

KNOWLEDGE AND PRACTICE TOWARDS  
PREMENSTRUAL SYNDROME  
AMONG UNDERGRADUATE STUDENTS  
IN HEALTH CAMPUS  
UNIVERSITI SAINS MALAYSIA

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by

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## **LIST OF ABBREVIATIONS**

<b>ACOG</b>	American College of Obstetrics and Gynaecology
<b>HREC</b>	Human Research Ethics Committees
<b>PMS</b>	premenstrual syndrome
<b>PMT</b>	premenstrual tension
<b>PMDD</b>	premenstrual dysphoric disorder
<b>SPSS</b>	Statistical Package of Social Sciences
<b>USM</b>	Universiti Sains Malaysia

**Pengetahuan dan Amalan terhadap Sindrom Premenstruasi dalam kalangan  
Pelajar Ijazah di Kampus Kesihatan Universiti Sains Malaysia**

**ABSTRAK**

Sindrom pramenstruasi (PMS) adalah gangguan haid yang lazim dalam kalangan wanita pada usia kesuburan yang signifikan sehingga mempengaruhi aktiviti harian dan kualiti hidup mereka. Satu kajian keratan rentas telah dijalankan untuk mengkaji pengetahuan tentang PMS dan amalan yang digunakan untuk melegakan PMS dalam kalangan pelajar ijazah di Kampus Kesihatan Universiti Sains Malaysia (USM). Seramai 234 orang pelajar ijazah di Kampus Kesihatan USM dipilih secara rawak untuk mengambil bahagian dalam kajian ini. Data dikumpul secara kuantitatif dan dianalisis menggunakan perisian statistik SPSS. Dapatan menunjukkan bahawa 62.8% responden mempunyai tahap pengetahuan rendah tentang PMS, 34.6% responden mempunyai tahap pengetahuan sederhana tentang PMS, dan hanya 2.6% responden mempunyai tahap pengetahuan tinggi. Amalan yang digunakan oleh responden untuk melegakan PMS juga telah dikaji dan disusun dalam turutan menurun iaitu rehat (95.7%), minuman suam (85.5%), tidak melakukan apa-apa (60.3%), bersenam (53.4%), mandi air suam (49.6%), ubat penahan sakit (46.6%), suplemen vitamin (33.3%), ubat tradisional (27.4%), antidepresan (6.4%), dan ubat homeopati (5.1%). Ujian Pearson Chi-square mendapati terdapat hubungan yang signifikan antara tahap pengetahuan tentang PMS dan amalan pengambilan ubat penahan sakit ( $p = 0.016$ ). Selain itu, terdapat juga hubungan yang signifikan antara tahap pengetahuan tentang PMS dan amalan mandi air suam ( $p = 0.023$ ). Kesimpulannya, pelajar ijazah perlu mendapatkan pendidikan yang lebih komprehensif tentang PMS untuk membolehkan mereka memberikan sokongan dan penjagaan yang

lebih baik kepada individu yang lain, serta meningkatkan kesejahteraan dan kualiti hidup komuniti secara keseluruhan.

**Knowledge and Practice towards Premenstrual Syndrome among Undergraduate  
Students in Health Campus Universiti Sains Malaysia**

**ABSTRACT**

Premenstrual syndrome (PMS) is a prevalent menstrual disorder among women of reproductive age that is significant enough to affect their daily activities and quality of life. A cross-sectional study design was carried out to study the knowledge about PMS and practice towards relieving PMS among undergraduate students in Health Campus Universiti Sains Malaysia (USM). 234 undergraduate students in Health Campus USM were selected randomly to participate in this study. The data was collected quantitatively and was analysed using SPSS statistical software. The findings showed that 62.8% of respondents had a low level of knowledge about PMS, 34.6% had a medium level of knowledge about PMS, and only 2.6% had a high level of knowledge. The practices employed by respondents in relieving PMS were also studied and arranged in decreasing order as rest (95.7%), warm drinks (85.5%), do nothing (60.3%), exercise (53.4%), warm bathing (49.6%), painkillers (46.6%), vitamin supplements (33.3%), traditional remedies (27.4%), antidepressants (6.4%), and homeopathic medications (5.1%). Pearson Chi-square test found that there is a significant association between level of knowledge about PMS and the practice of painkillers ( $p = 0.016$ ). Besides, there is also a significant association between level of knowledge about PMS and the practice of warm bathing ( $p = 0.023$ ). In conclusion, undergraduate students need more comprehensive education about PMS to provide better support and care to other individuals, subsequently enhancing the well-being and quality of life of the community as a whole.

# **CHAPTER 1**

## **INTRODUCTION**

This first chapter explained the background of the study and the current problems which require this study to be conducted. Then, research questions were generated, and subsequently the general objective, specific research objectives, and hypotheses were listed. Some frequently used terms were explained in terms of their conceptual and operational definitions. Lastly, the significance of the study was explained.

### **1.1 Background of the Study**

Premenstrual syndrome, or PMS, is a common menstrual disorder in women during their reproductive years (Abu Alwafa et al., 2021). PMS is also sometimes known by its lay term, premenstrual tension (PMT) (Tolossa & Bekele, 2014). PMT is a term introduced by Frank in 1931. Then in 1953, the term PMS was introduced by Greene and Dalton, to define that it has additional clinical manifestations rather than merely emotional tension (Abu Alwafa et al., 2021). The most severe form of PMS is known as premenstrual dysphoric disorder (PMDD), which is primarily presented with psychological symptoms (Tolossa & Bekele, 2014).

PMS is a prevalent health issue among women of reproductive age (Direkvand-Moghadam et al., 2014). It affects millions of young women globally and negatively impacts their normal daily activities and social functions (Abu Alwafa et al., 2021). Studies found that PMS might cause the quality of life to decrease significantly (EL-Hamid et al., 2013).

According to epidemiological data, the global prevalence of PMS was pooled at 47.8% (Direkvand-Moghadam et al., 2014). The incidence rate of PMS differs from that of premenstrual symptoms. An individual with premenstrual symptoms may not have PMS if she does not meet the criteria to be diagnosed with PMS. Studies reported that premenstrual symptoms are experienced by more than 90% of reproductive-age women, but the proportion of women experiencing PMS differs widely across countries worldwide, which is 35.6% to 96.6% (Salem et al., 2020). Another study reported that 75% of reproductive-age women experience symptoms of PMS, and 3% to 8% experience extremely severe PMS symptoms (Abu Alwafa et al., 2021).

Various studies reported the wide range of PMS prevalence in different countries, probably due to the sample differences, cultural characteristics, and diagnostic methods (Salem et al., 2020). The lowest prevalence was reported in France (12%) and the highest prevalence was reported in Iran (98%) (Direkvand-Moghadam et al., 2014). A study also revealed a high prevalence of PMS in developing countries (Shrestha & Giri, 2020).

PMS symptoms can develop between puberty and menopause (Freeman, 2022). However, it primarily affects younger women (Balaha et al., 2010). A study reviewed across many published studies stated that PMS was most prevalently reported among the age group of 20 to 24 (Salem et al., 2020). Thus, most undergraduate students are around the most prevalent age range for PMS. Several studies of the prevalence of PMS among university students in Middle Eastern countries reported the prevalence differently from each of the other countries, including 63% in Lebanon, 71.9% in Palestine, 80.2% in Egypt, and 92.3% in Jordan (Abu Alwafa et al., 2021). Meanwhile, a recent study in Malaysia reported that the prevalence of PMS exceeded 60% (Azhary et al., 2022).

Since the physical and psychological symptoms can affect daily activities and work efficiency and productivity before menstruation, knowledge about PMS and practice towards relieving PMS are important (Shrestha & Giri, 2020).

Knowledge can directly influence an individual's practice as explained by Knowledge-Attitudes-Practices (KAP) model. This model has frequently been used in health studies to understand and analyse human responses towards a specific phenomenon (De Pretto et al., 2015). In this study, knowledge of PMS includes how a person understands the definition, risk factors, and effective management of PMS.

There are many types of practice for relieving PMS, broadly classified into pharmacologic and non-pharmacologic interventions. The goal of the practice or treatment is to eliminate PMS symptoms, reduce the PMS symptoms' impact on daily activities and interpersonal relationships, and minimize the adverse effects of treatment (EL-Hamid et al., 2013).

## **1.2 Problem Statement**

With the advancement of the medical field, there have been many researchers studying PMS, including the impacts of PMS on women's well-being. PMS can significantly impact women's life from various aspects. One of the impacts is that PMS significantly reduced the quality of life. According to the study, the quality of life in women with PMS was found to be worse across almost all domains of quality of life (EL-Hamid et al., 2013).

Secondly, increased risk for psychiatric diseases was reported as significantly associated with poor physical health and high psychological distress resulting from PMS



(Lee et al., 2022). PMS was reported as one factor causing women to become more vulnerable to depression due to the rapid fluctuation of gonadal hormones during premenstrual. Additionally, high suicide and accident rates were related to PMS (Tolossa & Bekele, 2014).

In education, PMS is also related to poor academic performance, such as low-grade scores in tests and examinations. PMS is also found as a cause of absenteeism in classes and examinations (Shrestha & Giri, 2020).

On the other hand, some studies also found that people have inadequate knowledge about PMS. A recent study revealed that most respondents had inadequate knowledge about PMS, and only very few could answer the questionnaire correctly. This result indicates the need for awareness of PMS (Shrestha & Giri, 2020).

The lack of knowledge about relieving PMS can cause problems, such as wrong medication, adverse effects, drug interactions, drug abuse & dependence (Suaidi et al., 2020). Other studies found a risk of misdiagnosis resulting from a lack of knowledge, not seeking advice from professional healthcare members, the difficulty of the diagnostic criteria, and diagnosis based on the timing of the symptoms (Geta et al., 2020). The treatment approach should have matched the degrees of symptom severity (EL-Hamid et al., 2013).

Practice relieving PMS is important to improve the quality of life among women who suffer from PMS. A study reported that PMS symptoms resolve at varying rates after the onset of menstrual blood flow, in which some women get immediate relief while some get gradual relief. Unfortunately, some severely affected women reported that

premenstrual symptoms occur again shortly after ovulation and that they have only a “good week” each month. When this problem persists for a long time, their interpersonal relationship may also get affected and they may develop a risk for a chronic mood disorder (Reid, 2017). Moreover, a recent study found that 49.4% of university students in Karachi, Pakistan, were not taking any action to relieve PMS (Mohib et al., 2018). This may affect their well-being while suffering from PMS. Therefore, this research studied the practice of undergraduate students to relieve PMS.

### **1.3 Research Questions**

1. What is the level of knowledge about PMS among undergraduate students in Health Campus Universiti Sains Malaysia (USM)?
2. What is the practice towards relieving PMS among undergraduate students in Health Campus USM?
3. Is there any association between level of knowledge about PMS and practice towards relieving PMS among undergraduate students in Health Campus USM?

### **1.4 Research Objectives**

#### **1.4.1 General Objective**

To determine the knowledge about PMS and practice towards relieving PMS among undergraduate students in Health Campus Universiti Sains Malaysia (USM).

### **1.4.2 Specific Objectives**

- i. To determine the level of knowledge about PMS among undergraduate students in Health Campus USM.
- ii. To determine the practice towards relieving PMS among undergraduate students in Health Campus USM.
- iii. To determine the association between level of knowledge about PMS and practice towards relieving PMS among undergraduate students in Health Campus USM.

### **1.5 Research Hypothesis**

#### **Alternative Hypothesis (H<sub>A</sub>):**

There is a significant association between level of knowledge about PMS and practice towards relieving PMS among undergraduate students in Health Campus USM.

### **1.6 Conceptual and Operational Definitions**

Table 1.1 shows the conceptual and operational definitions for the terms that are frequently discussed in this research study.

**Table 1.1:** Conceptual and operational definitions

<b>Terms</b>	<b>Conceptual Definition</b>	<b>Operational Definition</b>
<b>Knowledge</b>	Knowledge refers to having information regarding meaning, causes, risk factors, symptoms, management and consequences (Shrestha & Giri, 2020).	In this study, knowledge was measured using the questionnaire adapted from Suaidi et al. (2020). The level of knowledge was determined by calculating the obtained marks from the questionnaire and categorising accordingly into low, moderate, and high levels of knowledge using Bloom's cut-offs (Suaidi et al., 2020). Respondents were required to answer "True", "False", or "Not sure" to each of the 14 statements.
<b>Practice</b>	Practice means action, rather than thought or ideas. Besides, practice also refers to an action that is frequently performed as a habit, tradition, or custom (Cambridge Dictionary, 2022a).	In this study, practice were measured using a questionnaire formulated by adapting two sources: Mohib et al. (2018) and EL-Hamid et al. (2013). Respondents must answer "Yes" or "No" to each of the 10 practices to determine their practice towards relieving PMS.
<b>Premenstrual syndrome (PMS)</b>	Premenstrual syndrome is clinically significant somatic and psychological manifestations during the luteal phase of the menstrual cycle, leading to substantial distress and impairment in functional capacity (Gudipally & Sharma, 2022).	Respondents were explained on the affective and somatic symptoms of PMS according to the American Congress of Obstetricians and Gynecologists (ACOG) before they answer their practice towards relieving PMS in the questionnaire (Geta et al., 2020).

**Table 1.1:** continued

<b>Terms</b>	<b>Conceptual Definition</b>	<b>Operational Definition</b>
<b>Undergraduate student</b>	It refers to a student studying for their first degree at a college or university. At the same time, another definition gives that student at a college or university who has not yet received a bachelor's degree (Cambridge Dictionary, 2022b).	In this study, undergraduate students included bachelor's degree students from all schools in the research location, Health Campus USM.

### **1.7 Significance of the Study**

This study's findings can help understand the knowledge level about PMS among undergraduate students in Health Campus USM. This is because even though the population is all studying health-related programmes, the level of knowledge will be different from one individual to another resulting from different levels of exposure to the knowledge and different levels of prerequisite knowledge.

Besides that, this study will determine the undergraduate students' practice towards relieving PMS. The study will find out how often they do such treatments or management towards relieving PMS, then can evaluate if their practice is appropriate using evidence-based practice with references from various published studies. It also evaluates their efforts to reduce PMS through the option of "Do nothing", hence their attitude towards PMS can be evaluated here. At the same time, the data can also be used to find the association between the level of knowledge and practice for each type of treatment or management.

When the level of knowledge about PMS is studied, it can indicate the necessity of education about effective PMS management. When their life is free from disturbance of

PMS or the disturbance from PMS is minimal, their academic performance may be further increased along with the improved body comfort level.

Going further beyond the university level, the research result may help to increase awareness among the university community about the symptoms experienced by females, so that the community may be more considerate of female colleagues when they are not energized, unhealthy, or suddenly have a drop in performance. Hence, the research result will benefit university students in terms of their physiological and psychological health.

Additionally, using an infographic about PMS that will be shown at the end of the questionnaire and will be made downloadable by all respondents can increase students' understanding of PMS. They can know the ways to correctly recognize PMS, and act appropriately to manage the PMS by themselves or seek appropriate treatments in clinics or hospitals. When they can handle the PMS, their quality of life can be increased, and they will have a reduced risk of complications from unnecessary or inappropriate treatments to a minimal extent. Providing the correct information on the management of PMS to respondents is also hoped to raise their awareness to seek appropriate treatments if the symptoms they experienced are likely caused by other diseases or health problems mimicking PMS.

## **CHAPTER 2**

### **LITERATURE REVIEW**

This chapter presented the literature review about premenstrual syndrome (PMS) and knowledge and practice towards PMS. Factors that affect knowledge of PMS were also discussed. Before the end of this chapter, the theoretical and conceptual framework of this study were explained.

#### **2.1 Premenstrual Syndrome (PMS)**

##### **2.1.1 Definition of PMS**

PMS has been defined in various ways. According to the American College of Obstetrician and Gynecology (ACOG), PMS is referred to as a cyclical presence of physical and emotional symptoms that may present five days before menstruation and disappear within four days of onset of menstruation for three consecutive cycles, without any presence of organic disease (ACOG Practice Bulletin, 2001).

Meanwhile, Clinical Gynecologic Endocrinology and Infertility defined PMS as cyclical somatic and affective symptoms that occur a few days before menses which can affect work and lifestyle, followed by a symptom-free period (Shamnani et al., 2018). Another definition of PMS is that PMS is a biochemical deficiency syndrome that starts during the luteal phase of the menstrual cycle (Thys-Jacobs, 2006).

##### **2.1.2 Diagnosis of PMS**

ACOG had outlined six affective and four somatic symptoms for PMS. The affective symptoms are depression, angry outbursts, irritability, anxiety, confusion, and

social withdrawal. Meanwhile, the somatic symptoms are breast tenderness, abdominal bloating, headache, and swelling of extremities (Geta et al., 2020).

Few criteria should be fulfilled to diagnose an individual with PMS. Based on ACOG, the individual should present with at least one affective and somatic symptom that occurs five days before menstruation for three consecutive menstrual cycles. Then, the symptoms should cease four days after the onset of menstrual blood flow, and not reoccur until day 13 of the menstrual cycle. The individual should also experience identifiable social or economic performance dysfunction.

Additionally, the symptoms should present reproducibly for two cycles of prospective recording (Pandey et al., 2013). In other words, the symptoms should be confirmed by two prospective cycles with impairment of some facet of women's life (Geta et al., 2020).

The symptoms should present without any influence from pharmacologic therapy, hormone ingestion, drug abuse or alcohol abuse (Pandey et al., 2013). The symptoms should also not be caused by other organic diseases (Buddhabunyakan et al., 2017). PMS must also be differentiated from simple premenstrual symptoms such as breast tenderness and abdominal bloating at a severity that does not interfere with daily functioning, and they are recognized as normal symptoms in an ovulatory cycle (Dickerson et al., 2003). PMS can only be proven after other diagnoses that can mimic the symptoms of PMS have been ruled out (Geta et al., 2020).

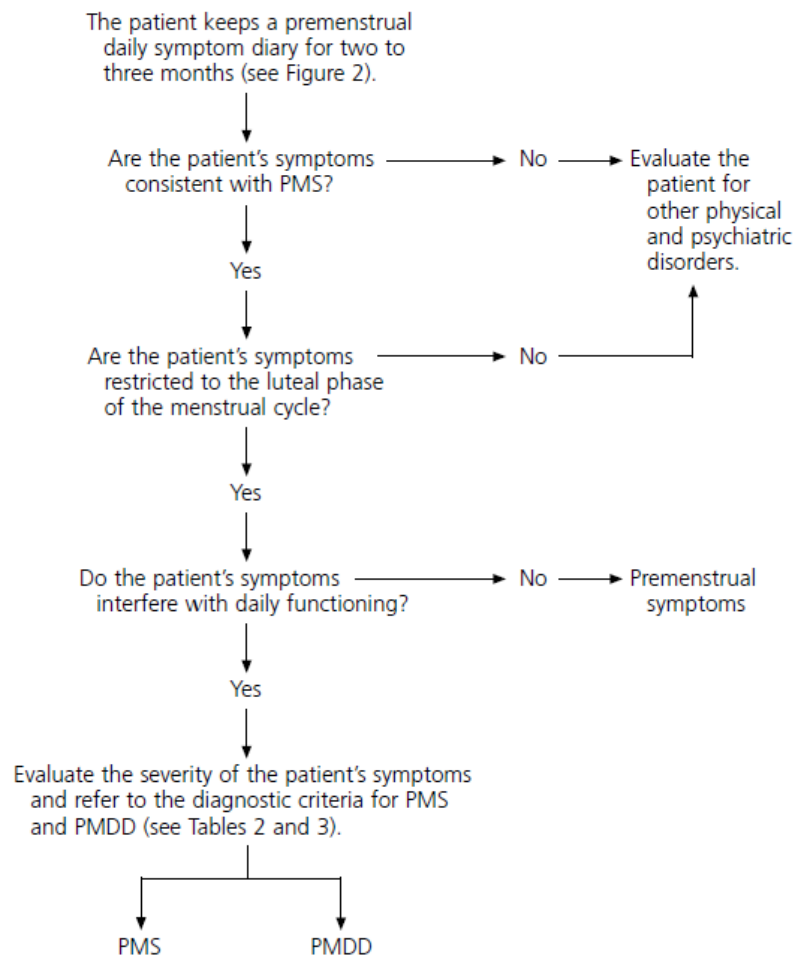
Some differential diagnoses of PMS need to be ruled out in diagnosing an individual as having PMS. For example, dysmenorrhea, endometriosis, hypothyroidism, anemia,



affective disorder (depression, anxiety, panic disorder, dysthymia), eating disorder (anorexia, bulimia), personality disorder, and perimenopause (Dickerson et al., 2003).

The algorithm for diagnosing PMS, premenstrual symptoms, and PMDD had been published by Dickerson and colleagues in the American Family Physician journal and was adopted as the following figure (Figure 2.1) (Dickerson et al., 2003). It gives a clearer outline of the diagnosis pathway for PMS.

### Diagnosis of Premenstrual Symptoms, PMS, and PMDD



**Figure 2.1:** Algorithm in diagnosing premenstrual symptoms, PMS, and PMDD (Dickerson et al., 2003)

### **2.1.3 Pathophysiology of PMS**

PMS has a complex and poorly understood pathophysiology (Gudipally & Sharma, 2022). It is believed that hormonal fluctuations that take place following ovulation are what cause PMS (Rapkin & Akopians, 2012). Towards the end of the menstrual cycle, the levels of estrogen and progesterone decrease, subsequently giving rise to physical and emotional symptoms of PMS (Watson, 2019).

It has been suggested that the main factor causing PMS is progesterone (Geta et al., 2020). Too little or decreasing levels of progesterone have been suggested to be one of the causes of PMS (Ford et al., 2012). Progesterone and progesterone-derived neuroactive steroid, which is allopregnanolone, will bind with the brain's gamma-aminobutyric acid (GABA) receptor. This will change the receptor configuration, causing it to be resistant to further activation and finally decrease the GABA receptor's sensitivity to GABA (Rapkin & Akopians, 2012). When these hormones bind with GABA, it will affect the functions of GABA as the main inhibitory neurotransmitter which is necessary for regulating stress, anxiety, alertness, and seizure. When the sensitivity of the GABA receptor decreases, the serotonin level will also decrease, and this can lead to PMS symptoms (Geta et al., 2020).

Besides that, a decrease in estrogen level is also found to be related to PMS. Estrogen is the body's natural mood stabilizer and antidepressant, in which any drop in estrogen levels will negatively impact mood.

Additionally, a decrease in estrogen also causes a decrease in the production of serotonin. Estrogen is necessary for serotonin production (Cebulak, 2019). Serotonin is a

neurotransmitter that plays a significant role in regulating mood, sleep cycle, and appetite. The lowering of serotonin can give rise to symptoms such as sadness and irritability, sleeping difficulties, and unusual food cravings (Watson, 2019). This is also due to serotonin acting as a positive regulator of GABA-GABA receptor interaction because serotonin can enhance and improve the effects of GABA (Gilette & Lener, 2021).

The symptoms of PMS will improve when the levels of estrogen and progesterone increase again, which usually happens a few days after the onset of menstruation (Watson, 2019).

#### **2.1.4 Factors contributing to PMS**

The exact causes of PMS remain is remained unknown.

One of the factors contributing to PMS is the biological factors, for example, age, reproductive and menstrual history (Omar et al., 2009). Besides, PMS is also found to correlate to parity, pregnancy, menopause, and inhibition of ovulation (Tenkir et al., 2003). PMS is also related to age at menarche, prolonged menstrual cycles, and being sexually active (Geta et al., 2020).

PMS is related to parity (Tenkir et al., 2003). The PMS may recommence or occur for the first time after childbirth due to the influence of postnatal depression, which causes a more severe PMS (National Association for Premenstrual Syndromes, 2022). The symptoms of PMS may become more severe along with increasing parity, particularly for symptoms such as irritability, decreased interest, changes in appetite and hypersomnia. Meanwhile, other symptoms such as anxiety, depressed mood, mood swings and physical symptoms were found not affected by parity (Sylvén et al., 2013). In contrast, PMS

symptoms may fade with pregnancy due to the more stable hormone levels during pregnancy (National Association for Premenstrual Syndromes, 2022; Tenkir et al., 2003).

PMS is also found to be significantly associated with a family history of PMS (Seedhom et al., 2013). Individuals will be at higher risk for PMS if their mother or sisters suffers from PMS (Freeman, 2022). Besides, hip circumference and BMI were also found to be associated with PMS (Rad et al., 2018).

PMS is found to be related to affective state (Omar et al., 2009). Research findings reported that stress such as stress from heavy duties is one of the factors causing PMS (Geta et al., 2020). Other research reported that PMS is more prevalent and more severe in women of high-level educated compared to low-level educated, which has a possible association with stress (Tenkir et al., 2003).

Other research findings found that PMS is associated with sociodemographic factors such as age, marital status, and living region. Parent's income and previous history of depression were also associated with premenstrual syndrome (Geta et al., 2020).

Dietary pattern is also one of the factors leading to PMS. A study showed that eating fried foods, sweet drink, fast food, and fruit has a significant positive relationship with PMS (Rad et al., 2018). PMS is also found to be significantly associated with habitual excess consumption of coffee (Seedhom et al., 2013). Nutritional deficiency is also found to be related to PMS. For example, deficiencies in vitamins B6, B1, and A or minerals such as magnesium and calcium may result in PMS (Rad et al., 2018).

In the context of lifestyle factors, it is reported that both women with extremely low and high physical activity levels had a higher rate of PMS symptoms, which are 27.6%

and 23.3% respectively, compared to women with normal physical activity level at 12% (Morino et al., 2016).

Physical inactivity is significantly associated with PMS (Seedhom et al., 2013). It is reported that the severity of PMS decreased in 3 months after starting an exercise regimen. This is because physical activity possesses biological connections with endorphin levels, decreased sex hormone levels, improved muscle oxygenation, and decreased cortisol levels (Kroll-Desrosiers et al., 2017). Another study explained that women with a low level of physical activity experience PMS due to the lack of beneficial effects given by physical activity, which are helping in venous blood return through the repetitive contractions in aerobic exercises, as well as reducing pain and discomfort in the back, pelvis, and abdomen by decreasing the local concentration of prostaglandins and other inflammatory substances (Morino et al., 2016).

Meanwhile, other studies reported that PMS may also associate with high physical activity. It is suggested that excessive physical activity may cause an increase in fatigue and stress, hence may contribute to the onset of PMS (Morino et al., 2016). A study in Japan also reported the relationship between high physical activity and PMS because a high prevalence of PMS symptoms was reported among female athletes. It is found that the intense workload and severe stress are the factors that contribute to their PMS symptoms (Takeda et al., 2015).

Other than that, smoking is also found related to PMS (Seedhom et al., 2013). It is reported that tobacco can affect the regulation of sex hormones including estrogens, progesterone, androgens, and the regulation of gonadotropic hormones (Fernández et al., 2019). Among women with chronic cigarette smoking, the level of serum estradiol is

lower during the luteal phase, while there are higher levels of progesterone, serum androgens and their 5 $\alpha$ / $\beta$ -reduced metabolites (Dušková et al., 2012).

Oral contraceptive use is also found to be causing PMS because the progestogens in some hormonal contraceptives are thought to adversely affect the GABAergic system (Rapkin & Akopians, 2012). A study reported a slightly increased risk of developing PMS symptoms among women with current oral contraceptive use, probably because women with oral contraceptive use are more likely to be depressed, and depression is one of the somatic symptoms of PMS (Akoku et al., 2020).

### **2.1.5 Symptoms of PMS**

PMS occurs during the menstrual cycle's luteal phase, the time between ovulation and menstruation (Kumari & Sachdeva, 2016). It is a cyclical syndrome marked by physical, psychological, and behavioural changes that significantly impair social interactions and daily activities (Arif, 2016).

Generally, PMS symptoms include affective symptoms of depression, angry outbursts, irritability, anxiety, confusion, and social withdrawal; as well as somatic symptoms of breast tenderness, abdominal bloating, headache, and swelling of extremities (Geta et al., 2020). After the onset of menstruation, these symptoms will disappear spontaneously (Yesildere Saglam & Orsal, 2020).

A recent study among medical students of Universiti Malaysia Sabah (UMS) reported the percentages of each symptom experienced by the participants according to the ACOG diagnostic criteria. The reported symptoms and the percentages of occurrence from the highest to the lowest sequence were irritability (60.2%), breast tenderness

(57.7%), angry outbursts (48.8%), abdominal bloating (46.8%), depression (45.3%), anxiety (39.8%), headache (27.4%), social withdrawal (23.9%), confusion (18.4%), and swelling of extremities (2%). Among the reported symptoms, symptoms including headache, confusion, irritability, social withdrawal, anxiety and swelling of extremities were significantly associated with PMS (Thwin et al., 2015).

Similar percentages were reported by another study in Malaysia, in which the frequently reported PMS symptoms were body ache (75.3%), abdominal pain (75.3%), irritable feeling (63.9%) and breast discomfort (61.4%) (Omar et al., 2009).

Another recent study reported that the participants almost equally presented somatic and psychological symptoms with PMS. The most common somatic symptoms are abdominal bloating, breast tenderness, headache, and weight gain. Meanwhile, the most common psychological symptoms were irritability, fatigue and changes in appetite, depressed mood, mood swings, and anxiety (Chumpalova et al., 2020).

Other than that, over 150 physical and behavioural symptoms associated with PMS have been recorded, and most women suffer at least one symptom throughout their lives. The symptoms that are most frequently reported include headache, irritability, backache, insomnia, cramps, fatigue, forgetfulness, difficulty concentrating, and food cravings (Tempel, 2001).

## **2.2 Knowledge about Premenstrual Syndrome**

Knowledge is a theoretical construct that comprises precise and in-depth information such as causes, risk factors, symptoms, and treatments. It is important in the adoption of healthy behaviours (Rincón Uribe et al., 2021).

### 2.2.1 Factors influencing knowledge about PMS

The knowledge level of PMS can vary from person to person due to many factors. A study about knowledge of PMS reported that age ( $p = 0.038$ ) and educational level ( $p = 0.044$ ) are associated with PMS knowledge, whereby this study had used  $p$ -values  $<0.05$  considered “statistically significant” (Arif, 2016).

Another study reported that age and knowledge of PMS were statistically significant ( $p <0.05$ ). Females aged between 23 and 30 years have a significantly higher proportion of knowledge of PMS compared to females between 17 and 22 years old (Teotia et al., 2020). Another study about knowledge of PMS shows that a higher level of knowledge has been reported in participants of older age, grade (year of study), and from a single-parent household (Borjigen et al., 2019).

Meanwhile, participants with a home address in rural were reported to have a slightly higher mean score of level of knowledge than participants with a home address in urban (Borjigen et al., 2019). The source of information is also important in the accurate acquisition of knowledge. A study shows that a mother is the common source of menstrual-related information (Borjigen et al., 2019). The source of information on PMS is also reported by another study, in which the sources include mothers, sisters, grandmothers, peers, books and newspapers, and mass media (internet and television) (EL-Hamid et al., 2013). Other than that, a study reported a significant association between the knowledge of PMS and ethnicity at ( $p=0.037$ ) (Shrestha & Giri, 2020).

The sources of knowledge of PMS can be varied. A study among adolescent girls reported that 10% of them receive information about PMS from health workers, 16.67%



of them receive information from mass media, and 28.33% of them obtain information from books (Shwetha Rani et al., 2021). Meanwhile, another study among female employees in Egypt reported that the mother is the most common source of information about PMS (EL-Hamid et al., 2013).

### **2.3 Practice towards Relieving Premenstrual Syndrome**

Treatment goals for PMS are to eliminate symptoms, reduce their impact on activities and interpersonal relationships, and minimize the adverse effects of treatment (EL-Hamid et al., 2013).

Treatments of PMS should be carried out according to its severity. For example, mild symptoms can be relieved through lifestyle modifications, while treating moderate symptoms may require medications, dietary supplements, and lifestyle modifications. All PMS patients should initially be offered nonpharmacologic treatments. PMS patients should not be provided medications unless the symptoms of PMS persist after the nonpharmacologic treatments have been carried out (Dickerson et al., 2003).

Surgical treatment such as hysterectomy plus bilateral oophorectomy should not be considered as a usual treatment for PMS because it is irreversible and it possess considerable risks unless the patient is severely affected, fails in responding to other therapies, and is having significant gynecologic problems (Dickerson et al., 2003).

Although there are many interventions to relieve PMS, a study of PMS among university students shows that 49.4% of participants answered “Do Nothing” when experiencing PMS (Mohib et al., 2018). Another study in Malaysia reported that 59.5% of participants did not seek treatment when facing PMS (Omar et al., 2009).

### **2.3.1 Non-pharmacological interventions**

Several non-pharmacological interventions could be performed and they have been shown effective in relieving PMS. According to a study among Malaysian community pharmacists, the most frequently recommended interventions by themselves to their customers to manage PMS are such as eating a healthy and balanced diet (75.7%), resting and sleeping more (74.6%), doing more exercise (69.1%), consult the doctor if the symptoms persist (69.1%), avoid caffeine and alcohol (68.0%), and avoid stressful situations (56.9%) (Suaidi et al., 2020).

#### **2.3.1.1 Vitamin and mineral supplements**

Vitamin and mineral supplements are believed to be effective in relieving PMS symptoms. Studies showed that women eating vitamins- or minerals-rich diets have a lower incidence of PMS. This is because vitamins and minerals such as vitamin D, calcium, vitamin B, and magnesium are important in the synthesis of neurotransmitters and in maintaining hormonal balance (Kaewrudee et al., 2018). According to a study in Malaysia, approximately 19% of women took vitamins to reduce PMS (Omar et al., 2009).

Firstly, vitamin D and calcium are recommended low-risk nutrients to relieve PMS symptoms (Abdi et al., 2019). According to a study, during the luteal phase of the menstrual cycle, an increase in ovarian steroid hormone concentrations and a deficiency of vitamin D in the body would cause disturbance in calcium-regulating hormones, thus causing calcium deficiency (Kaewrudee et al., 2018). The low serum levels of vitamin D and calcium resulted in PMS symptoms. Hence, vitamin D and calcium intake through diet intake or supplementation can restore the deficiencies in serum and relieve PMS

symptoms (Abdi et al., 2019). Another study also found that adequate vitamin D and calcium supplementation often relieve most PMS symptoms (Thys-Jacobs, 2006). Few studies showed that women who took 1200 mg of calcium a day experienced a significant reduction in their symptoms of depression, water retention, pain, fatigue and insomnia (Omar et al., 2009). Another study also concluded that taking daily calcium can prevent premenstrual symptoms such as water retention, mood swings and cramps (EL-Hamid et al., 2013). Another study by Bertone-Johnson in 2005 found that the risk ratio of developing PMS among women with high and low vitamin D and calcium intake are 0.59 and 0.70, respectively (Kaewrudee et al., 2018).

Besides, vitamin B significantly reduces PMS symptoms (Omar et al., 2009). This is because vitamin B is required in serotonin metabolism, which converts tryptophan amino acid to serotonin and produces active substances involved in serotonin metabolism. Therefore, when vitamin B is deficient, serotonin production is hindered, making an individual more vulnerable to mood disturbances related to PMS (Lewis et al., 2013). A study showed that women with a high dietary intake of vitamin B have a lower risk for PMS than women with a low dietary intake of vitamin B (Chocano-Bedoya et al., 2011). Other research findings showed that 50 to 100 mg of vitamin B6 effectively produces relieving effects towards PMS (Omar et al., 2009). Another study reported that vitamin B6 effectively reduces bloating, irritability, and sugar cravings during premenstrual (EL-Hamid et al., 2013).

Next, magnesium is also found to be effective in reducing PMS symptoms, and its effects increase when taken with vitamin B6. A study found that combining magnesium and vitamin B6 can significantly reduce water retention and pain in PMS. However,

according to the study, the therapeutic effects of magnesium or a combination of magnesium with vitamin B6 require at least two months. A shorter or higher dose of treatment with magnesium is ineffective in relieving the PMS symptoms because the excessive magnesium load in the body will be excreted in the form of urine (Fathizadeh et al., 2010).

Besides, according to studies, vitamin E is found effective in reducing physical and mental symptoms of PMS (Mandana & Azar, 2014). The effects of vitamin E supplementation towards PMS had been evaluated in a single double-blind trial and the result showed that physical and affective symptoms of PMS significantly reduced when vitamin E was taken at 400 IU per day for three cycles. However, vitamin E improves PMS not via correction of vitamin E deficiency because women with PMS are not deficient in vitamin E, but via other mechanisms (Bendich, 2000). A study suggests that vitamin E may reduce oxidative stress-mediated inflammation, and thus may possess an effect in treating PMS (Frankel et al., 2021).

### **2.3.1.2 Dietary modifications**

Dietary modification is a common method recommended to relieve physical and psychological symptoms of PMS (EL-Hamid et al., 2013). According to a study in Malaysia, 15.8% of women practised a healthy diet to alleviate PMS (Omar et al., 2009). Another recent study reported that diet alteration is practised by 18.5% of female university students (Eshetu et al., 2022).

First is the restriction of salt use, which has been reported to relieve fluid retention, weight gain and breast swelling during premenstrual (Omar et al., 2009). It is

recommended to avoid food high in salt such as junk food and fast foods (EL-Hamid et al., 2013).

Next is the restriction of caffeine. It is often recommended for premenstrual insomnia and irritability (Dickerson et al., 2003). Women with PMS are suggested not to take tea and coffee containing caffeine, especially during premenstrual, to prevent PMS symptoms (EL-Hamid et al., 2013).

Besides, taking small, frequent meals with complex carbohydrates is also recommended to handle premenstrual food binges (Omar et al., 2009). Premenstrual binge eating or compulsive eating often occurs due to high progesterone levels during premenstrual because progesterone stimulates appetite (Hirschberg, 2012; McDermott & Wilson, 2018). A recent study from USM reported that craving for carbohydrate-rich food is associated with estradiol while craving for sweetened beverage intake is associated with progesterone (Krishnan et al., 2016). Another reason for premenstrual food binges is the decreased serotonin levels during premenstrual, causing an increased craving for serotonin-releasing foods, which are often high in carbohydrates, sugar, and fat (Ryan et al., 2021). Among those food cravings during premenstrual, most food cravings are for chocolate (Lustyk et al., 2011). This is because chocolate contains tryptophan, which helps release serotonin in the brain, improving mood (Carreras, 2020). Therefore, diet control is important to prevent compulsive eating patterns. Eating food with complex carbohydrates and fibres that provide longer satiety effects, such as green vegetables, nuts, brown rice, dried beans, and so forth is advised. Fibre-rich foods are also found to help in restoring estrogen levels. It is also recommended to increase water intake (EL-Hamid et al., 2013).