CHAPTER II
REVIEW OF LITERATURE

The task of reviewing research literature involves the identification, selection, critical analysis and written description of existing information on the topic of interest. It is presented in two sections: related literature and conceptual framework.

2.1 Related Literature

The related literature are presented under the following sub headings

2.1.1 Knowledge about menstrual health and problems among adolescent girls

2.1.2 Definition and diagnosis of PMS

2.1.3 Prevalence and impact of PMS

2.1.4 Anxiety and depression experienced among women with PMS

2.1.5 Factors influencing PMS experience

2.1.6 Treatment and complementary therapies for premenstrual syndrome

2.1.7 Research related to the health education on PMS

2.1.8 Research related to the yoga relaxation exercise on PMS

2.2 Conceptual Framework

Modified conceptual framework based on symptom management model (Dodd et al., 2001)

2.1.1 Knowledge about menstrual health and problems

In India, school systems are ambivalent about imparting sex education. Even in some schools where sexual and reproductive health education exists in the curriculum, teachers are often too embarrassed and uncomfortable to effectively instruct. On an average, most adolescent girls in India have little knowledge of menstruation, sexuality and reproduction. Large numbers of rural and urban population believe that menstruation contaminates the body and makes it unholy. As a
consequence, the girl often sees herself as impure, unclean and dirty. According to the Nutrition Foundation of India, the average age of menarche is 13.4, yet 50% of girls aged 12-15 do not know about menstruation. This is true for rural as well as the urban poor. The lack of information can be attributed to a veil of secrecy that surrounds menarche (U.S. Agency for International Development 2001).

Adolescent girls constitute a vulnerable group, particularly in India where female child is a neglected one. Menstruation is still regarded as something unclean or dirty in Indian society. The reaction to menstruation depends upon awareness and knowledge about the subject. The manner in which a girl learns about menstruation and its associated changes may have an impact on her response to the event of menarche. Although menstruation is a natural process, it is linked with several misconceptions and practices, which sometimes result into adverse health outcomes. Hygiene-related practices of women during menstruation are of considerable importance, as it has a health impact in terms of increased vulnerability to Reproductive Tract Infections (RTI). The interplay of socio-economic status, menstrual hygiene practices and RTI are noticeable. Today millions of women are sufferers of RTI and its complications and often the infection is transmitted to the offspring of the pregnant mother. Women having better knowledge regarding menstrual hygiene and safe practices are less vulnerable to RTI and its consequences. Therefore, increased knowledge about menstruation right from childhood may escalate safe practices and may help in mitigating the suffering of millions of women.

Karthiga, Abhijit Boratne, Shib Sekhar Datta, Suba Joice, Sherin Billy Abraham and Anil Purty (2010) conducted a study on menstrual problems and pattern of consultation among adolescent school girls in Pondicherry, India. Result revealed that 193 (52.02%) girls had experienced dysmenorrhoea and 150 (40.43%)
reported passing of clots in menstrual flow. 272 (73.32%) girls stated that they had some or other kind of menstrual problem since menarche. Eleven (2.96%) girls had menses first time (just prior to survey) and were unable to comment on duration of menstrual cycle and regularity. Two-third (66.39%) girls had menses for the duration from 1-5 days while rest reported beyond 5 days. Three-fourth (75.83%) of the study subjects had regular menstrual cycle. Out of 272 adolescent girls whoever had faced menstrual problem, 73 (26.84%) had sought consultation. Majority 43 (58.09%) girls had consulted doctors and 3 (4.12%) girls had consulted health worker while 25 (34.25%) girls had discussed their problem with their mother and concluded that there is an urgent need for strong health educational activities among the adolescent girls, their parents and teachers for effective management of menstrual problems among all adolescent girls.

A survey of 160 girls in West Bengal, India, (Dasgupta & Sarkar, 2008) found that 67.5 per cent were aware of menstruation prior to menarche, but 97.5 per cent did not know the source of menstrual bleeding. In Nepal, 92 per cent of 204 adolescent girls surveyed had heard about menstruation, but the majority of respondents reported that they were not prepared in any way for their first period (Water Aid in Nepal, 2009). A common belief amongst Gujar girls (a semi-nomadic tribal group in Jammu and Kashmir) was that menstruation was the removal of bad blood from the body necessary to prevent infection (Dhingra, Kumar, & Kour, 2009). The majority of girls learn about menstruation from their mothers, sisters and girl friends (Dasguptar and Sarkar 2008; Water Aid in Nepal 2009; Dhingra, Kumar, & Kour, 2009). The evidence from these few studies suggests that in South Asia, formal education about reproductive health is very limited. Teachers were given as a source of information on menstruation only in the Nepal study, and this was by one fifth of the respondents.
Focus group discussions with girls revealed that teachers generally avoided teaching reproductive health. One girl reported that her teacher had said, 'This topic need not be taught, you can do a self-study at home. It’s like knowing to go to toilet with slippers/shoes' (Water Aid in Nepal 2009). The girls in this study also reported that the information they received was mainly regarding use of cloth, the practice of rituals, the concept of (cultural) pollution, and cautions about behavior towards men and boys. Very little information was shared regarding the physiological process involved.

Patil and Wasnik Wadke (2010) studied health problems amongst adolescent girls in rural areas of Maharashtra, India and found that majority of the girls had one or the other problems related to their menstrual problems. Dysmenorrhoea (44.2 %) was the commonest problem stated by adolescent girls and more than 50% of the study subjects had one or the other symptoms of PMS.

Sharma, Malhotar, Taneja and Saha (2010) studied type and frequency of problems related to menstruation among adolescent girls in New Delhi, India. The results revealed that dysmenorrhea (67.2) was the commonest problem and 63.1% had one or other symptoms of PMS. Daily routine of 60% girls was affected due to prolonged bed rest, missed social activities /commitments, disturbed sleep and decreased appetite. Seventeen percent had to miss a class and 25% had to abstain from work. Mothers and friends were the most common source of information on the issue.

Population based online survey regarding PMS was conducted among 1000 Korean women aged 15-49 years. The result revealed that prevalence of PMS/PMDD by the WHO International classification of diseases (ICD-10), ACOG, and DSM IV was 98.6, 32.1 and 2.8% respectively and the proportion of women with
impaired activities of daily life were significantly associated with the severity of PMS and also mentioned most of the women (91.5%) had no knowledge regarding terminology pertaining to PMS (Choi et al., 2010).

A cross sectional study was conducted in two small towns called Dabat and Koladiba, northwest Ethiopia among 622 school girls about age at menarche and the menstrual pattern of secondary school adolescents, result showed that the average age at menarche by recall method was 15.8 years. A cycle length between 21 and 35 days was observed in 70.3% of the girls. The overall prevalence of dysmenorrhea was 72%, premenstrual symptoms were present in 75.4%. The leading sources of menarcheal information to the adolescents were mothers (39.7%), followed by their friends (26.6%) and teachers (21.8%) (Zegeye, Megabiaw, & Mulu, 2009).

Houston, Abraham, Huang and Angelo (2006) stated that PMS was the most prevalent reported menstrual disorder (84.3%) followed by dysmenorrhea (65%). Only 2% of teens reported receiving information about menstruation from their health care provider. Negative expectations regarding menstruation were associated with higher rates of school absenteeism and missed activities.

Lee, Chen, Lee and Kaur (2006) carried out cross sectional descriptive study among 2,411 secondary school adolescent females in Negeri Sebilan, Malaysia. The study found that majority (74.6%) experienced PMS and 69.4% had dysmenorrhoea. Only 11.1 percentage of school girls sought medical consultation for the menstrual disorders.

2.1.2 Definition and diagnosis of PMS

The evolution of diagnostic criteria for PMS and PMDD has a confusing and controversial history that has led to frustration among scholars and caregivers who are unclear of what symptoms constitute either disorder. Table 1 provides a time line
starting with initial clinical observations and moving through the establishment of research guidelines. Today, the tenth revision of the International Classification of Diseases (ICD-10) places PMS under ‘‘Diseases of the genitourinary system: Pain and other conditions associated with female genital organs and menstrual cycle’’ and labels it as Premenstrual Tension Syndrome (N94.3) (WHO, 2004).

PMS occurs during the late luteal phase of the menstrual cycle. On an average, one menstrual cycle lasts 25-36 days beginning with the first day of menstruation. This first phase of the cycle is known as the follicular phase and occurs on the first day of menses when estrogen and progesterone levels decrease at the end of the previous cycle. Following the follicular phase, the ovulatory phase of the cycle begins approximately on day 13 or 14 with a surge in luteinizing hormone that stimulates the release of an egg (ovulation). The luteal phase begins after ovulation and usually lasts approximately 14 days, unless fertilization has occurred (Rosenblatt, 2007). PMS occurs during the luteal phase of the cycle, most often with one week before menses.

The causes of PMS are not clear. PMS is thought to be caused by an underlying neurobiological vulnerability to normal fluctuations in the circulating sex hormones estrogen and progesterone levels during the menstrual cycle. The role of sex steroids in PMS is supported by observations that symptoms often improve with treatments resulting in ovulation suppression (Daley, 2009). In addition, studies suggest that PMS is uncommon in anovulatory menstrual cycles and that women with elevated levels of sex hormones have more severe symptoms (Halbreich, 2003). Another hypothesis on the etiology of PMS proposes that emotional and physical symptoms may result from hormonal fluctuations during the menstrual cycle that alter brain neurotransmitter or neuropeptide function (Mortol, 1992).
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>Pre 1800’s</td>
<td>Hippocrates provided description of observed premenstrual mood changes.</td>
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<tr>
<td>1847</td>
<td>Dr. Ernst. Von Feuchtersleben provided a description of menstrual moodiness.</td>
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<tr>
<td>1931</td>
<td>American neurologist Dr. Robert Frank coined the term premenstrual tension from his observations of a small number of women who experienced seizure and mood changes premenstrually.</td>
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<td>1938</td>
<td>Dr. Leon Israel was the first obstetrics gynecological specialist to use the term premenstrual tension. He further qualified the time and length of cycle in which personality was affected.</td>
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<tr>
<td>1953</td>
<td>Dr. Katharina Dalton introduced the term premenstrual syndrome and established first clinic in Britain to treat the condition.</td>
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<tr>
<td>1982</td>
<td>Premenstrual syndrome was given an international classification of diseases (ICD) diagnostic code by the WHO.</td>
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<tr>
<td>1983</td>
<td>The national institute of mental health provided research criteria for the study of PMS including the recommendation for prospective symptom reporting and symptom severity determination.</td>
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<td>1987</td>
<td>Late Luteal Dysphoric disorder (LLDD) was distinguished as a severe form of PMS by the American Psychiatric Association (APA). Conceptual guidelines for recognition of LLDD were provided in the appendix of the 3rd and revised edition of the Diagnostic Manual of Mental Disorders (DSM).</td>
</tr>
<tr>
<td>1994</td>
<td>Premenstrual Dysphoric Disorder (PMDD) replaced LLDD in the 4th edition of the DSM under ‘Mood disorder not otherwise specified”, and quality of life impairment guidelines for diagnosis. Two months of prospective symptom reporting are required for diagnosis.</td>
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Serotonin levels may be related to menstrual symptoms including depression, irritability, anger and increased cravings for carbohydrates. Dietary intake of chocolate, alcohol, sugary drinks and vitamin B6 has also been examined for their potential role in PMS, but results are inconclusive. Genetic predisposition to specific symptoms has been suggested by studies examining symptom occurrence in mother-daughter and twin relationships.

**Diagnosis**

PMS is a term used to describe a complex of emotional, physical and behavioral symptoms (Table 2) that occur cyclically during the luteal phase and resolve within a few days of the onset of the follicular phase. There are no specific physical findings or laboratory tests that can be used to make the diagnosis of PMS, therefore the diagnosis is made based on symptoms. Various classification systems have been published, including the American College of Obstetricians and Gynecologists (ACOG) and the American Psychiatric Association. In the WHO’s International Classification of Disease (ICD-10), the definition of premenstrual tension syndrome requires at least one distressing physical or emotional symptom and does not specify any level of required severity or impairment. In addition, symptoms do not need to occur exclusively during the luteal phase (WHO, 2004).

A stricter definition of PMS by ACOG requires at least one affective and one somatic symptom, especially during five days before menstruation and remitting within 4 days of the onset of menses in each of three prior menstrual cycles. The prospective confirmation for two cycles is required (Table 3) (ACOG, 2001). To meet the DSM-IV criteria for PMDD, symptoms should reach a level of severity to interfere with functioning in work, family, social relationships and must occur in the last week before menstruation and remit within a few days of the onset of the
follicular phase. At least 5 out of 11 symptoms and at least one of which should be a mood symptom, which must have been experienced in most of the past 12 months (APA, 1991). The diagnosis of PMDD also requires the confirmation by prospective daily monitoring for at least two menstrual cycles, comprehensive history and physical examination to rule out other causes of symptoms.

**Table 2.** Common symptoms of premenstrual syndrome

<table>
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<tr>
<th>Physical</th>
<th>Behavioral</th>
<th>Psychological</th>
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<tr>
<td>Breast tenderness and swelling, abdominal pain and bloating, headaches, back pain, weight gain, swelling of extremities, water retention, nausea, muscle and joint pain</td>
<td>Fatigue, insomnia, dizziness, changes in sexual interest and food cravings or overeating</td>
<td>Irritability, anger, depressed mood, crying and tearfulness, anxiety, tension, mood swings, lack of concentration and confusion</td>
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**Table 3.** Diagnosis of PMS by ACOG criteria

<table>
<thead>
<tr>
<th>Affective symptoms</th>
<th>Somatic symptoms</th>
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<tbody>
<tr>
<td>Depression</td>
<td>Breast tenderness</td>
</tr>
<tr>
<td>Angry outbursts</td>
<td>Abdominal bloating</td>
</tr>
<tr>
<td>Irritability</td>
<td>Headache</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Swelling of extremities</td>
</tr>
<tr>
<td>Confusion</td>
<td></td>
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<tr>
<td>Social withdrawal</td>
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1. Diagnosis made if there is a report of at least one of these affective and somatic symptoms in the three prior menstrual cycles during the 5 days before the onset of menses.
2. The symptom must resolve within 4 days of onset of menses and not recur until after day 12 of the cycle.
3. The symptoms must be present at least two cycles during prospective recording.
4. The symptoms must adversely affect social or work related activities.

**2.1.3 Prevalence and impact of PMS**

Joshi, Pandey, Galvankar and Gogate (2010) did a study to determine the prevalence of premenstrual cyclic symptoms in perimenopausal age at Mumbai, India.
Result revealed that out of 107 women, 26 (24.3%) did not report any premenstrual symptoms at all and 81 (75.7%) reported at least one symptom. Forty one women (38.3%) had three or more symptoms whilst 15 (14.0%) had five or more cyclic symptoms. Five women (4.7%) reported that the symptoms were severe. Eleven women had seeked treatment for premenstrual tension syndrome. The commonest symptom was mastalgia or heaviness of breasts next was anger attacks and depression.

Wong and Khoo (2010) investigated 1092 adolescents from 94 schools about physical and emotional well being of the adolescents’ reproductive health among multi – racial Asian adolescents. The result revealed that 80.7 and 83.6 % of the participants experienced one or more affective and somatic symptoms respectively in the pre menstrual phase. The effect of functional impairment and quality of life, in order of importance, include poor class concentration, restriction of social and recreational activities, difficulty to mingle with friends and poor class performance. Despite the evident impact, only 10.3% of adolescent girls know about their condition.

Issa,Yussuf, Dlatinwo and Ighodalo (2010) investigated severe form of PMS among medical students in a university in the north central state of Nigeria. Result revealed that 36.1% of the respondents had severe form of PMS and concluded that college’s health care providers should take in to account the issues of severe PMS by intensifying health education in order to improve the quality of life of the students.

Takeda, Koga and Yaegashi (2010) investigated prevalence of PMS in Japanese high school students, a total of 618 high school students were assessed, of them 64.6% were found to suffer from PMS and had significant consequences with the daily functioning of adolescent girls.
Dennerstein et al. (2010) assessed the impact of PMS on Activities of Daily Lives (ADL) and quality of life among France, Germany, Hungary, Italy, Spain, Brazil and Mexican women. Result showed that physical and mental PMS symptoms had had negative effects on ADL. 64.4% were minimally affected in ADL, 24% were moderately affected and 11.1% were severely affected.

Choi, Lee, Lehert, Lee, Kim and Dennerstein (2010) studied the impact of premenstrual symptoms on activities of daily life in Korean women. Result revealed that the approximate prevalence of PMS by the WHO’s ICD-10, ACOG, DSM-IV criteria was 98.6, 32.1, and 2.8%, respectively. Among 23 documented symptoms, the most predominant symptoms were joint-muscle-back pain, abdominal pain and irritability. Physical symptoms were more prevalent than mental symptoms. There was a high correlation between the duration and severity of symptoms. The impact of PMS on ADL and the proportion of women with impaired ADL were significantly associated with the severity of PMS. Most of the women (91.5%) had no knowledge regarding terminology pertaining to PMS.

Heinemann, Minh, Filonenko and Uhl-Hochgräber (2010) explored the impact of severe premenstrual disorders on work absenteeism and productivity. Results showed that employed women with moderate-to-severe PMS/PMDD had higher rate of productivity impairment on the modified version of the Work Productivity and Activity Impairment (WPAI) questionnaire, relative to those with no perceived symptoms/mild PMS. Similar outcomes were obtained for impairment of working productivity or efficiency using the premenstrual symptoms screening tool. The mean number of days on the daily record of severity of problems with at least moderate reduction in productivity or efficiency in daily routine was higher for women with
moderate-to-severe PMS/PMDD (5.6 vs. 1.1). Women with moderate-to-severe PMS/PMDD had a higher rate of absenteeism (>8 hours per cycle; 14.2% vs. 6.0%).

Dennerstein, Lehert and Heinemann (2009) conducted international cross-sectional study on PMS-severity, duration and typology, result revealed that 40.8% of them had mild PMS, 20.8% of them had moderate PMS and 8.6% of them had severe mental and physical symptoms.

Singh et al. (2008) studied problem related to menstruation among medical students at Rewa and identified PMS to be the second most (60.50%) prevalent disorder and 67.08% reported social withdrawal and concluded that PMS is highly prevalent, it is related to college/class absenteeism, limitations on social, academic, sports and daily activities. Maximum number of student does not seek medical advice and self-treat themselves with prostaglandin inhibitions like ibuprofen.

Eighty five percent of reproductive aged women experience physical or emotional changes with their menstrual cycle and up to 40% of women are bothered by menstrual cycle related symptoms such as dysmenorrhea and PMS. These condition influence women’s lives, relationships, work and is the most common reason for absenteeism for women younger than age 30, yet many do not discuss this (Ballagh & Heyl, 2008).

Nisar, Zehar, Haider, Munir and Sohoo (2008) conducted a study to determine the frequency and severity of premenstrual symptoms on a sample of 172 medical college students of Pakistan. The result showed that 51% girls met the ICD-10 criteria of PMS, among them 59.5% had mild PMS, 29.2% had moderate and 11.2% had severe PMS. 5.8% girls were found to have premenstrual dysphoric disorder. The orders of frequency of symptoms were anger, irritability, anxiety, tiredness, difficult concentration and concluded that PMS is a common problem in young girls which
adversely affects their educational performance and emotional well being. Strategies should be adopted for detection and management of PMS in young girls.

School girls of 10 -15 years were studied in Kerala, India for menstrual problems by questionnaire method and general physical examination. Only 67.5% attained menarche by 15 yrs. Mean age of attainment of menarche was 12.2 yrs. 70.1% had various menstrual problems. The commonest problem was dysmenorrhea 88.8%. Of these, only 1.5 % was using painkillers. Medical consultation was done by only one student. Associated school absenteeism was noticed in 23% of the study population. PMS was the second priority problem in the study group (45.8%). Of which headache (42.5%) and irritability (40%) were the commonest problems related to menstruation as frequent in adolescent girls ending in interruption of school routine. So that school health programs should focus this problem and provide remedial measures (Christina John, 2007).

Takeda, Tasaka, Sakata and Murata (2006) investigated the prevalence and impact of PMS among 1187 Japanese women. The result showed that 95% of women had premenstrual symptoms. Similarly Rapkin and Mikacicn (2006) studied PMS in adolescents at Los Angeles and found that 80% of adolescents had some degree of PMS. Additionally Silva, Gignate, Carret and Fassa (2006) studied prevalence of PMS among 1,395 women in Brazil, result revealed that 60.3% of them had PMS and higher risk was presented by women of higher socio economic level and better schooling level.

Diaa, Moza Mosallam, Syfian Alyan and Nico Nagelkerke (2006) conducted a study on prevalence and impact of PMS among adolescent school girls in the United Arab Emirates. The result showed that prevalence of PMS was 16.4%, on logistic regression analysis. PMS was significantly associated with dysmenorrhea, only 45.2%
of adolescent were taking treatment and the majority (60%) used pharmacological therapy. PMS had a moderate but significant negative impact on the quality of life, particularly school performance, social interactions, lifestyle and emotional wellbeing. Difficulty in performing school function and increase in stigma were the two most adversely affected parameters.

Dean, Borenstein, Knight and Yonkers (2006) evaluated the criteria used for identification of PMS. Criteria for defining PMS were assessed by comparing a reference definition previously demonstrated to be associated with reduced health related quality of life and impaired productivity. Health-related quality of life data were collected from the Short Form-36 (SF-36) for women aged 18-64 years. Women maintained daily calendars of emotional and physical symptoms and work productivity. Result revealed that PMS prevalence ranged from 19% to 30%. Regardless of the criteria used, PMS was associated with reductions in health-related quality of life, with Mental Components Subscale scores 5-12 points lower for women with PMS compared to those without PMS. Likewise, across definitions, women with PMS had greater work productivity impairment than women without PMS.

Lustyk, Widman, Paschane and Ecker (2004) assessed Premenstrual symptomatology, stress, Quality of Life (QOL), exercise frequency, volume, and intensity among 114 females (18-33 years). Based on premenstrual symptoms, women were divided into high and low PMS groups and compared on stress, QOL and exercise variables. Results revealed that women with high PMS had significantly more stress and poorer QOL than women with low PMS (p <.05 for both comparisons). Groups did not significantly differ on any of the exercise variables.

Borenstein et al. (2003) explored the effect of the PMS on health-related quality of life, health care utilization and occupational functioning among women
prospectively diagnosed with PMS. Result revealed that women with PMS had significantly lower scores on the mental component summary and physical component summary scale scores of the medical outcomes study short form-36 as compared to women without PMS. Women with PMS reported reduced work productivity, interference with hobbies and greater number of work days missed for health reasons (P < .001). In addition, women with PMS experienced an increased frequency of ambulatory health care provider visits (P = .04) and were more likely to accrue > $500 in visit costs over 2 years (P < .006).

Halbreich, Borenstein, Pearlstein and Kahn (2003) studied the prevalence, impairment, impact and burden of PMS and reported that the prevalence of clinically relevant dysphoric premenstrual disorder is probably higher. 13-18% of women of reproductive age may have premenstrual dysphoric symptoms severe enough to induce impairment and distress, though the number of symptoms may not meet the arbitrary count of five symptoms on the PMDD list. The impairment and lowered quality of life for PMDD is similar to that of dysthymic disorder and is not much lower than major depressive disorder. Nevertheless, PMS/PMDD is still under-recognized in large published epidemiological studies, as well as assessments of burden of disease. It is demonstrated here that the burden of PMS/PMDD as well as the Disability Adjusted Life Years (DALY) lost due to this repeated-cyclic disorder is in the same magnitude as major recognized disorders. Appropriate recognition of the disorder and its impact should lead to treatment of more women with PMS/PMDD. Efficacious treatments are available. They should reduce individual suffering and impact on family, society and economy.

Addis Tenkir, Nebreed Fisseha and Biniyam Ayele (2002) studied PMS prevalence and effect on academic and social performances of students in Jimma
University, Ethiopia. Result revealed that almost all (99.6%) had at least one premenstrual (PM) symptom in many of the menstrual cycles in the last 12 months. The prevalence of PMS or premenstrual dysphoric disorder (according to DSM-IV) was 27%. About 14% of the study participants frequently missed classes and 15% missed examinations or scored a lower grade at least once because of PM symptoms. Both were significantly associated with severity of symptoms (p<0.005). More first year students were affected by PMS than students of other class-years (p<0.05) and concluded that health education, appropriate medical treatment and counseling services, as part and parcel of the overall health service should be availed and provided to affected.

2.1.4 Anxiety and depression experience among women with PMS

Petta, Osis, Depidua, Bahamondes and Makuch (2010) described the perspectives and attitudes of 1053 Brazilian women towards PMS. The result showed that 96.1% had heard of PMS, 65.4% considered that all or almost all women experienced the condition, 87.5% stated that symptoms occurred prior to menstruation. The emotional and physical symptoms most frequently mentioned were anxiety (76.4%), mood swings/crying (55.7%), pain and breast tenderness (45.4%).

Rapkin and Winer (2009) studied PMS quality of life and burden of illness in Los Angeles. The result showed that typical symptoms of PMS include irritability, anger, mood swings, depression and anxiety. The symptoms recur monthly and last for an average of 6 days per month. Severe form of PMS can disable as major depressive disorder. It has been estimated that affected women experience almost 3000 days of severe symptoms during the reproductive years.

Bakhshani, Mousavi and Khodabandeh (2009) investigated the frequency of premenstrual symptoms and prevalence of PMS among young Iranian women.
Overall 300 participants were asked to complete an anonymous questionnaire assessing premenstrual symptoms. Of the 300 participants, 98.2% reported at least one mild to severe premenstrual symptom and 16% met the criteria of DSM-IV for PMS. Most common symptoms were feeling of tiredness or lethargy (84%), depressed mood (72.3%), sudden feeling of sadness or tearfulness (70.3%), anxiety (70%), backache (69%) and sleep problems (66%). There was no significant difference in severity of symptoms based on marital status and living conditions (living with parents or away from parents), but severity of symptoms were significantly higher for the younger women (18-20 years) compared to the older women (21-24 and 25-27 years).

Gonda et al. (2008) studied 63 mentally healthy women about fluctuation of psychological symptoms during luteal phase with use of prospective record of symptoms for three cycles and in addition they used state trait anxiety inventory, Zung self-rating depression scale and concluded that there is a significant increase in psychological symptoms related to neuroticism and depression during late luteal phase.

Yonkers, Brien and Erikson (2008) stated that women of reproductive age have some physical discomfort or dysphoria in the weeks before menstruation. Symptoms are often mild, can be severe enough to substantially affect daily activities, most of these women also meet criteria for PMS. Mood and behavioral symptoms, including irritability, tension, depressed mood, tearfulness and mood swings are the most distressing.

Adigzel, Tafkin and Danaci (2007) studied 541 women living in the area of Turkey and found 6.1% had severe PMS symptoms and 72.2% had mild PMS. The most common symptoms were feeling irritable and restless (72%), anxiety (67.3%),
pain in the abdomen (66.6%), lack of energy or easily fatigued (66.6%) and fatigue in the legs (65.5%).

Myint Thu, Edessa Ore-Giron Diaz, and Sawhsarkapaw (2006) presented the results of research on PMS among female students at Assumption University in Bangkok, Thailand. A cross sectional descriptive survey, including a total of 266 female students between the age of 16 and 35, were utilized. Result revealed that almost 60% of the respondents expressed breast pain and discomfort during the premenstrual period. Around 50% complained of lower abdominal cramp or discomfort, headache and increasing stress before period. Around 40% of the respondents noticed that sadness, depression, confusion, weight gain, irritability and conflicts with friends were common before menstruation. Less than 30% reported high rate of anxiety, withdrawal feeling, ineffective coping and bloated body image. 28% of the respondents suffered these symptoms before every period. A total of 41% of the respondents had symptoms with mild severity, that is, the symptoms were present but not a problem and did not interfere with daily functioning. But 53% reported moderate PMS symptoms with significant discomfort. 6% of the respondents reported severe PMS symptoms interfering daily function such as school performance and interpersonal relationships. When they noticed the symptoms, 41.4% of the PMS victims used Paracetamol, 24.4% used Ponstan and 3.4% used Advil. Other non-pharmacologic treatments were sleep (75.9%), exercise (23%) and dietary change (10%).

Derman, Kanbur, Tokur and Kutluk (2004) investigated the frequency of PMS in adolescent girls. Modified DSM - IV criteria were used for the diagnosis of PMS. Result revealed that 61.4% of girls met DSM – IV criteria of PMS. Half of the girls that is 49.5% had mild, 37.1% had moderate and 13.4% had severe PMS. The most common symptoms were negative effect particularly in the form of stress (87.6%) and nervousness (87.6%).
Lane and Francis (2003) investigated the relationships between premenstrual symptomatology, locus of control, anxiety and depression in women with normal menstrual cycles. Sixty-nine female participants completed a survey. Result revealed that both overall and specific subtypes of premenstrual symptomatology were found to correlate with external locus of control, anxiety and depression. In addition, locus of control was found to moderate the relationship between premenstrual symptomatology, anxiety and depression. Finally, women who were in the premenstrual phase when completing the questionnaire scored significantly lower on the internal scale than those in either the follicular or early luteal phases. It was concluded that an external locus of control may be associated with a susceptibility to depression or anxiety when certain premenstrual or postmenstrual changes are experienced.

Burt and Stein (2002) studied epidemiology of depression throughout the female life cycle and stated that women are at an increased risk for first onset of major depression from early adolescents until their mid 50’s and have a lifetime rate of major depression 1.7 – 2.7 times greater than that for men and most women report a physical or emotional symptoms premenstrually.

Ronchi, Muro, Marziani, and Rucci (2000) studied depressive symptoms in late leuteal phase dysphoric disorder and found that there was a strong and positive association between late leuteal phase dysphoric disorder and depressive symptoms. Chan and Chang (1998) examined the relationship between PMS and anxiety in Chinese adolescents. 153 school girls completed Spielberger’s trait anxiety inventory and Abraham’s menstrual symptom questionnaire. The high level of trait anxiety found in this sample was related to an increase in premenstrual tension symptoms.
Zhao, Wang, and Qu (1998) investigated the prevalence of PMS and its influential factors among 454 reproductive women aged 15 – 49 in Beijing. Result revealed that the prevalence of PMS in these women was 30.4% among which 61.6% was mild, 34.1% moderate and 4.3% severe. The order of frequency of the symptoms occurring in PMS was irritation, depression, anxiety, lack of concentration and hypersomnia women with greater stress in life and depression had a higher incidence of PMS.

Yonkers (1997) studied relationship between anxiety symptoms and anxiety disorders and PMS. And stated that premenstrual symptoms are common among young menstruating women, but the psychiatric disorder PMDD is seen only in approximately 3% of this group. The most commonly reported symptoms are depression and mood swings, but a substantial number of women reported tension and anxiety. Lifetime psychiatric illness is also common in women with PMDD, and although mood disorders predominate, past histories of anxiety disorders are also common, further suggesting an association between PMDD and anxiety disorders. Finally, treatments that are effective for anxiety disorders are also useful in the treatment of PMDD.

2.1.5 Factors influencing PMS experience

Ray, Mishra, Roy, and Das (2010) conducted a study to find out variation in menstrual characteristics between rural and urban adolescents in Kolkata, India. Results showed rural and urban adolescents differed significantly (p<0.05) with respect to age at menarche, skipped and irregular cycles, PMS and duration of menstrual discharge.

Golub and Sharon administered the depression adjective check list, state-trait anxiety inventory, and a battery of factor analytically derived cognitive tests sensitive
to anxiety or depression to fifty 30-45 yr old women during the 4 days prior to the
onset of menstruation and again 2 wks later. Testing sessions were scheduled on the
basis of a previously completed Menstrual Distress Questionnaire (MDQ). There were
significant increases in anxiety and depression during the premenstrum. However, no
statistically significant differences were found in cognitive test performance and
correlation data failed to support any consistent relationship between premenstrual
mood and cognitive function. Moreover, no significant correlations were found
between premenstrual complaints on the MDQ and either cognitive test performance
or mood scores obtained during the premenstrual testing sessions. It is concluded that
the magnitude of the premenstrual mood change was not great enough to affect
intellectual function (PsycINFO Database Record (c) 2010 APA).

Yamamoto, Okazaki, Sakamoto, and Funatsu (2009) did cross – sectional
study and examined the relationship between menses-associated health problems of
women, such as premenstrual symptoms, menstrual pain, irregular menstrual cycles
and psychosocial stress among Japanese college students. Result revealed that the
proportions of students who reported premenstrual symptoms, menstrual pain and the
experience of irregular menstrual cycles were 79%, 79%, and 63%, respectively. Students who reported premenstrual symptoms, menstrual pain and the experience of irregular menstrual cycles had higher stress scores than those who did not. Multiple
logistic regression analyses were used to identify independent factors associated with
having premenstrual symptoms, menstrual pain and the experience of irregular
menstrual cycles. Stress score, heavy menstrual flow and menstrual pain were
significant predictors for premenstrual symptoms, while age at menarche and having
premenstrual symptoms were significant predictors for menstrual pain. Both stress
score and body mass index were found to be significant predictors for having
experienced irregular menstrual cycles. The results suggest that psychosocial stress is independently associated with premenstrual symptoms and the experience of irregular menstrual cycles among college students.

Megan Moreno (2009) mentioned in United States PMS have been reported to affect as many as 90% of women of reproductive age sometime during their lives. Approximately 10% are affected severely and 14 - 88% of adolescent girls have moderate-to-severe symptoms. Another 3-5% of women met the criteria for PMDD. Result revealed that women with a Body Mass Index (BMI) of 30 or above are nearly 3 times more likely to have PMS than women who are not obese.

Bijan Moghimi-Dehkordi (2007) investigated the associations between obesity and perceived depression, anxiety and stress. Result revealed that the prevalence of perceived depression, anxiety and stress were higher in women than in men. A higher proportion of underweight and obesity was observed in women. Being underweight, overweight and obese were associated with a one to four-fold increased risk for perceived depression, anxiety and stress.

Gold (2007) conducted a cross sectional analysis of demographic and lifestyle factors associated with PMS among 3302 women. The result showed that most dietary factors were not related to PMS. Fat intake was negatively associated with craving and bloating (p=0.024) and fiber intake was positively associated with breast pain (p=0.037), alcohol intake was negatively associated with anxiety and mood change (p=0.045) and headaches (p=0.009), smoking (p=0.028) and passive smoke exposure (p=0.050) were positively associated with cramps and back pain.

Michelle Vichnin, Eilen Freeman, Hui Lin, Janice Hilman, and Stephanie Bui (2006) studied PMS severity and impairment in adolescents. Results revealed that 31% of adolescents met the criteria for the PMS and 54% said they had PMS but did
not meet criteria and 15% clearly had no PMS. The most severe symptoms were mood swings, anxiety and irritability, with the greatest impairment in the family domain. Dysmenorrheal and duration of PMS were significantly associated (p< 0.01) with PMS.

Strine, Chapman, and Ahluwalia (2005) studied menstrual-related problems and psychological distress among women in the United States. Data were obtained from women aged 18-55 years (n = 11,648) who participated in the 2002 National Health Interview Survey. Result revealed that approximately 19% of women aged 18-55 years reported experiencing menstrual-related problems (e.g., heavy bleeding, bothersome cramping and PMS). These women were significantly more likely than those without menstrual related problems to report frequent anxiety and depression, insomnia, excessive sleepiness, and pain over the past 12 months. Women with menstrual-related problems were also significantly more likely to report feeling sad, nervous, restless, hopeless or worthless. Cigarette smoking, drinking heavily and being overweight or obese were also more frequently reported among women with menstrual-related problems than those without and concluded that menstrual-related problems pose substantial implications for public health. Healthcare providers should examine mental health concerns in women reporting menstrual-related problems.

Rasheed and Sowielen (2003) conducted a study on the prevalence and predictors of PMS among 464 young women and found that at least one premenstrual symptom was experienced by 448 women (96.6%) and 176 (37.5%) with high symptom severity score premenstrual symptom frequency was significantly associated with a maternal history of premenstrual syndrome, self perception of mental stress, physical activity, consumption of sweet tasting foods and coffee.
2.1.6 Treatment and Complementary therapies for premenstrual syndrome

Treatment for PMS

The first therapeutic option for PMS are typically self-help techniques like healthy nutrition, dietary supplements, increased exercise and stress reduction (Anna Rushton, 2010; Reproductive Psychiatry Resource and information centre, 2010; Jean Hailes foundation for women’s health, 2009; Scott Ransom & Julie Moldenhauer, 1998). These measures should be emphasized if the patient's symptoms are not severe and last less than one week. Detailed discussions with the patient are vital for these non pharmacologic options to succeed.

Shin, Park, and Heitkemper (2009) examined the effect of hand acupuncture therapy and hand moxibustion therapy among Korean women with PMS. Experimental groups received 10 sessions of either hand acupuncture or hand moxibustion therapy. Both the experimental groups had significantly reduced overall premenstrual symptom severity scores following the therapy as compared to women in the control group and concluded that hand acupuncture and hand moxibustion therapy are an effective strategies for women to reduce PMS symptoms.

Akush Ginekol (2009) assessed the effectiveness of femifort in treating the premenstrual syndrome and the results showed that the femifort (vitamins and phytoproducts) has positive influence in premenstrual syndrome. Busse et al. (2009) determined the efficacy of psychological interventions among nine women with the premenstrual syndrome. In which, five samples were subjected to cognitive behavioral therapy and the result suggested that cognitive behavioral therapy significantly reduces both anxiety, depression and also suggested a possible beneficial effect on behavioral changes.
Jing, Yang, Ismail, Chen, and Wu (2009) evaluated the effectiveness and safety of traditional Chinese herbal medicines among 549 women with premenstrual syndrome. The result showed that the traditional Chinese herbal, (Jingquianping granule) is effective in reducing symptoms associated with PMS.

Gephshwin et al. (2008) have evaluated the effectiveness of traditional Japan’s medicine (Kampo) among three women with PMS and the result showed that each of these women reported improvement in their symptoms associated with premenstrual syndrome.

Jarvis, Lynch, and Morin (2008) evaluated the current non pharmacologic and pharmacologic treatment options for symptoms of PMS and PMDD. Data were obtained through searches of MEDLINE and OVID (1950-March week 3, 2008) and concluded that lifestyle modifications and exercise are first-line recommendations for all women with PMS/PMDD and may be all that is needed to treat mild-to-moderate symptoms. Herbal, vitamin supplementation, complementary and alternative medicine have been evaluated for use in PMS/PMDD and have produced unclear or conflicting results. More controlled clinical trials are needed to determine their safety and efficacy. Healthcare providers need to be aware of the symptoms of PMS and PMDD and the treatment options available.

There are several biological mechanisms by which physical activity may reduce the occurrence of PMS. These include an increase in endorphin levels, a stabilization of hormone levels and their effect on the hypothalamic-pituitary axes, improvements to oxygen in muscles and an overall improvement to psychological well-being. Endorphin levels in the body are the highest during the late follicular phase of the cycle and tend to decrease during the late luteal and menstrual phases. Low endorphin levels may contribute to PMS by decreasing a general overall feeling
of wellbeing and leading to depression and other low emotional states. Physical activity has been shown to increase beta-endorphin levels, which improves mood and thus could reduce emotional symptoms (Aganoff, 1994; Daley, 2009).

Physical activity may also improve PMS symptoms by impacting circulating hormone levels acting on the hypothalamic-pituitary-adrenal (HPA) axis. The HPA axis is a part of the neuroendocrine system and is involved in regulating many body processes including digestion, the immune system, mood and emotions, sexuality, energy storage and expenditure, and stress reduction (The Lundbeck Institute, 2007).

A study by Roca and her colleagues (2003) found that women with PMS did not have a normal increase in HPA axis response following a treadmill stress test conducted during the luteal phase compared to control women and that menstrual cycle related variation in HPA axis function was affected by both progesterone and estrogen levels (Roca et al., 2003). These findings suggest that women with PMS have a decrease in HPA axis response during the symptomatic period, which could contribute to physical and emotional symptoms. Physical activity may also impact the HPA axis by reducing cortisol levels through a modification to psychological or behavioral reaction to stress. One of the studies found that women with daily stress and suffering from PMS had higher levels of cortisol than control subjects, while another study found that women who experienced more stress on a day-to-day basis (and thus had higher cortisol levels) had more frequent and severe PMS.

Cramping, a common symptom of PMS, is caused by elevated tonic activity of the myometrium (uterine smooth muscle), which is stimulated by the sympathetic nervous system. If pain results from hypoxia of the uterine muscle, vasoconstriction caused by stress (due to the enhanced sympathetic activity that results from environmental stress) would cause more pain, while physical activity could possibly
alleviate this symptom (Gannon, 1988). Physical activity has also been shown to affect a women’s psychological outlook by improving self-esteem and providing a distraction from other thoughts, which could provide relief from emotional symptoms associated with PMS (Aganoff, 1994; Choi et al., 1995). Increased physical activity has been found to reduce tension, anger, depression and low self-esteem, all of which are symptoms of PMS. Physical activity may also improve the functioning of the immune system and increasing the body’s resistance to stress. In summary, there is biological evidence in support of an association between physical activity and reduction of PMS symptoms through a variety of physiological mechanisms. These include increase in endorphin levels, that helping to maintain the proper HPA axis response, decrease sex steroids levels by impacting the HPG axis, reduce hypoxia of the uterine muscle, and improve emotional and psychological states of mind.

Ghanbari et al. (2009) investigated effects of calcium supplement therapy in women with PMS in Tehran, Iran. The study groups were selected from young female college student’s based on PMS criteria. The subjects were divided in to two groups, one group received placebo and the other received 500mg of calcium carbonate twice daily for 3 months. Result revealed that PMS depressive symptoms had significantly improved in the group receiving calcium treatment.

Clayton (2008) conducted a study on symptoms related to the menstrual cycle: diagnosis, prevalence and treatment. The result showed that menstrual cycle-related symptoms are associated with the intrinsic hormonal fluctuations of the menstrual cycle. These symptoms can be physical, behavioral or emotional and include problems such as dysmenorrhea, PMS and PMDD. As many as 2.5 million women are affected by menstrual disorders each year, which can have a profound impact on their quality of life. Although a definitive etiology is yet to be established, fluctuations in
estrogen and progesterone as well as genetic factors are thought to contribute to the occurrence of menstrual disorders. Current treatment options include nonsteroidal anti-inflammatory drugs (for dysmenorrhea), lifestyle changes, selective serotonin reuptake inhibitors and ovulation suppression (e.g., with oral contraceptives). Treatment with oral contraceptives particularly extended or continuous use may significantly reduce the incidence of menstrual cycle-related symptoms. Domoney, Vashisht, and Studd (2003) investigated the use of complementary therapies by women who attended a specialist premenstrual syndrome (PMS) clinic in the UK. Data were collected via an anonymous questionnaire survey of 100 women attending the clinic. Results showed that 91% of the women had used at least one form of complementary therapy for the management of their premenstrual symptomatology although only 35% were current users. Over half (53%) felt that these therapies had been of some benefit and 83% of these women were satisfied with the perceived success of conventional therapy. In conclusion, the vast majority of women attending a specialist PMS clinic in the UK have used complementary therapies to treat this chronic debilitating condition but few continue use long-term. Treatment may be instigated by the woman with advice from her informal support network and/or her physicians. However as use is so prevalent, but with few randomized controlled trials conducted to show their benefits or risks, it is important to improve awareness of these therapies, both in qualitative and quantitative terms. Satisfaction with prescribed medications did not appear to be influenced by complementary therapy use in this group of women.

Association of Women’s Health, Obstetric & Neonatal Nurses (AWHONN, 2003) and ACOG guidelines recommend beginning treatment by working with the patient to set goals. The ACOG guidelines state that according to consensus and
expert opinion the steps in treating PMS should be the following. First step is Supportive therapy including reassurance and education about physiologic changes. Second step is dietary changes- especially carbohydrate rich foods and beverages to improve mood symptoms, food craving, calcium supplements and aerobic exercise. AWHONN guidelines recommend effective multimodal therapies for PMS as the first course of treatment. Therapies include cognitive behavioral symptom management, dietary counseling, supplements and exercise promotion.

Stevenson and Ernst (2001) reviewed literature to determine whether the use of complementary/alternative therapies is supported by evidence of effectiveness from rigorous clinical trials. Trials were located through searching 7 databases and checking the reference lists of articles. Randomized controlled trials investigating a complementary/alternative therapy in women with PMS published in the peer-reviewed literature were included in the review. Twenty-seven trials were included investigating herbal medicine (7 trials), homeopathy (1), dietary supplements (13), relaxation (1), massage (1), reflexology (1) chiropractic (1), and biofeedback (2). Despite some positive findings, the evidence was not compelling for any of these therapies, with most trials suffering from various methodological limitations. On the basis of current evidence, no complementary/alternative therapy can be recommended as a treatment for PMS.

Pearlstein and Steiner (2000) mentioned non-antidepressant and selective serotonin reuptake inhibitors as the first-line treatment option for PMS, several other such options are also available. Multiple studies have indicated that medications that suppress ovulation alleviate premenstrual emotional and physical symptoms. However the use of such medications, such as the gonadotropin-releasing hormone agonists, leads to prolonged low estrogen levels and cardiac and osteoporotic health
risks. A recent double-blind, placebo-controlled study of 466 women with PMS reported that calcium was effective in reducing emotional, behavioral and physical premenstrual symptoms. Recent preliminary trials have suggested efficacy for cognitive therapy, light therapy and tryptophan. Future studies of diet recommendations, exercise, relaxation, magnesium, nonsteroidal anti-inflammatory drugs, diuretics, opiate antagonists and alternative therapies were needed.

Bendich (2000) discussed dietary supplements to reduce PMS. Many types of dietary supplements have been advocated for the reduction of certain symptoms of premenstrual syndrome (PMS). However, only one supplement—calcium—has been demonstrated to be of significant benefit in a large, rigorous, double-blind, placebo-controlled trial. Limited evidence suggests that magnesium, vitamin E and carbohydrate supplements might also be useful, but additional research is needed to confirm these findings. Trials of vitamin B6 supplementation have had conflicting results and high doses of this vitamin taken for prolonged periods of time can cause neurological symptoms. Trials of evening primrose oil have also had conflicting results; the two most rigorous studies showed no evidence of benefit. Health professionals should be aware of the possible use of these supplements and ask those with PMS about their use of such products and counsel them based upon the totality of evidence.

Hernandez Reif et al. (2000) assessed the effectiveness of massage therapy on PMS among 24 women. Participants were randomly assigned to a massage therapy or a relaxation therapy group. The massage group showed decreased anxiety, depressed mood and pain immediately after the first and last massage sessions. The long term (five weeks) effects of massage therapy included a reduction in pain, water
retention and overall menstrual distress. The study concluded that massage therapy is an effective adjunct therapy for treating severe premenstrual symptoms.

**PMS and yoga**

Complementary medication and alternative medicines can consist of relaxation methods, exercise, diet change and other treatments. Relaxation techniques usually involve breathing exercises, yoga and meditation. This can help reduce the irritability as well as the mood swings. Newer and bigger challenges are experienced everyday with cut-throat competition. There is a dire need to learn skills and methods that are simple, rational and practical, which can give a person the self-empowerment to rise to the occasion and make appropriate decisions at the right time. The scriptural Indian science of Yoga offers an alternative and is reputed to be an effective and diverse application that appears to simultaneously address the multiple dimensions of personality development. Yoga is believed to increase the faculties of adjustment, which are essential to personality, through developing control over the mind. Jo George (2008) suggested relaxation therapy like breathing exercises, meditation and yoga will help lessen PMS symptoms.

Several yoga poses are proven to ease menstrual pain. It can also help our mind and body adapt with stress, anxiety and depression making us to feel relaxed and calm, and enabling us to cope with psychological symptoms of PMS. Having a generally relaxed mind and body can also help in alleviating the menstrual pain and affective somatic symptoms of PMS (Max Lifestyle International, 2008)

Khushbu Rani, Tiwari, Uma Singh, Agrawal, Archana Ghildiyal, and Neena Srivastava (2011) did study to assess the Impact of Yoga Nidra on psychological general wellbeing in patients with menstrual irregularities. Patients were recruited from the Department of Obstetrics and Gynecology, C.S.M. Medical University,
Lucknow, Uttar Pradesh, India. A total of 150 female subjects were randomly divided into two groups: 1) group of 75 subjects (with yogic intervention) and 2) a control group of 75 subjects (without yogic intervention). Assessment of psychological general well being (tool) was used for all the subjects (Cases and controls). This assessment was done twice first time in the beginning (baseline) and then after six months. Result revealed that anxiety decreased significantly ($p<0.003$) and depression decreased significantly ($p<0.01$) in the Yoga group. Positive wellbeing and general health improved significantly ($p<0.02$), and vitality improved significantly ($p<0.01$) after six months of Yoga therapy (Yoga Nidra) in the Yoga group compared with the control group.

Yoga relaxation techniques, affects the sympathetic and parasympathetic components of autonomic nervous system, thereby affecting the vital physiological functions that govern heart rate, blood pressure, respiration, temperature, muscle tension and sweating. This exercise eliminates muscular tension, reduces stress, improves sleep and calms down anxiety and affective symptoms of PMS (Anice George, 2011; Jyoti Dvivedi, 2007).

Research has proved that PMS is a physiological and a stress induced disorder and that stress is a cause of symptoms of PMS (Gollenberg, 2010; Peeke & Frishett, 2002; Benson & Frankel, 2002; Cromie, 2002). Presence of more than 300 modalities of treatment indicates that existing remedies have not provided satisfactory help to relieve PMS. The yoga relaxation being a successful means of stress relaxation is expected to relieve PMS as well (Chakmakjian, 1983).

Arias, Steinberg, Banga, and Trestman (2006) identified 82 studies, 20 randomized controlled trials in their systematic review of the efficacy of meditation, meditative prayer and yoga relaxation techniques as treatments for medical illness.
The studies included 958 subjects in total (397 experimentally treated, 561 controls). No serious adverse events were reported in any of the included or excluded clinical trials. Serious adverse events are reported in the medical literature, though rare. The strongest evidence for efficacy was found for epilepsy, symptoms of PMS and menopausal symptoms. Benefit was also demonstrated for mood and anxiety disorders, autoimmune illness and emotional disturbance in neoplastic disease. The results support the safety and potential efficacy of meditative practices for treating certain illnesses, particularly in non psychotic mood and anxiety disorders. Clear and reproducible evidence supporting efficacy from large, methodologically sound studies is lacking. Recent studies have shown that yoga and meditation are beneficial for many types of health related conditions including relieving the symptoms associated with PMS (Anne Ahira, 2010).

Nidhi Gupta, Shveta Khera, Vempati, Ratna Sharma, and Bijlani (2005) conducted a study to assess the impact of short-term comprehensive but brief lifestyle intervention, based on yoga, on anxiety levels in normal and diseased subjects at All India Institute of Medical Sciences, New Delhi, India. The intervention consisted of asanas, pranayama, relaxation techniques, group support, individualized advice, lectures and films on philosophy of yoga, the place of yoga in daily life, meditation, stress management, nutrition and knowledge about the illness. The outcome measures were anxiety scores, taken on the first and last day of the course. Anxiety scores, both state (study group pretest mean 39.6 and posttest mean 34.1 and control group pretest mean 35.0 and posttest mean 36.4) and trait anxiety (study group pretest mean 43.1 and posttest mean 38.5 and control group pretest mean 36.1 and posttest mean 37.1) were significantly reduced. Among the diseased subjects significant improvement was seen in the anxiety levels of patients with hypertension, coronary artery disease,
obesity, cervical spondylitis and those with psychiatric disorders. The observations suggest that a short educational programme for lifestyle modification and stress management leads to remarkable reduction in the anxiety scores within a period of 10 days.

Vempati and Telles (2002) studied 35 male volunteers at Bangalore, India, whose age ranged from 20 to 46 years in two sessions of yoga-based guided relaxation and supine rest. Assessments of autonomic variables were made for 15 subjects, before, during and after the practices, whereas oxygen consumption and breath volume were recorded for 25 subjects before and after both the types of relaxation. A significant decrease in oxygen consumption and increase in breath volume were recorded after guided relaxation (paired t test). There were comparable reductions in heart rate and skin conductance during both types of relaxation. During guided relaxation the power of the low frequency component of the heart-rate variability spectrum reduced, whereas the power of the high frequency component increased, suggesting reduced sympathetic activity. The results suggest that sympathetic activity decreased after guided relaxation based on yoga, depending on the baseline levels.

The symptoms of PMS can also be relieved by utilizing calming exercises such as breathing techniques. Deep breathing techniques such as those performed in yoga, can help to relax the body, calm the nerves and reduce stress as well take the mind off the symptoms of PMS (Daley, 2009). Recreational relaxation activity has been recommended as a method of reducing PMS occurrence and severity. ACOG recommends aerobic exercise, in particular to reduce fatigue and depression associated with PMS. The U.S. Department of Health and Human Services recommends regular physical activity as a treatment for PMS and some sources
suggest that relaxation exercise is an effective alternative to pharmaceutical treatments in easing PMS.

In a clinical trial testing the use of relaxation for treatment of PMS investigations found that 58% reduction in PMS after three months of daily relaxation compared with 17% to 27% improvement in two control groups (Goodale, Domar, & Benson, 1990). Taylor (1996) found that learning proper breathing also reduces the symptoms of anxiety and in 1999 tested a combination of behavioral and cognitive relaxation strategies and found that strategies are very helpful in managing PMS as well as general stress response.

Divedi, Mahajan, Mittal, and Singhal (2008) stated that PMS is a psychoneuro endocrine stress related disorder and studied the effect of 61-points relaxation exercise (61-PR), a relatively less known hatha yoga technique, is a successful means of stress relaxation and is expected to relieve PMS as well. The study was conducted on 50 clinically healthy women volunteers who were in their reproductive age group and in their premenstrual period. The results suggest a reduction in sympathetic activity by 61-PR and also the high basal sympathetic tone present in subjects of PMS group due to stress is considerably reduced by relaxation. 61-PR is effective in providing relief from PMS and may be a useful adjuvant to medical therapy of PMS and other stress disorders.

2.1.7 Research related to the health education on PMS

Anna Stout (2008) stated that mood disorders have been associated with reproductive events and gynecologic conditions which specifically affect women. Somatic therapies have dominated treatment for these disorders, possibly because of the commonly held belief that the accompanying mood changes are primarily related to physiological states. Some women, however, may receive inadequate symptom
relief from currently available pharmacologic therapies or find other treatment options, such as surgical or hormonal therapies, unacceptable because of the negative impact on their future reproductive or health status. Based on the documented effectiveness of cognitive-behavioral therapies in the treatment of other mood disorders, exploratory studies of the efficacy of cognitive-behavioral treatment strategies for gynecologically related mood disorders have been initiated. A number of cognitive-behavioral strategies for treating premenstrual mood symptoms have been reported in the literature; however, few have been subjected to controlled studies with well-evaluated and well-described subjects. Preliminary findings suggest that a combination of cognitive-behavioral interventions and relaxation training, when administered in an adequate number of treatment sessions, may significantly improve premenstrual mood disorders and possibly maintain benefits for a longer period time than pharmacologic treatments. However, several studies report that combined multidisciplinary approaches result in improved levels of functioning.

Yoo and Lee Yoon (2009) analyzed the effects of a cognitive-behavioral nursing intervention on anxiety and depression of patients with breast cancer undergoing radiotherapy. A nonequivalent control group design was used for the study. The research participants were patients with breast cancer (N=71; experimental group=35, comparison group=36) who received radiotherapy at P university hospital. The experimental group received a 6-week cognitive-behavioral nursing intervention (2 hr/week), which included nursing counseling, education about treatment choices for breast cancer and possible side effects and management strategies during radiotherapy, and rehabilitation exercise. Result revealed that following the intervention, the experimental group showed significantly lower levels of anxiety (Experimental group=34.60+/-6.35, Comparison group=44.63+/-9.93, t=3.552,
p<.001) and depression (Experimental group=10.20+/-6.61, Comparison group=17.81+/-10.85, t=3.542, p<.001) than the comparison group.

Kim, (2006) conducted a study to identify the effects of PMS nutritional education program among student nurses, 29 in the experimental group and 27 in the control group. The experimental group participated in PMS nutritional education program for 8 weeks. Data were collected before and after the education and with the measurement tools focused on premenstrual symptoms, PMS knowledge, and self care behaviors. After the intervention, the experimental group showed a significant increase in knowledge regarding PMS (Z=6.32, p=.000) and self care behaviors (t=3.00, p=.004) compared to the control group. These results suggest that the short term effects of a PMS nutritional education program for student nurses have proven useful and the program should be applied to PMS clients as well as health professionals.

Min A.K (2002) examined the effects of an educational program with a purpose of reducing symptoms and ailments of women's PMS on the basis of the Self-care theory of Orem, a stimulation was carried out by using pre-and post-design of non-equity control group after choosing both an experimental group of 62 persons and a control group of 62 persons among 497 industrial women. An education was provided for the experimental group of 62 persons for 8 weeks but no education for the control group of 62 persons. Result revealed that women in their teens and twenties showed more serious symptoms and ailments of PMS than women in their thirties (p<0.01). For the experimental group of 62 persons who received the educational program, both the knowledge of premenstrual syndrome and the degree of self-care behavior had remarkably improved (p<0.01), respectively and the symptoms and ailments of premenstrual syndrome were also remarkably reduced (p<0.01), while
the control group showed no change in the knowledge self-care behavior, and symptoms and ailments of premenstrual syndrome.

An education program was developed (Janita Chau & Anne Chang, 1999) and evaluated to determine its efficacy in increasing knowledge and decreasing the severity of symptoms of PMS. Participants from a sample of 94 schoolgirls aged between 14 and 18 years from four secondary schools in Hong Kong assigned to either the experimental or control group. Immediately following the education program, the schoolgirls in the experimental group had significantly increased knowledge scores as measured by the Premenstrual Syndrome Knowledge Questionnaire. Three months following the education program, schoolgirls in the experimental group reported having a significant reduction in total PMS scores and three of the subscale scores as measured by a translated version of Abraham's Menstrual Symptom Questionnaire. In addition, no significant differences were found for the control group on pre-test and post-test PMS scores suggesting that the education program could have been the source of the reduction in PMS symptoms of the experimental group of young adolescent girls. Similarly, Seideman (1990) studied the effect of an educational program on PMS with 47 women employed in an industrial setting. The results showed a significant reduction in the occurrence of anxiety and craving symptoms among subjects in the experimental group as well as a significant decrease in the severity of edema symptoms.
CONCEPTUAL FRAMEWORK BASED ON MODIFIED SYMPTOM MANAGEMENT MODEL

Symptom Management Model

The symptoms management model developed by university of California, San Francisco School of Nursing provided the conceptual framework for the study. The symptoms management model first was introduced in 1994 and later revised in 2001 (Dodd, Janson et al., 2001). With reference to this model, a symptom is defined as a subjective experience reflecting changes in the bio-psychosocial functioning, sensations or cognition of an individual. Symptoms are important phenomena occurring in company with individual health, they are a major problem for patient and their families who often have responsibility to deal with the management and resulting outcome. It is difficult for health care providers to accurately assess the symptoms and plan appropriate management strategies if patient and their families are unable to accurately describe the various symptoms they have experienced. Accordingly, knowledge gained from patient’s symptom experience is essential to form the basis for planning appropriate interventions to the relevant target group.

The symptom management model is based on the following assumptions.

1. The study of the symptoms is based on the perception of the individual experiencing the symptom and her or his self report. 2. Non-verbal patients who experience symptoms and interpretation of those symptoms that is done by the parent or caregiver is assumed to be accurate. 3. All troublesome symptoms need to be managed 4. Individuals, group, family or the work environment may be the target of management strategies and 5. Symptom management is a dynamic process that may be modified by the individual’s outcomes and the influences of the nursing domains of person, health or illness or environment.
Dimensions of the symptom management model:

The symptoms management model has three dimensions; the symptom experience, symptoms management strategies and outcome. It is based on the premise that the three dimensions are interrelated and the effective management of any particular symptom or group of symptoms require interrelation of three dimensions.

The **symptom experience** is defined as dynamic process involving the interaction of an **individual’s perception** of the symptoms. Perception of symptoms refers to whether an individual notices a change from the way he/she usually feels or behaves. **Evaluation of symptoms** means the judgment of an individual about symptom severity, cause, treatability and the effects of symptoms on her life. It involves a complex set of factors that individualize the symptom experience including its intensity, location, temporal nature, frequency and effective impact. Also it includes evaluation of the threat from symptoms such as dangerous or disabling effect. **Response to symptoms** refers to physiological, psychological, socio cultural and behavioral reaction of an individual to symptoms. The relationships among these components of the symptoms experienced are bi directional.

**Symptom management** is a dynamic process often requiring changes in strategies from time to time, in response to acceptance or lack of acceptance of the planned strategies. Symptom management strategies include intervention, actions or process for the goal of averting or delaying a negative outcome through bio medical, professional and self care strategies. Management begins with assessment of the symptom. The intervention strategies may be targeted at one or more components of the individuals symptom experienced to achieve one or more desired outcomes. Researchers should consider the specification of **what** is the nature of strategy? **when? where? why? how much?** (Intervention dose), **to whom?** (recipient of
intervention) and how?(delivered) and so also details of when was it designed, developed and prescribed?.

Symptom outcomes emerge from both symptom management strategies and symptoms experience status. Further, eight factors including symptom status (the central indicator), costs, functional status, self care ability, morbidity and co morbidity, quality of life, mortality and emotional status are thought to influence the symptom outcomes. In addition, adherence is considered to be a critical factor producing an intended result from symptom management strategies. The model is no longer relevant when a symptom is successfully treated and completely resolved. But, if symptom continues intervention is necessary to control recurring symptoms, then the model continues to be applicable and direct management and measurement of outcomes continue.

The domains of nursing science related to the model:

In the symptom management model, it is shown that the domain of nursing science is associated with symptom experience, symptoms management strategies, and outcomes. The nursing science domains of person, health and illness, and the physical, social and cultural environment are thought to influence the three components in the model and these three components and the three domains are inter related with one another as shown below.

The personal domain influences how an individual views and responds to the symptoms experienced by him/her, and it includes demographical, psychological, sociological development and physiological factors. In addition, developmental variables including the level of development or maturation of an individual are considered as the personal domain. When the model is applied to personal variables, it
may be explained or contracted depending on the symptoms and the population of interest.

The health and illness domain, which includes variables unique to health and illness state of an individual and encompasses risk factors, injuries and disability, has both direct and indirect effects on symptom experience, management and outcomes. The environmental domain refers to the aggregate of conditions or the context within which a symptom occurs including physical, social and cultural variables. The physical environment may encompass home, work and hospitals. The social environment includes an individual’s social support network and interpersonal relationships cultural aspects of the environment are those beliefs, values and practices that are unique to an individual’s identified euthenics, racial or religious group. The symptom management model is shown in Figure 1.

Figure 1. Symptom Management Model (Dodd, Janson et al., 2001)
**Conceptual framework for the study**

The symptom management model, a middle range theory. The original symptoms management model has been modified to provide a better framework for the study in order to better understand the phenomena related to the symptom experienced and nursing management strategies of adolescent girls with PMS. In this study, the symptom management model included all three dimensions; specific assumptions of this study which incorporate some of the basic assumptions of the symptom management model where PMS experiences were viewed subjectively based on the perceptions and self-reports of adolescent girls. In addition, Cognitive Behavioral Nursing strategies were the management strategies that include cognitive nursing strategies and behavioral nursing strategies. Cognitive nursing strategies refer to interactive teaching learning sessions on review of structure and functions of female reproductive organs, physiology of menstruation, myths and misconceptions about menstruation, definition of PMS, causes of PMS, symptoms of PMS, life style measures for managing PMS, self help measures to manage stress, to provide self care during menstruation and to deal with menstrual cramps and demonstration of Yoga Relaxation Technique. Behavioral nursing strategies refer to practice of yoga relaxation technique under the researcher’s guidance for 40 school days. The researcher assumed that these strategies would help to manage the troublesome symptoms and it is targeted to individual adolescent girls in their school environment.

In this study, symptom was defined as a subjective experience reflecting changes in the premenstrual distress, depression, anxiety and knowledge on PMS of an individual. Signs and symptoms of PMS (premenstrual distress, anxiety, and depression) were important aspects of health and illness that disrupt physical, mental
and social functioning (premenstrual distress sub scale item such as pain, concentration, behavioral change, autonomic reaction, water retention, negative effect, arousal, and control). Presence of these signs and symptoms were the first indication for the researcher to identify adolescent girls with PMS.

Adolescent girls with PMS have a variety of symptoms which range from breast tenderness to depression with suicidal idea. PMS becomes severe and leads to high degree of disruption in an adolescent girl’s life and well being, when adolescent girls perceive or notice change from the way they usually feel. They could interpret the occurrence, intensity of premenstrual menstrual symptoms and its effect on their daily life. Adolescent girls in the schools had more stress like higher educational demand from the parents, more activities at school, peer pressure. These stressor and challenges influence the intensity of premenstrual symptoms. Hence the researcher identifies adolescent girls in the school setting were vulnerable for premenstrual distress, anxiety and depression.

In this study PMS included premenstrual distress, depression, anxiety and knowledge on PMS. These symptoms could be attributed due to various personal domains such as demographic variables, (age, educational status of mother, educational status of father, occupation of the mother, occupation of the father, family monthly income and type of family) personal variables, (height, weight (BMI), class performance, class attendance, exercise habit) and gynecological related study variables (age at menarche, days of bleeding, pain during menstruation, regularity of menstrual cycle, heaviness of periods, PMS awareness and PMS duration) influences adolescent girls views and response to the symptom experiences.

With regards to the “symptoms experience” dimension, in this study researcher identified adolescent girl’s perception of symptoms (symptoms
occurrences) through daily symptom diary. Adolescent girls were expected to notice PMS symptoms, retrospectively for one menstrual cycle and prospectively for one menstrual cycle before pretest as well as till the end of study period that is for two menstrual cycles. The researcher evaluated premenstrual distress as mild, moderate, strong and severe with the help of Moss menstrual distress questionnaire, mild and borderline depression with the help of Beck Depression Inventory, and evaluated anxiety with the help of State Trait Anxiety Inventory and based on the evaluation of symptoms, adolescent girls excluded from the study were those who had severe premenstrual distress, no distress, moderate depression, severe depression, very severe depression or no depression. Adolescent girls who had severe and very severe depressions were referred to Sri Ramachandra hospital for further management. Adolescent girls responded to their symptoms and proposed their willingness to participate in research through their informed consent.

Cognitive Behavioral Nursing Strategies are the symptom management strategies in this study. Cognitive Nursing Strategies refer to Interactive Teaching Learning Sessions (ITLS) and Behavioral Nursing Strategies that include practice of Yoga Relaxation Techniques for 40 consecutive school days under researcher guidance. Cognitive Behavioral Nursing Strategies were administered by the researcher to the study group adolescent girls after school hours in their regular class room and common hall. ITLS was imparted by the researcher, through lecture cum discussion using visual aids like charts, flashcard and black board and in group session with each group consisting of 20 girls, for 120 minutes. Two teaching sessions for 80 minutes and YRT demonstration session for 40 minutes were conducted on 3 days within one week and continued practice of YRT for a period of 40 school days.
After implementation of Cognitive Behavioral Nursing Strategies adolescent girls were expected to manage their premenstrual symptoms accurately by adopting appropriate life style modification strategies. As symptom management is a dynamic process, often requiring changes in strategies from time to time, the researcher decided to give information booklet on menstrual hygiene, PMS and steps of yoga relaxation techniques to ensure practice of life style modification to reduce PMS and to practice YRT regularly, thereby symptoms management were individualized based on symptoms occurrence and intensity.

In this study, Cognitive Behavioral Nursing Strategies was intentionally processed only to the study group adolescent girls. Cognitive Behavioral Nursing Strategies being a mind body and theory based behavioral change intervention, is a strong input to improve the premenstrual distress, depression, anxiety and knowledge on PMS. CBNS were targeted to more components of the individual symptoms experience like stress, anxiety, depressive symptom, pain, concentration, behavioral change and negative effect. After a regular practice of yoga relaxation techniques with necessary lifestyle modification to manage PMS by adolescent girls in the study group, it was expected to have better adaptation levels like improved concentration, positive behaviour, less pain, less anxiety and mild premenstrual symptoms.

In this study, symptom outcome includes symptom status and emotional status. Symptom and emotional status were assessed by measurement of the dependent variables such as premenstrual distress, depression, anxiety and knowledge on PMS to determine the effectiveness of Cognitive Behavioral Nursing Strategies. The researcher believed that the outcome of study group would be more desirable than the control group considering the nature of symptom management strategies (CBNS). CBNS includes multifactorial approach as they are cheap, easy to perform by
adolescent girls as they were healthy and had more to do with self care ability. Adherence to CBNS was ensured by the practice of YRT for 40 consecutive school days under the researcher’s guidance, as well as by giving information booklet that would help them to practice lifestyle and dietary modification as per their needs.

Adolescent girls in the control group were expected to perceive their symptoms continuously as same or with more severity because Cognitive Behavioral Nursing Strategies were not given to manage their symptoms experience. These adolescent girls should remain in the same level of premenstrual distress, anxiety, depression and knowledge on PMS. The adolescent girls in the control group were allowed to follow their routine activities to manage their symptoms, however the researcher considered Cognitive Behavioral Nursing Strategies to change the premenstrual distress, depression, anxiety and knowledge on PMS in an effective way when compared to other intervention as it is a mind, body and theory based behavioral nursing intervention and it provides a holistic approach on the adolescent girls well being. When symptom is successfully treated and completely resolved, the intervention is no longer needed, but if continued, intervention is necessary to control recurring symptoms as well as to improve the quality of life, general health and to handle day to day stress. Hence researcher encouraged adolescent girls to perform YRT daily at home.

The modified framework is in view with the original theorist view that is symptoms are important phenomena occurring in company with individual’s health and they are a major problem for adolescent girls to achieve their goals, and ability to complete the rigors required for higher educational achievement. Community health nurses have responsibility to deal with negative outcome of PMS through professional and self care strategies. Cognitive Behavioral Nursing Strategies were provided for
the betterment of health that would bring positive changes among adolescent girls. As it is mind, body and theory based behavioral change intervention being a time tested and effective intervention strategies, it can be used among adolescent girls to manage premenstrual distress, depression, anxiety and knowledge on PMS, and also in many other situations to achieve optimum health/benefit, especially at the primary health care level. The conceptual framework modified for adolescent girls with PMS was derived from the symptom management model illustrated in figure 2.
Figure 2: Conceptual framework based on Modified Symptom Management Model (Dodd et al., 2001)