24.58%(177/720) |
| No. of House wives | 34.72%(250/720) |
| No. of Students | 40.69%(293/720) |
| | |
| **Education level** | |
| Education level | No. of Subjects |
| Illiterate | 0.83%(6/720) |
| Primary Education till class 7 | 3.05%(22/720) |
| High School Education till class 10 | 22.08%(159/720) |
| Higher Education till class 12 | 20%(144/720) |
| Graduation (Completed college education) | 38.33%(276/720) |
| Post graduation (PG) | 15.27%(110/720) |
| Higher education more than PG | 0.42%(3/720) |
| | |
| **Economic status** | |
| Family Income less than 5000Rs./month | 4.86%(35/720) |
| Family Income 5000Rs./month | 5%(36/720) |
| Family Income 5000-10,000Rs./month | 27.63%(199/720) |
| Family Income 10,000-20,000Rs./month | 33.19%(239/720) |
| Family Income more than 20,000Rs./month | 29.30%(211/720) |
| | |
| **Religion** | |
| Hindus | 90 % (648 / 720) |
| Jains | 5.69 % (41 / 720) |

| | |
|---|---|
| Muslims | 3.61 % (26 / 720) |
| Christians | 0.69 % (05 / 720) |
| | |
| **Type of family** | |
| Nuclear Families | 59.16%(426/720) |
| Joint families | 40.83%(294/720) |
| | |
| **Marital Status** | |
| Married | 49.72%(358/720) |
| Unmarried | 50%(360/720) |
| Divorce | 0.27%(02/720) |
| | |
| **Nature** | |
| Extrovert | 84.02%(605/720) |
| Introvert | 15.97%(115/720) |
| | |
| **Type of Food** | |
| Vegetarian | 79.16 % (570/720) |
| Non-Vegetarian | 15.55 % (112/720) |
| Egg-Vegetarian | 5.27 % (38/720) |
| | |
| **Weight status** | |
| Healthy Weight | 52.36% (377/720) |
| Underweight | 30.27%(218/720) |
| Overweight | 11.66%(84/720) |
| Obese | 5.69%(41/720) |
| | |
| **Health Status** | |
| Healthy | 98.05 % (706 / 720) |
| Abnormal | 1.94 % (14 / 720) |
| Allergy | 5.13 % (37 / 720) |
| Leucorrhoea | 8.75%(63/720) |
| UTI | 1.66% (12/720) |
| Itching in vagina | 5% (36/720) |
| | |
| **Menarche** | |
| Average menarche age | 13 years (236/720) |
| | |
| **Menses details** | |
| Regular Menses | 87.5%(630/720) |
| Irregular Menses | 12.5 %(90/720) |

| | |
|---|---|
| **Pain during menses** | |
| Less Pain | 19.16%(138/720) |
| Moderate | 17.36%(125/720) |
| Excessive | 10.41%(75/720) |
| Unbearable | 15%(108/720) |
| Painless | 38.05%(274/720) |
| | |
| **Amount of flow during menses** | |
| Scanty | 7.22%(52/720) |
| Normal | 72.77%(524/720) |
| Heavy | 20%(144/720) |
| | |
| **Duration of menses** | |
| Less than 4 days | 31.11%(224/720) |
| 4 days | 19.30%(139/720) |
| more than 4 days | 49.58%(357/720) |
| | |
| **Family Planning Devices Used** | |
| Use Contraception | 53.05%(191/360) |
| Not Using Contraception | 23.47(169/360) |
| Using IUD | 14.44% (52/360) |
| Under gone Tubectomy | 13.61% (49/360) |
| Use OC pills | 20.55% (74/360) |
| | |

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# PUBLICATIONS AND PRESENTATIONS

## List of Publications

| No. | Name of Journal | Title of Paper |
|---|---|---|
| 1 | Veer Narmad South Gujarat Journal of Science, VNSGU, Surat, India<br>Vol.V, 198-203,2007 | *Premenstrual Syndrome (PMS) in the Girls of age groups 13 to 23 years – A Study |
| 2 | National Journal of Life Science (NJL), Satna, M.P., India.<br>Vol.05, No.1, 39-42,2008 | *Status of Types of Premenstrual Syndrome (PMS) in adolescent girls of Surat city (Gujarat) |
| 3 | ATAST – 2012, ISBN : 978-81-923514-0-7, 82 (pg. no. 479 – 481). | *Menstrual Cramps in College Girls of Surat City – A Study |

## List of Presentations

| No. | Date and Venue | Name of Conference | Title of Paper |
|---|---|---|---|
| 1 | 15th February'2009, Veer Narmard South Gujarat University, Surat, Guj.- India | 'Frontiers of Science & Technology : Vision Gujarat 2020' - 23rd Gujarat Science Congress | ^*Trend of Menarche & menstruation in Surat City girls (Poster Presentation) |
| 2 | 27-28th January'2009, Shree Ramkrishna Institute of Computer Education & applied Sciences, Surat, Guj. – India. | National Conference on 'Advanced Trends in Applied Sciences & Technology' (ATAST – 2012) | *Menstrual Cramps in College Girls of Surat City – A Study<br>(Oral Presentation) |
| 3 | 26th February'2012, M S University, Vadodara, Guj.- India. | XXVI – Gujarat Science Congress 2012 | ^*A Study on BMI & Health Status of Adolescent girls _ Age group 13 -18 years of Surat City (Oral Presentation) |

**Note :**

**Authors of above papers :** * Shah Nehal D. and Dholakia A. H.

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# Annexures

# ANNEXURE - I

## QUESTIONNAIRE

## PMS STUDY IN AGE GROUPS OF 13 TO 36 YEARS.

*(Undertaken by Miss Nehal D. Shah )*

### A) General Profile

Name : Miss/ Mrs.
Age : Weight : Height :
Edu. Qua. :
Address : (R)
(O / S)

Phone no : ( R ) ( O ) ( M )
Profession :
Religion : Caste : Sub Caste :
Nature : Reserved / Mixing Category : O / SC / ST / BC
Hobbies : Addiction/s : Exercise: Y / N
Health Status : N / HWP Hb : ____ UNITS / NK
Marital status : M / UM / D / RM Year :
Bl. Grp.: **A / AB / B / O + - NK**
Major disease /s in past 2 yrs. ; Malaria, Jaundice, Typhoid, etc.
Major surgery/operation(s) :

### B) Family details

| | Edu.qua. | Profession | Addiction/s | Health Status |
|---|---|---|---|---|
| Mother | | | | |
| Father | | | | |
| Husband | | | | |
| Sis. / Brother | | | | |

Joint family / Nuclear family Total Income :
Family History for : 1) Depression 2) Cardiac problems 3) Addiction 4) Obesity 5) Reproductive problems 6) Diabetes 7) Cancers ( Vagi., cervical, endomet.& breast ) 8) Genetical Disorder

### C) Marital details

Married life : 1) Satisfied 2) Dissatisfied
No. of miscarriage/abortion (if any) :
First pregnancy : No. of Progeny :
Time gap between two pregnancies ( In yrs.) :
Pregnancy : 1) Normal 2) Caesarean
Contraception's Used : Y / N Which : Time Period :
Diseases / Infection of reproductive organs : Itching, White discharge etc.
Postpartum blues/ Mood disorder : Y / N

**D) Dietary Information**

Vegetarian / Non-vegetarian / Egg- vegetarian
Non-veg. dishes eaten : Chicken, Mutton, Fish, Egg
No. of meals per day : **1 / 2 / 3 / 4 / 5**
Dairy products : milk / curd / buttermilk / cheese / butter
Fruits : Daily Y / Daily N Vegetables : All Daily / Selected only
Beverages(which & how many times) : Tea / Coffee / Juice / others, **1 / 2/ 3 / 4 / 5**
Fasting(Days/week) : ____ / week or None
Spices : Mod./Less/ex/N Salt : Mod./Less/ex/N Sweet: Mod./Less/ex/N
Likes/Dislilkes :
Junk food/ home meals :
Time of lunch & dinner: L D Water Intake: _____ glass

**E) Menstrual details**

Regular/ Irregular No. of days :
First menses :
How you got details of menses & by whom : **M / S / T / F / R / E B / A**
Uses : 1) S.Pads 2) Cloth
Blood flow : 1) Less 2) Moderate 3) Heavy
Pain : 1) Less 2) Moderate 3) Excess 4) Unbearable 5) Nil
Medicines : Y /N Which : Dosage : _____ /day
Religious Dogmas ( if any) : v.strict / temple / pickle / no

**** Mother's menses history***

Regular/Irregular **NK /** No. of days : **NK /**
First menses (Age) : **NK /**
How she got details of menses & by whom : **M / S / T / F / R / E B / A NK**
Uses : 1) S.Pads 2) Cloth / **NK**
Blood flow : 1) Less 2) Moderate 3) Heavy / **NK**
Pain : 1) Less 2) Moderate 3) Excess 4) Unbearable 5) Nil / **NK**
Medicines : Y /N Which : Dosage : **NK/** ____/day
Religious Dogmas( if any) : v.strict / temple / pickle / no
Onset of Menopause (Age ) : Y / N _____ age

**F) PMS Symptoms**

***a) Physical symptoms***

1) Headache
2) Backache
3) Body ache
4) Acidity
5) Appetite (I / D / No change)
6) Fever
7) Recurrent cold sores
8) Darkening of skin / shine on skin / no change
9) Acne ( only 1 / many) 10) Dizziness
11) Low sugar
12) Nausea
13) Hot flush

14) Urine (less / More)
15) Exacerbation of Migraine, Asthma, Allergy
16) Eye complaints
17) Breast pain
18) Weight gain
19) Swelling ( face / fingers / body / abdomen )
20) Pain in joints of body / knee joints
21) Full leg pain
22) Calf muscle pain
23) lower abdominal cramps
24) Gas retention
25) Indigestion
26) Constipation
27) Diarrhea 28) Abdominal fullness after little food eating
29) Mastalgia 30) Fatigue 31) Weakness

***b) Psychological and behavioral symptoms***

1) Classical depression (feeling low, worthlessness, loss of interest in hobbies/ routine/ pleasurable activities, suicidal tendencies, tension, violent crimes, loneliness).
2) Anxiety (uneasiness, tension due to monotonous lifestyle, palpitation, tightening in the chest, hyperventilation, panic, restlessness).
3) Mood swing (marked affective liability for e.g. feeling suddenly sad or tearful or increased sensitivity to rejection).
4) Confusion
5) Cry spells
6) Irritability
7) Clumsiness
8) Altered interest in sex (increased/ decreased).
9) Sleep disorder (more /less).
10) Food craving (increased/ decreased) chocolates, ice cream, cakes, sweet food, spicy food, salty food, outside food).
11) Anger
12) Loss of self control
13) Nervousness
14) Forgetfulness
15) Poor judgment
16) Increased guilt feeling
17) Doubtfulness
18) Increased fear
19) Less tolerance to light / noise
20) Want to remain alone
21) Bad dreams
22) Insecurity
23) Hyperactive

Were you knowing about PMS ? Y / N . From where you got to know it ?

## ANNEXURE - II

## SHORTENED PREMENSTRUAL ASSESSMENT FORM

## (SPAF)

**Name:** **Date:**

***For each of the symptoms below, circle the number that most closely describes the intensity of your premenstrual symptoms during your last cycle. These are symptoms that would occur during the premenstrual phase of your cycle. This phase begins about seven days prior to menstrual bleeding (or seven days before your period) and ends about the time bleeding starts. Rate each item on this list on a scale from 1 (not present or no change from usual) to 6 (extreme change, perhaps noticeable even to casual acquaintances).***

**1=No change** **Extreme change=6**

1. **Pain, tenderness, enlargement or swelling of breasts 1 2 3 4 5 6**
2. **Feeling unable to cope or overwhelmed by ordinary demands 1 2 3 4 5 6**
3. **Feeling under stress 1 2 3 4 5 6**
4. **Outburst of irritability or bad temper 1 2 3 4 5 6**
5. **Feeling sad or blue 1 2 3 4 5 6**
6. **Backaches, joint and muscle pain, or joint stiffness 1 2 3 4 5 6**
7. **Weight gain 1 2 3 4 5 6**
8. **Relatively steady abdominal heaviness, discomfort or pain 1 2 3 4 5 6**
9. **Edema, swelling, puffiness, or water retention 1 2 3 4 5 6**
10. **Feeling bloated 1 2 3 4 5 6**

**Total Score ____**

**(Note: A score greater than 30 generally indicates moderate PMS symptoms; the more severe the symptoms, the higher the score.)**

***Used with permission.***

***(Allen S, et al.: The Shortened Premenstrual Assessment Form. J Reprod Med. 1991; 36(11):769-72).***

## ANNEXURE – III

## PROFORMA FOR DOCTORS

*(PMS study undertaken by Miss Nehal Shah)*

**Name of Doctor :**
**Qualification :** **Prof. Experience :**
**Address :**
**Phone No.:**

**1) What is PMS (Premenstrual Syndrome)?**

**2) What can be its cause?**

**3) Do you come across such cases with PMS? Y / N.**

**4) If yes, how often and which age group?**

**5) What are the common complaints of such patients?**

**6) What medicines do you prescribe?**

**7) Do you suggest some alternative treatments too? Y / N**

**8) Which are they?**

**9) Guideline to study PMS :**

**10) Some other points :**

## ANNEXURE – IV

## PROFORMA FOR TEACHERS / MOTHERS

*(For PMS study undertaken by Miss Nehal Shah)*

**Name :**
**Address :**

**Qualification :** **Contact No.:** **Dt.:**

**1) How and when the girl was introduced to Menses and / or PMS for the first time?**

**2) When she approaches you? Or does she deal on her own or with others help?**

**3) What complaints she does?**

**4) What kind of behavioral changes, dietary, lifestyle changes have you noticed in her during such phase?**

**5) Have you taken any medical advice or have you consulted any doctor to help deal with such issues?**

**6) What kind of guidance, advice or suggestion you provide to such girls approaching you?**

**7) How do girls deal with PMS problems?**

**8) Share your observations and views regarding such issues?**