Prevalence and Associated Factors of Premenstrual Syndrome Among Secondary School Students in Ma'een District, Sana'a City (2024-1446)

Research Submitted to community medicine departement in Partial Fulfillment of the Requirements for the Bachelor's Degree in G. Medicine,and surgery Faculty of Medicine and Health Sciences, Emirates International University.

Researcher

- **Gehan Galal Murshed Ali Almaamari**
- **Asmaa Abdo Thabet Al Gamal**
- **Elham Mabrook Mohammed Mosed**
- **Amt Rahman Abdullah Mohammed Bojali**
- **Thana Abdu Alhafid Hassan Alshamiree**
- **Hindia Yaheya Esmail Ataa**
- **Nadia Mohammed Abdulwally Haider Alsnawi**
- **Amal Mohammed Saleh AL Jabr**

- **Leena Abdullah Saleh Al-Juaid**
- **Asma'a Mahdi Qassem Dobis**
- **Rohima Abdulraheem Ali Alqady**
- **Rosa Mustafa Mohammed Abdullah**
- **Nouria Muwaffaq Omar Assani**
- **Amal Adnan Ahmed Ali**
- **Zainab Adel Mohamed Ahmed Alsalehi**

Supervisor

Dr. Abeer Yahya Al-Washali

(2024 ^{AD}-1446^H)

Dedication

To our parents, families, friends, and doctors،

Your endless love, unwavering support, and boundless sacrifices have been the foundation upon which we built our dreams. Your belief in us has been a constant source of strength, guiding us through every challenge and triumph. This achievement would not have been possible without your continuous encouragement and wisdom.

With all our gratitude and infinite love, we dedicate this work to you.

ACKNOWLEDGMENTS

Finally, we dedicate this research to all high school girls who suffer from Premenstrual Syndrome (PMS), and to all those who strive to achieve medical advancements that promise a future filled with hope and healing. We hope this study will serve as a stepping stone and a beacon of light for all the girls affected by PMS in our beloved country, Yemen.

We aspire that this research will shed light on the physical and psychological impacts of PMS on high school students and contribute to finding effective solutions that enhance their daily quality of life. Our goal is for this work to inspire researchers and professionals in both the medical and educational fields to continue investigating this phenomenon and to provide the necessary support to students, thus fostering a healthy and comfortable learning environment that allows them to reach their full potential.

We pray that this study opens new doors for the improvement of young girls' health and well-being, while raising community awareness of the importance of providing them with integrated health and educational care. May this work serve as a guiding light in advancing the understanding of PMS, and in supporting future research and development in this field within our cherished country, Yemen

ABSTRACT

Background: Premenstrual syndrome(PMS) is a recurring condition marked by both physical and emotional symptoms that usually manifest in the days preceding menstruation, followed by a symptom-free period. Adolescent girls, especially those in secondary schools, are particularly susceptible to these symptoms, which can significantly impact their academic performance and social interactions. Despite its widespread effects, there is limited empirical data on the prevalence and severity of PMS among secondary school girls in Yemen. Enhancing our understanding of these dynamics is essential for effectively addressing the educational and health challenges encountered by this demographic.

Objectives: The purpose of this study is to identify the prevalence of premenstrual syndrome and associated factors among secondary school students in Ma'een District, Sana'a City, Yemen.

Methodology: This study is a cross-sectional study that was be conducted in four secondary schools in Ma'een district, Sana'a city. Eligible students whose parents give consent will be interviewed using a questionnaire. Data collection was commence after obtaining permission and approval from the Faculty of Medicine and Health Sciences at Emirates International University, as well as permissions from the schools and parental consent from the students. The results of this study was provide valuable information regarding the prevalence and associated factors of premenstrual syndrome among secondary school students.

Result: Four handred female secondary school students in Ma'een District, Sana'a City, Yemen, to determine the prevalence of premenstrual syndrome (PMS) and associated factors. The prevalence of PMS was high at 98.1%, with symptom severity distributed as severe (34.3%), moderate (41%), mild (18.8%). Significant associations were found between PMS severity and factors such as age (p=0.05), academic level (p=0.02), menstrual irregularity (p=0.001), smoking (p=0.001), and painkiller use (p=0.001). PMS interfered with daily routines in 73.3% of participants, highlighting its substantial impact on quality of life. No significant relationships were observed with marital status, mother's education, age at menarche, cycle length, menstrual duration, BMI, chronic diseases, physical activity, chewing Qat or coffee/tea consumption.

Conclusion: This study revealed a high prevalence of premenstrual syndrome (PMS) among secondary school students in Ma'een District, Sana'a City, with most participants experiencing moderate to severe symptoms. Key factors associated with PMS severity included age, academic level, menstrual irregularity, smoking, and painkiller use, while no significant relationships were found with marital status, mother's education, age at menarche, cycle length, menstrual duration, BMI, physical activity, chronic diseases, chewing Qat, or coffee/tea consumption. PMS significantly impacted daily activities, with the majority of participants reporting difficulties in household tasks and school attendance. These findings indicate the need for targeted interventions to handle PMS and its effects on adolescents' quality of life and academic performance.

Keywords: Premenstrual syndrome, secondary school student, associated factors, Yemen.

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

ACOG	American College of Obstetricians and Gynecologists
BMI	Body Mass Index
GABA	Gamma amino butyric acid
GnRH	Gonadotropin-releasing hormone
NSAID	Non-steroid anti-inflammatory drug
OTC	Over-the-counter
PMS	Premenstrual Syndrome
PMSS	Premenstrual symptoms scale
RAAS	Renin-Angiotensin-Aldosterone System
SPSS	Statistical package for the social sciences
SSRIS	Selective Serotonin Reuptake Inhibitors
USA	United States of America
WHO	World Health Organization

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

CHAPTER 1
INTRODUCTION

1.1 Background

(PMS) is characterized by cyclic physical and emotional symptoms that emerge in the days before menstruation and typically resolve within a few days of onset. Defined by the American College of Obstetricians and Gynecologists (ACOG), PMS involves recurring symptoms—unrelated to any organic disease—that appear in the five days before menstruation across at least three prior menstrual cycles. These symptoms fade within four days after menstruation begins and do not return until at least day 13 of the cycle (Núñez-Troconis, 2022).

A physiological rise in prostaglandins contributes to primary dysmenorrhea, a condition marked by painful uterine cramps. Prostaglandins cause uterine muscle contractions to reduce blood flow, leading to uterine hypoxia and cramping. Additionally, the synthesis and release of vasopressin and oxytocin, which increase prostaglandin production and activate pain pathways, also contribute to dysmenorrhea. Menstrual disorders like PMS and dysmenorrhea significantly impact quality of life, often leading to school absences, reduced social engagement, and sleep disturbances (Núñez-Troconis, 2022; Carvallo and Martínez-Núñez, 2021).

PMS symptoms vary widely, encompassing physical symptoms such as fatigue, abdominal bloating, breast tenderness, headache, and swelling of extremities, alongside emotional symptoms like irritability, anger, depression, anxiety, and social withdrawal. Diagnosis requires the presence of at least one physical and one emotional symptom, unrelated to hormone therapy, medication, or substance abuse (Lobo et al., 2016). Young women are particularly affected, as PMS can impair their quality of life, disrupt sleep, and negatively impact both social and academic performance (Armour et al., 2019).

1

Regardless of type, dysmenorrhea severity can lead to debilitating symptoms that recur monthly. Adolescents with moderate to severe dysmenorrhea may struggle with daily activities and frequently miss school, often resulting in poorer academic performance, which can have long-term effects on productivity and social outcomes. Severe dysmenorrhea has also been linked to reduced academic and athletic achievements ((Al Mulla, Lotfi, and Khamis, 2022).

1.2 Problem statement

Premenstrual Syndrome (PMS) is a prevalent reproductive health issue affecting women worldwide, manifesting in a range of physical, emotional, and behavioral symptoms (Gudipally and Sharma, 2021). Although global research on PMS is extensive, there remains a significant gap in understanding its prevalence and impact among specific demographic groups within Yemen, particularly adolescent girls in secondary schools.

Secondary school girls in Yemen represent a unique cohort with specific socio-demographic characteristics, and they face considerable challenges in managing PMS symptoms. Recent studies have identified disruptions in academic performance, social stigma, and limited access to healthcare services as key issues affecting this group (Armour et al., 2019; Núñez-Troconis, 2022). However, empirical data on the prevalence and severity of PMS among this group is scarce.

Understanding PMS prevalence and severity among this population is critical, as adolescence is a vulnerable period marked by hormonal changes and psychosocial stressors that may exacerbate PMS symptoms. Such factors can negatively impact both academic achievement and psychosocial well-being, underscoring the need for targeted research and interventions.

1.3 Significance of Study:

This study on the prevalence and associated factors of premenstrual

syndrome (PMS) among secondary school students in Yemen is significant for several reasons. Firstly, PMS is a common health issue that can substantially impact adolescents' physical, emotional, and academic well-being, yet it remains under-researched in Yemen. By examining its prevalence, this study contributes essential baseline data that can inform healthcare providers, educators, and policymakers about the extent of PMS among young Yemeni females.

Secondly, understanding the factors associated with PMS, such as lifestyle, psychological stress, and social influences, can lead to better-targeted interventions that improve the quality of life and academic performance of affected students. This study will help identify risk factors and protective measures, supporting efforts to mitigate the condition's impact on adolescents' daily lives.

Furthermore, this research is particularly relevant for public health strategies in Yemen, where young women may face unique social, economic, and cultural challenges that influence health outcomes. Findings from this study can support the development of culturally sensitive health education programs and interventions that address PMS, reduce stigma, and improve access to effective treatment options in school and community settings.

Lastly, this study can serve as a foundation for future research on adolescent health issues in Yemen, encouraging more focused studies on women's health in the region. It contributes to a growing body of literature on the importance of addressing PMS and other menstrual health issues within the context of low-resource settings, fostering a more inclusive approach to global adolescent health research.

1.4 Objectives

1.4.1 General objective :

To identify the prevalence of premenstrual syndrome and associated factors among secondary school students in Ma'een District, Sana'a City.

1.4.2 Specific objectives:

1. To determine the prevalence of premenstrual syndrome among female secondary school students.
2. To determine the association between sociodemographic factors and PMS prevalence.
3. To determine the association between menstrual characteristics and PMS.
4. To determine the association between lifestyle factors and PMS prevalence.
5. To determine the association between body mass index and PMS prevalence.
6. To determine the impact of PMS on daily life.

1.5 Research Questions

1. What is the prevalence of premenstrual syndrome (PMS) among female secondary school students?

2. What is the association between sociodemographic factors and the prevalence of PMS among female secondary school students?

3. What is the association between menstrual characteristics (e.g., cycle length, duration, regularity) and PMS prevalence among female secondary school students?

4. What is the association between lifestyle factors and the prevalence of PMS among female secondary school students?

5. Is there an association between body mass index (BMI) and the prevalence of PMS among female secondary school students?

6. What is the impact of PMS on daily life?

CHAPTER 2: LITERATURE REVIEW

CHAPTER 2
LITERATURE REVIEW

2.1 Overview:

Premenstrual Syndrome (PMS) is a psychneuroendocrine disorder of unknown etiology, commonly observed just prior to menstruation. Symptoms typically manifest in a cyclic manner during the last 7–10 days of the menstrual cycle. Various biological factors are believed to contribute to PMS, including estrogen, progesterone, neurotransmitters (such as gamma-aminobutyric acid and serotonin), and the renin-angiotensin-aldosterone system (RAAS). Symptoms often regress with the onset of menstruation. the general population 15% of women are asymptomatic, 50% have mild premenstrual syndrome symptoms, 30% moderate, and 5–10% severe (Dutta and Hiralal Konar, 2020)

PMS is most commonly reported in women aged 30–45 and may be influenced by factors such as childbirth or significant life events. The symptoms can vary in character and intensity across menstrual cycles but consistently include a symptom-free interval of at least one week. Mood changes are often clustered as irritability, depression, anxiety, tension, mood swings, fatigue, and a lack of motivation. The specific symptoms that women find most challenging can differ based on their cultural background and lifestyle stressors (Collins et al., 2023).

Diagnosis of PMS requires careful evaluation of the timing and pattern of symptoms, verification of a symptom-free period following menstruation, and exclusion of other medical conditions (e.g., migraines, irritable bowel syndrome, bipolar disorder) that may worsen during the luteal phase of the menstrual cycle. The diagnosis is typically confirmed by having the woman maintain a daily symptom diary over three menstrual cycles. This diary not

only aids in diagnosis but also encourages women to engage with their health and recognize their symptoms (Oats, Abraham, and Llewellyn-Jones, 2023).

Establishing a comprehensive medical history and nurturing a strong therapeutic relationship with patients are crucial in managing PMS effectively. This approach promotes trust and facilitates better counseling and support. Exploring lifestyle factors is essential, and women may benefit from suggestions to reduce stress. Regular exercise has been shown to alleviate PMS symptoms. By analyzing symptom charts, healthcare providers can identify predominant symptoms and tailor treatments accordingly. For example, maintaining consistent eating habits during the follicular phase can help prevent overeating or binge eating in the premenstrual period. Various treatments, including medications and natural remedies such as evening primrose oil, Chinese herbal therapies, and progesterone, have been explored for hormone regulation and symptom relief. Additionally, psychological therapy can assist women in managing the emotional challenges associated with PMS (Oats, Abraham, and Llewellyn-Jones, 2023).

2.2 Pathogenesis of Premenstrual Syndrome (PMS):

The pathogenesis of PMS involves a complex interplay between hormonal fluctuations, neurotransmitter dysregulation, and genetic predispositions. Symptoms typically emerge during the luteal phase of the menstrual cycle and vary in severity among individuals. Research indicates that a combination of cyclical hormonal changes and neurotransmitter imbalances underlies PMS symptomatology (Yonkers, O'Brien & Eriksson, 2022).

- **Role of Serotonin**

  Serotonin dysregulation is a primary factor in PMS. Studies have shown that individuals with PMS have significantly lower serotonin levels during the luteal phase, contributing to mood-related symptoms such as irritability, depression, and anxiety (Reed, Levin & Evans, 2023). The effectiveness of

selective serotonin reuptake inhibitors (SSRIs) in alleviating PMS symptoms supports this link, as these medications increase serotonin availability, helping to stabilize mood. Furthermore, tryptophan depletion—a precursor to serotonin—worsens PMS symptoms, while serotonin antagonists can trigger relapse, underscoring serotonin's critical role in mood regulation during PMS (Yonkers, O'Brien & Eriksson, 2022).

- **Influence of Ovarian Steroids**

  Ovarian hormones, particularly estrogen and progesterone, are central to PMS pathophysiology. Symptoms often align with the hormonal fluctuations of the menstrual cycle, especially during the luteal phase. Research suggests that progesterone changes, or disruptions in the estrogen-to-progesterone ratio, may impact neurotransmitter systems like serotonin and GABA, contributing to PMS symptoms (Tschudin, Bertea & Zemp, 2021). However, progesterone levels alone do not fully explain symptom severity. Treatments with gonadotropin-releasing hormone (GnRH) agonists, which suppress ovarian hormone production, have shown to alleviate symptoms in some cases, suggesting hormonal involvement without providing a complete explanation (Reed, Levin & Evans, 2023).

- Genetic and Environmental Factors

  Genetic polymorphisms in hormone receptor genes may influence PMS susceptibility, potentially modifying responses to hormonal fluctuations and impacting central neurotransmitters such as serotonin and GABA, which exacerbate mood symptoms (Tschudin, Bertea & Zemp, 2021). Environmental factors like stress, diet, and lifestyle also play significant roles in symptom severity. These findings underscore the importance of a personalized approach in PMS management, as genetic and lifestyle differences can modulate symptom expression and severity (Tschudin, Bertea & Zemp, 2021).

2.3. The Prevalence of Premenstrual Syndrome (PMS):

The prevalence of PMS varies significantly worldwide, influenced by

cultural, social, and environmental factors, underscoring the need for region-specific data to better understand its impact and associated factors.

2.3.1 Global Prevalence of PMS:

Globally, the prevalence of PMS ranges from 12% to 98%, with a pooled prevalence of approximately 47.8%, as noted in a recent meta-analysis (Bhandari et al., 2023). PMS impacts women's health substantially, affecting work attendance, increasing healthcare expenses, and lowering health-related quality of life. The World Health Organization (WHO) reports that PMS has a particularly high prevalence in Asian countries compared to Western regions, with an estimated 70-90% of women of childbearing age affected (Mbati et al., 2021).

2.3.2 Regional and Country-Specific Prevalence of PMS:

1. Asia:

In China, the prevalence among high school girls is estimated to be around 65%, with academic stress and cultural factors influencing symptom severity (Wang et al., 2023; Zhao et al., 2024).

In India, studies indicate a prevalence of around 50% in Kolkata (Ghosh et al., 2022) and 42% in other areas, with cultural factors significantly impacting symptom reporting (Verma et al., 2024).

Turkey: Among adolescents, the prevalence of PMS is approximately 61.2%, with nearly half reporting moderate to severe symptoms (Akbulut et al., 2024).

2. Europe:

In the United Kingdom, studies indicate a PMS prevalence of about 50% among high school girls, though recent findings in Scotland suggest a slightly lower rate of 40% (Smith et al., 2020; Taylor et al., 2024).

In Germany and Spain, PMS prevalence rates stand at around 40% and 60%, respectively, with studies attributing variations to lifestyle factors like diet and exercise (Weber et al., 2024; Sánchez et al., 2024).

Poland reports a PMS prevalence of 48%, with findings linking symptom severity to lifestyle factors (Jankowska et al., 2024).

3. North America and Latin America:

In California, USA, about 45% of high school students report PMS symptoms (Rosenfield et al., 2021).

In Mexico City, 38% of students report PMS symptoms, and in São Paulo, Brazil, approximately 42% experience PMS (González et al., 2021; Silva et al., 2021).

4. Middle East and North Africa:

In Saudi Arabia, the prevalence of PMS among high school students is estimated at 37% (Salem et al., 2020). Similar rates are reported in Kuwait (38%; Al-Shammari et al., 2022) and Bahrain (37%; Al-Qarbi et al., 2023).

In Jordan, about 50% of students experience PMS symptoms, highlighting the prevalence of this condition in the region (Al-Rousan et al., 2023).

In Iraq, approximately 43% of high school students report PMS symptoms (Al-Shahrani et al., 2022), while in Palestine, about 42% experience PMS (Al-Azzam et al., 2022).

In Lebanon and Egypt, 40% and 38% of high school students, respectively, report experiencing PMS (Kassem et al., 2022; El-Sherif et al., 2022).

In North Africa, studies show varying prevalence rates, with Morocco reporting rates of mild, moderate, and severe PMS at 52.9%, 25.5%, and 21.6%, respectively (Lghoul et al., 2022). In Tunisia, 36% of students report PMS (Ben Salah et al., 2022), while in Sudan, about 45% of high school students experience PMS, with a significant proportion reporting severe symptoms (El-Hadi et al., 2022).

In Yemen, no studies have been conducted to determine the prevalence of PMS among high school students. However, a study carried out among female students at Sana'a University found a prevalence rate of 88(37.3%).

2.4 Factors Influencing Premenstrual Syndrome (PMS):

2.4.1 Socio-demographic Factors:

Age: Studies indicate that PMS prevalence and severity often increase with age among adolescents. For example, Ghamdi et al. (2020) in Saudi Arabia

and Maharaj et al. (2021) in Canada found that the high school girls report PMS symptoms, with severity higher in older adolescents (16-18 years) compared to younger ones (12-15 years). Similar findings were observed in Turkey (Yilmaz et al., 2022), where older teens had more severe symptoms, while Nigerian studies (Suleiman et al., 2023) found no significant age-related differences in PMS occurrence.

Marital Status: Married women in Turkey (Çakmak et al., 2022), and India (Sharma et al., 2023) reported reduced PMS symptoms compared to single women, possibly due to emotional support in marriage. Concurrently, a Jordanian study by Ababneh, Alkhalil and Rababa'h noted more severe symptoms in married women, while Nigerian data by Suleiman et al. (2023) found no association between marital status and PMS.

Household Income: Research reveals that girls from lower-income families report higher PMS severity, attributed to limited access to healthcare and menstrual education. Studies from Saudi Arabia (Al-Ghamdi et al., 2020), Morocco (Lghoul et al., 2022), and California (Smith et al., 2023) identified a significant association between family income and the severity of PMS symptoms.

Family History of PMS: Studies in Saudi Arabia (Salem et al., 2020), and Ethiopia (Momina Ali et al., 2023) show that adolescents with a family history of PMS are significantly more likely to report severe symptoms, pointing to a potential genetic component. Concurrently, an Iranian study by Babapour et al. reported a significant relationship between PMS and the family history of PMS.

Parents' Education: Higher parental education is associated with reduced PMS severity. For instance, in South Korea, students with parents holding advanced degrees were 25% less likely to report severe symptoms (Lee & Choi, 2020). Similarly, a study in Saudi Arabia (Salem et al., 2020) found a connection between maternal education and milder PMS, while Moroccan

studies found no correlation (Lghoul et al., 2022).

Academic Level: Higher educational attainment correlates with lower PMS severity. Studies in the USA and Indonesia, demonstrated that education level significantly influences PMS experiences (Schmidt et al., 2021; D. D. Mbati et al., 2021).

2.4.2 Menstrual Characteristics:

The characteristics of the menstrual cycle—such as cycle length, regularity, flow intensity, and age at menarche—play a significant role in the experience and severity of premenstrual syndrome (PMS). Here's a breakdown of how these factors can affect PMS:

Cycle Length

Short Cycles (<21 days): Women with shorter menstrual cycles often experience more intense PMS symptoms. Shorter cycles have been linked to higher hormonal fluctuations, particularly in estrogen and progesterone, which can intensify PMS symptoms like mood swings, bloating, and breast tenderness (Yi, Kim & Park, 2023).

Long Cycles (>35 days): Longer cycles can also be associated with more severe PMS symptoms, as irregular hormonal fluctuations disrupt the body's natural rhythm, making it harder to predict and manage symptoms (Hernandez et al., 2020).

Cycle Regularity

Irregular Cycles: Studies suggest that those with irregular cycles often experience more pronounced PMS symptoms due to hormonal unpredictability, which affects both physical and psychological symptoms of PMS (Tabassum et al., 2019).

Flow Intensity

Heavy Flow: Women with heavier menstrual flows are more likely to experience severe PMS symptoms, particularly physical symptoms such as abdominal cramping, fatigue, and headaches. This link is thought to be due to higher levels of prostaglandins, which are chemicals that cause pain and inflammation, intensifying symptoms associated with PMS (Frye & Hall, 2017).

Light Flow: While lighter menstrual flows do not eliminate PMS, they are generally associated with milder symptoms, likely because the hormonal fluctuations are less intense (Yazdani et al., 2018).

Age at Menarche

Early Menarche (<12 years): Early menarche has been linked to a higher likelihood of experiencing PMS later in life. This may be because early exposure to fluctuating hormone levels makes these individuals more sensitive to PMS-related hormonal changes (Cheng et al., 2022).

Later Menarche (>14 years): Later onset of menstruation is sometimes associated with fewer PMS symptoms, although the connection varies by individual. Fewer years of hormone fluctuation exposure may reduce PMS symptom severity (Li et al., 2019).

2.4.3 Lifestyle Factors:

Physical Activity: Regular physical activity is linked to reduced PMS severity, with studies from Saudi Arabia (Salem et al., 2020), Canada (Maharaj et al., 2021), and Tunisia (Ben Salah et al., 2022) showing a 25-40% symptom reduction among active teens. However, Jordanian study found no correlation (Ababneh, Alkhalil and Rababa'h, 2023).

Chronic Diseases: Studies in Palestine (Abu Alwafa et al., 2022) and Ethiopia (Chekol et al., 2023), where adolescents with chronic health issues reported no associated with PMS severity.

Smoking: Smoking significantly increases the likelihood of severe PMS symptoms, with studies showing smokers are at a higher risk of severe symptoms. For instance, by Salem et al. (2020) found passive and active smoking were both strongly linked to PMS in Saudi Arabia. Similarly, a study by Garcia et al. (2022) in the USA where smoking was linked to increased PMS severity due to its effects on hormonal regulation and stress levels. Additional research conducted by Ababneh, Alkhalil and Rababa'h (2023) indicated that adult female smokers in Jordan exhibited a significantly higher risk of reporting PMS than non-smokers. This heightened risk may be attributable to the impact of cigarette smoking on the dysregulation of hormones such as estrogen, progesterone, and gonadotropins, all of which play a critical role in the development of PMS.

Dietary Habits: a research by Lghoul et al. (2022) in Morocco suggested that the frequency of sweet consumption is significantly associated with the occurrence of PMS. Additionally, a study by Ababneh, Alkhalil and Rababa'h (2023) found a positive correlation between fast food consumption and psychological symptoms associated with PMS. Notably, coffee consumption did not reveal a statistically significant relationship with PMS symptoms.

Painkiller Use: Many adolescents use over-the-counter (OTC) pain relief for PMS, such as ibuprofen and acetaminophen. Studies from Canada (Brown & Taylor, 2020), and Saudi Arabia (Al-Ghamdi et al., 2020) reported that 30-65% of students engage in self-medication, often without healthcare guidance. Additionally, research by Ababneh, Alkhalil and Rababa'h (2023) demonstrated a significant correlation between PMS symptoms and analgesic use, with approximately 75% of participants in Jordan reporting the use of painkillers during PMS; nearly 45% indicated daily use during their menstrual cycle. Among the painkillers used, 46.8% of participants reported

using paracetamol, while over two-fifths utilized (NSAIDs).

2.4.4 Body mass index

Higher BMI correlates with more severe PMS, as seen in Saudi Arabia (Salem et al., 2020) and Ethiopia (Momina Ali et al., 2023), which underweight individuals were also less likely to report symptoms compared to those classified as overweight.

2.5 Impact of PMS:

Studies show that PMS significantly impacts school performance by causing absenteeism, reduced focus, and impaired social interactions. For instance, research by Persich & Robinson (2022) found that absenteeism can contribute to increased social isolation and weakened peer relationships over time, impacting students' self-esteem and social competence. Suleiman et al. (2023) in Nigeria found that 44.2% of students experiencing PMS-related symptoms like mood swings, headaches, and fatigue reported absenteeism, which negatively affected academic performance compared to students without PMS. The cumulative effect of these academic disruptions can hinder long-term educational outcomes, underscoring the need for supportive measures to help students manage PMS symptoms effectively.

CHAPTER 3: METHODOLOGY

CHAPTER 3

METHODOLOGY

3.1 Study design:

A cross-sectional study was designed to assess the prevalence and associated factors of PMS among adolescent students.

3.2 Study location:

The study took place across four selected girls' schools in the Ma'een directorate, which included 42 public schools, nine of which were specifically secondary schools for girls. The schools chosen were:

- Al-Risala School
- Asmaa Secondary School for Girls
- Salah Al-Din School
- Um Hani School

3.3 Sampling Methods:

3.3.1 Study Population:

The population included all female secondary school students (level 2 and 3) within the study area, who were surveyed between July and August 2024.

3.3.2 Inclusion Criteria:

Female secondary school students (level 2 and 3) who had attained menarche for at least 1 year and had regular menstrual flow for at least the last three consecutive menstrual periods were included.

3.3.3 Exclusion Criteria:

Students who were pregnant, had used contraceptive pills, experienced amenorrhea, or had a documented history of endocrine disorders, autoimmune diseases confirmed through medical consultation and laboratory

investigation, or chronic liver disease were excluded from the study.

3.4 Sample Size:

The sample size was estimated based on a study conducted at Sana'a University among medical students, where the prevalence of PMS was reported 37.3%. The sample size was calculated using this formula:

N = {Z1-α/2² Ṗ(1- Ṗ)} / d²   (Charan and Biswas, 2013)

N : The required sample size.

Z1-α : Critical value corresponding to the confidence level. In this study, the 95% CI was 1.96.

Ṗ : Expected prevalence based on previous research.

d : Desired margin of error,which was 5% (0.05).

The calculated sample size was 360.

3.5 Sampling Technique:

A multi-stage cluster sampling method was employed to enroll participants. In the first stage, one local government area was selected from the ten in Sana'a city. Ma'een district was chosen due to its high population size (602,180), the largest among the districts (Yemen Local Governance Mapping, 2024). From a list provided by the Ministry of Education, which identified 42 public secondary schools in Ma'een district—nine of which were specifically for girls—four schools were randomly selected using a paper ballot. In the final stage, 90 girls who met the inclusion criteria were selected from each of the four secondary schools, with equal allocation across the schools.

3.6 Data Collection:

To gather demographic and menstrual information from participants, a questionnaire was prepared based on premenstrual symptoms scale (PMSS) developed by Padmavathi et al. (2014)

The PMSS consisted of 40 items rated on 5-points Likert-type scale (Never, Rarely, Sometimes, Very Often, Always) and was divided into three subscales: physical, psychological, and behavioral symptoms. Responses were scored as follows: Never = 1, Rarely = 2, Sometimes = 3, Very Often = 4, and Always = 5, resulting in a total score ranging from 40 to 200. The score interpreted as follow:-

1-40 No symptoms.

41-80 Mild symptoms.

81-120 Moderate symptoms.

121-160 sever symptoms.

161-200 very severe symptoms .

3.7 Validity and Reliability of the Questionnaire:

The face validity of the questionnaire items was assessed by presenting the questionnaire to experts, who were asked to evaluate its purpose and identify the constructs they believed it measured. Their feedback helped ensure that the items were relevant, clear, and aligned with the intended constructs.

3.8 Data Analysis:

Statistical analysis was performed using SPSS version 25. Data were processed and summarized as frequencies and percentages. For categorical variables, Fisher's Exact Test was used to assess associations in two-category variables, while the chi-square test was applied for variables with more than two categories. Statistical significance was set at a p-value of $\leq$ 0.05.

3.9 Ethical Considerations:

The study adhered to strict ethical guidelines, beginning with institutional approval from the Faculty of Medicine and Health Sciences at Emirates International University, followed by formal permissions from the Ministry of Education, the Educational Office in Bayt Ma'yad, and the Ma'in directorate. Each participating school provided consent, and students were required to obtain permission from their parents before participation. Verbal informed consent was then obtained from each student, who was briefed on the study's objectives and assured of the confidentiality of their responses. This careful approach ensured that participants' rights and privacy were protected throughout the study.

CHAPTRE 4: RESULTS

CHAPTER 4

RESULTS

The study included 400 female secondary school students aimed to determine the prevalence of premenstrual syndrome (PMS) and identify its associated factors.

4.1 Sociodemographic Characteristics of Participants:

A total of 400 students participated in this study, distributed as follows: Umm Hani School (25%), Asmaa School (25%), Salahalden School (24.5%), and the largest group from Al-Risalah School (25.5%) (Table 4.1).

Table 4. 1 The distribution of participants according to schools

School	Frequency	Percentage
Umm Hani	100	25.0%
Asmaa	100	25.0%
Al-Risalah	102	25.5%
Salahalden	98	24.5%
Total	400	100.0%

4.1.1 Age Participants: The mean participant age was 16.9 ± 1.1 years, ranging from 15 to 23, with the majority (62.5%) over 16 years old (Figure 4.1).
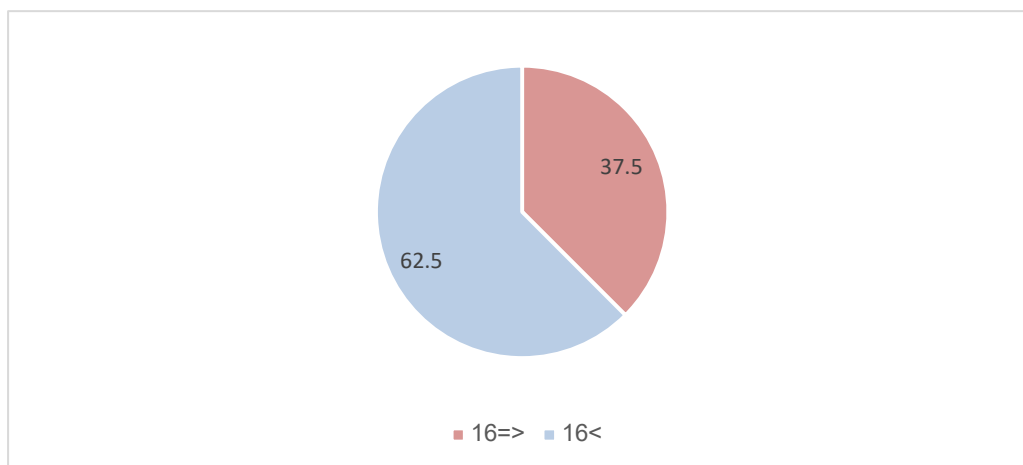
Figure 4. 1 Age of Participants

4.1.2 Academic Level of Participants: Most students were in level 2 (52%), with 48% in level 3 (Figure 4.2).
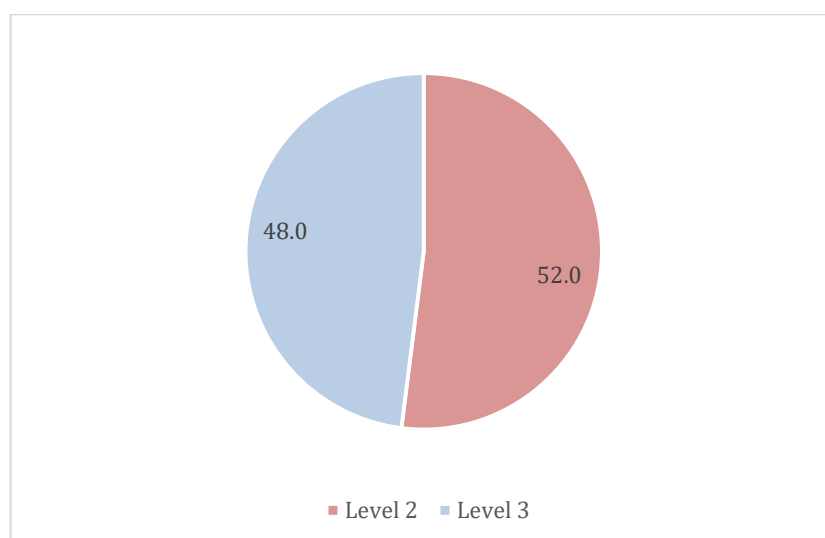
Figure 4. 2 Academic Level of Participants

4.1.3 Marital Status : Regarding marital status, 99% were single, and 1% married (Figure 4.3).
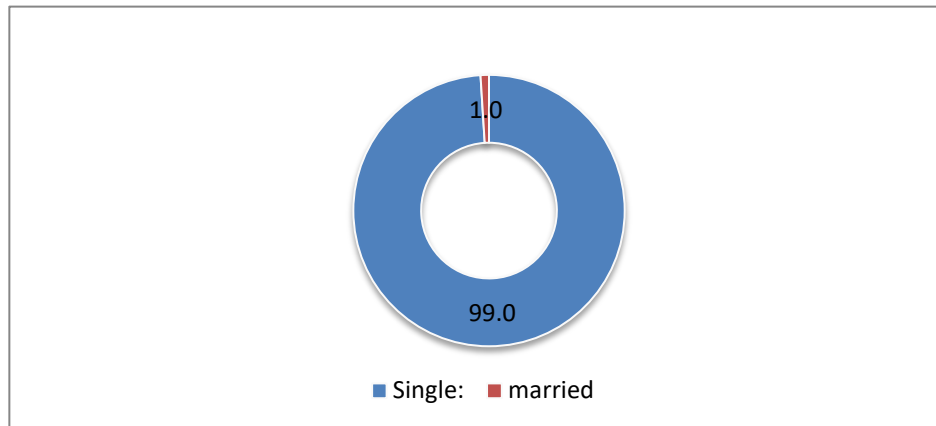
Figure 4. 3 The Marital Status of Participants

4.1.4 Mother's Education : Educated mothers accounted for 70.5%, while 29.5% were uneducated (Figure 4.4).
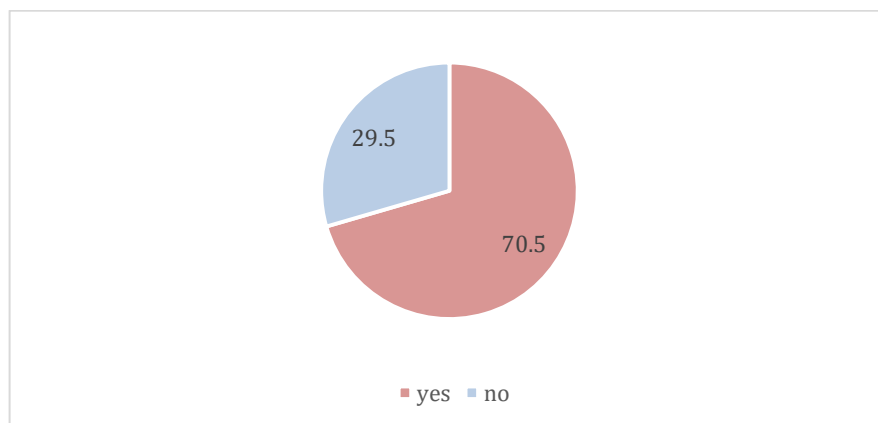
Figure 4. 4 Mother's Education

4.2 Characteristics of the Menstrual Cycle among Participants:

4.2.1 Regularity of Menstruation:

The study found that (59%) of the students reported having a regular menstrual cycle, while (41%) experienced irregular cycles (Figure 4.5).
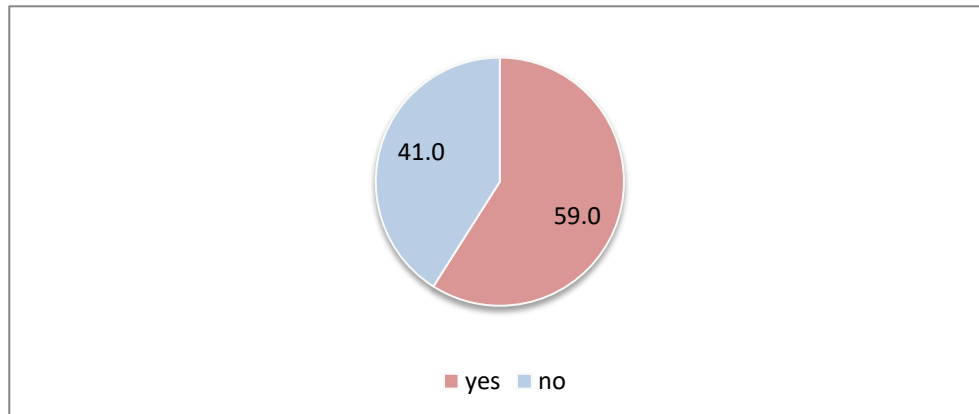
Figure 4. 5 Menstrual Regularity among Participants

4.2.2 Age of Menarche:

The distribution of menarche age among students shows that the most common age group was 14-15 years, with (53.5%) of students reporting menarche during this period. Additionally, (34.3%) of students experienced menarche at 12-13 years. A smaller percentage,(7%), reported menarche at 16-17 years, while (5.3%) reached menarche earlier, at 10-11 years (Figure 4.6).
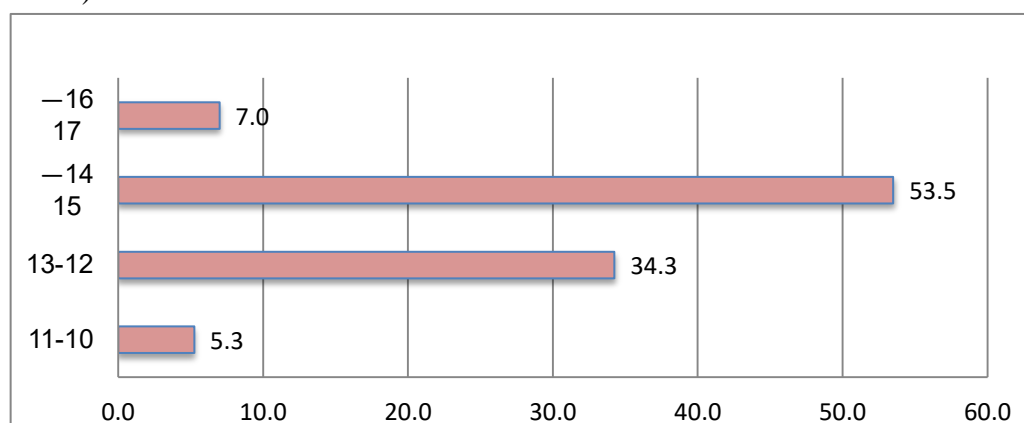
Figure 4. 6 Age of Menarche

4.2.3 Menstrual Duration:

This study provides a detailed overview of menstrual duration among the students sampled. According to the findings, (75.8%) of students reported that their periods typically last between 3-7 days. Meanwhile, (12.3%) experienced longer durations, with menstrual cycles exceeding 7 days, and another (12.0%) had shorter cycles lasting less than 3 days Table (4.2).

Table 4. 2 Menstrual Duration

How many days does your period last?	Frequency	Percent
Less than 3 days	48	12.0%
3-7 days	303	75.8%
More than 7 days	49	12.3%
Total	400	100.0%

4.2.4 Cycle Length:

The data shows that the majority of students (55.0%) have a menstrual cycle length between 21-35 days, indicating this is the most common range. In contrast, (32.0%) of students reported shorter cycles of less than 21 days, while only (13.0%) had cycles exceeding 35 days (Figure 4.7).
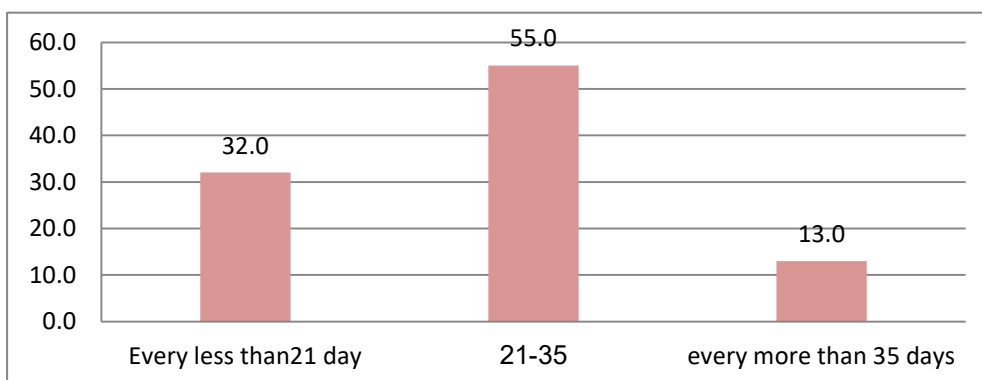
Figure 4. 7 Cycle Length

4.3 Characteristics of Lifestyle among Participants:

4.3.1 Coffee or Tea Consumption:

This study assessed lifestyle factors, including coffee or tea consumption among participants the results indicate that (52.3%) of the participants reported , frequent consumption of tea\coffee , while the remaining (47.8%) were not regularly consumed it as shown in (Figure 4.8).

4.3.2 Smoking:

The data also highlights smoking habits among the study population, revealing that (19.8%) of participants identified as smokers (Figure 4.8). Among these, (88.6%) were shisha smokers (Figure 4.9).
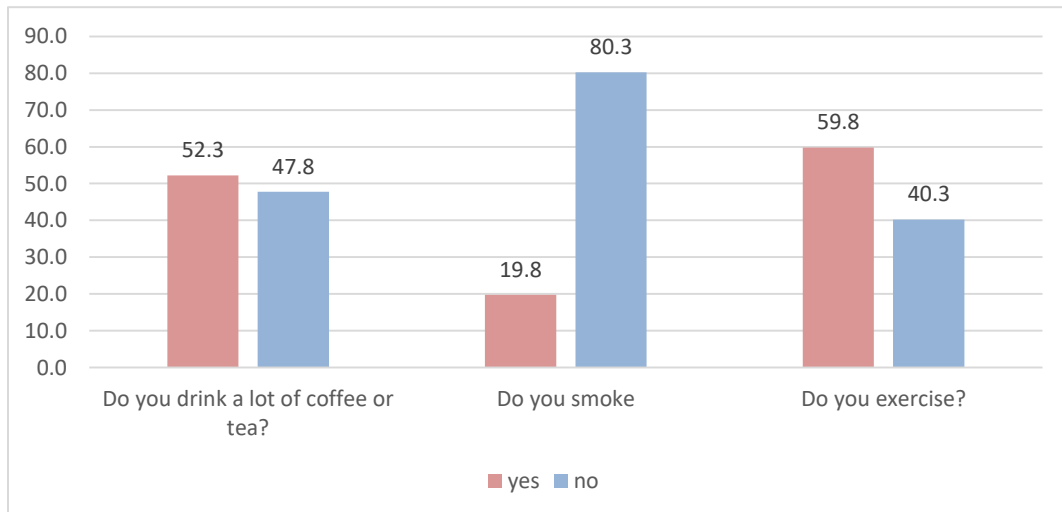
Figure 4. 8 Lifestyle Factors
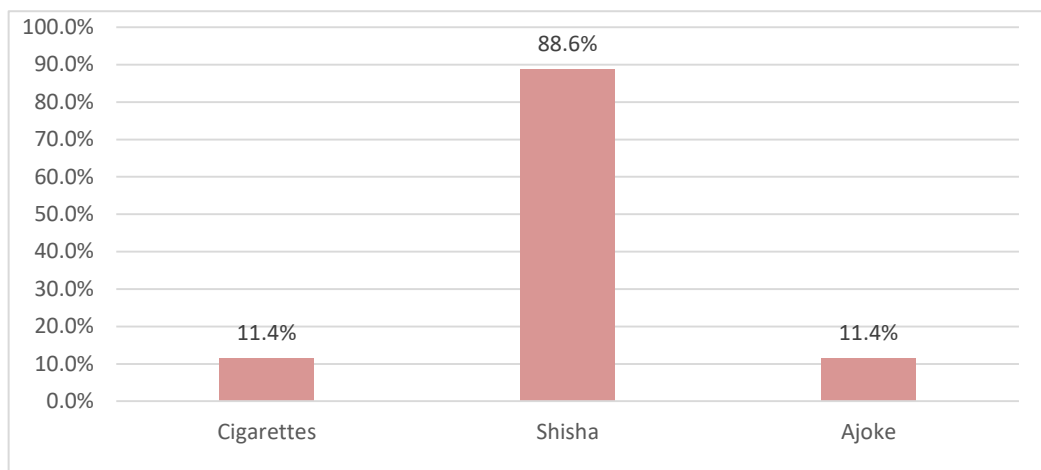
Figure 4. 9 Type of Smoking

4.3.3 Physical Activities:

The data on physical activity among participants reveals varied exercise habits. Most participants (59.8%) reported engaging in exercise (Figure 4.8). Of these, (54%) exercised 3 or more times per week, while (46%) exercised 1–2 times weekly (Figure 4.10). Additionally,(66.1%) exercised for less than 30 minutes per session, whereas (33.9%) exercised for more than 30 minutes Table(4.3).
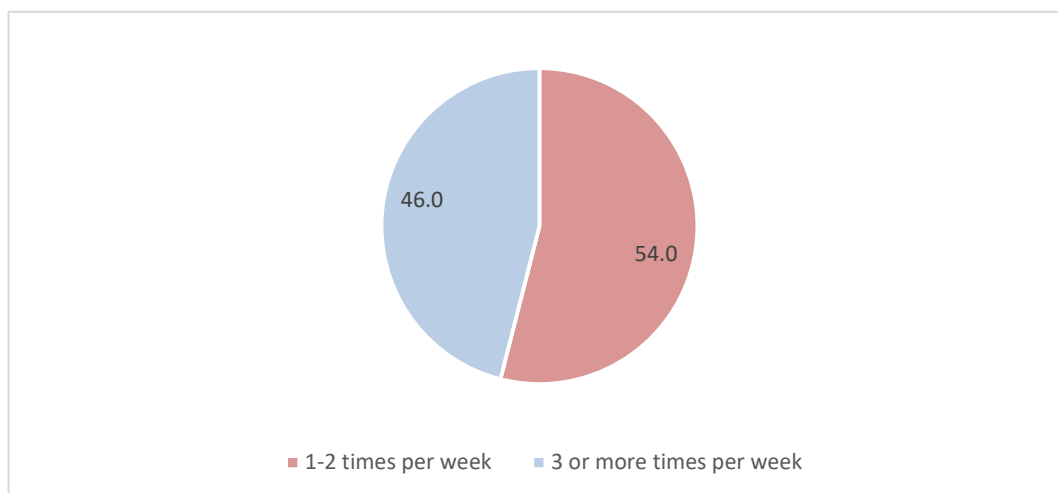
Figure 4. 10 Distribution of Exercise Frequency

Table 4. 3 Exercise Duration

If you practice sports, how much time do you spend exercising	Frequency	Percent
Less than 30 minutes per day	158	66.1%
More than 30 minutes per day	81	33.9%
Total	239	100.0%

4.3.4 Qat Chewing:

This study found that (59%) of participants had never chewed qat, (24.8%) chewed it rarely, and (11.3%) chewed it occasionally. Only (5%) of students reported chewing qat regularly, as shown in(Figure 4.11).
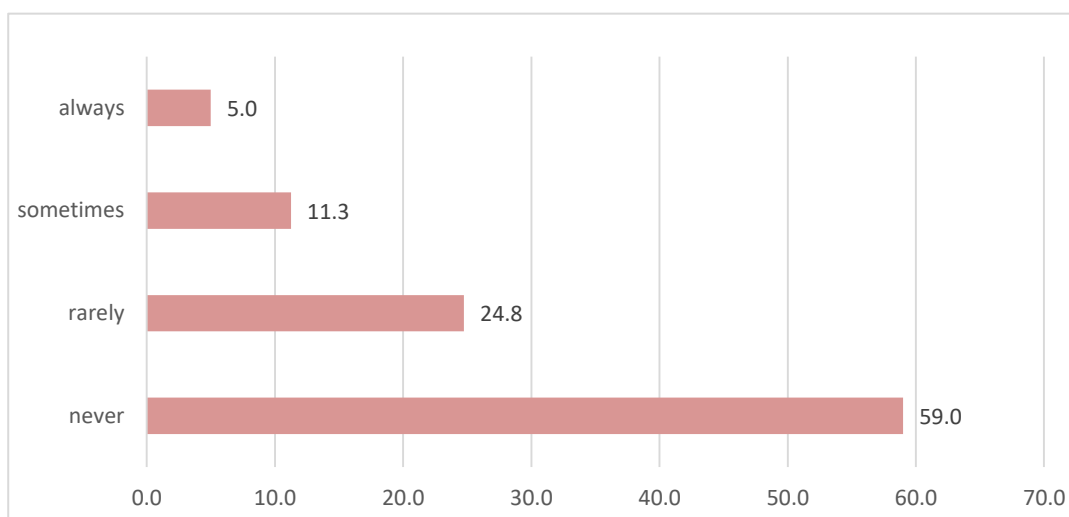
Figure 4. 11 Qat Chewing Among Participant

4.3.5 Chronic Diseases:

The data shows that most participants (95.2%) reported no chronic health conditions, suggesting a generally healthy profile within the sample. A small portion, however, reported specific chronic conditions:(4.3%) were affected by asthma, and (0.5%) had diabetes Table (4.4).

Table 4. 4 Chronic Diseases Among Participants

Do you suffer from any chronic physical or mental illness	Frequency	Percent
Diabetes	2	0.5%
Asthma	17	4.3%
none	381	95.2%

4.3.6 Painkiller Use:

This study found that (52.5%) of participants do not use any method for pain relief, while (30.3%) rely on medications like Panadol, Amol, and Diclofenac. Additionally, (27.3%) use natural herbs such as thyme, anise, marjoram, and ginger. Furthermore, (3.3%) take vitamins, such as Vitamin D, and (1.3%) use other methods, like a warm water bag (Figure 4.12).
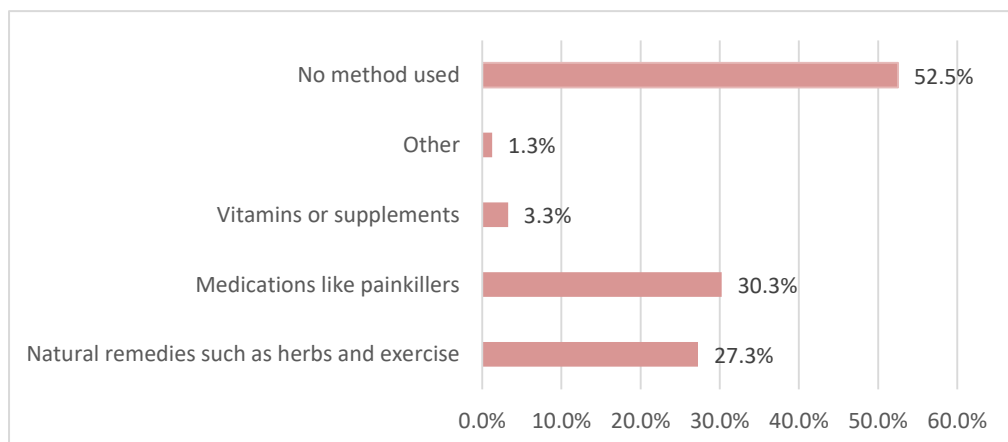
Figure 4. 12 Approaches to Mitigate Symptoms

4.4 Body Mass Index of Participants:

According to this study, (61.8%) of participants had a normal BMI, while (31.8%) had a BMI below normal, and (6.5%) had a BMI above the normal range (Figure 4.13).
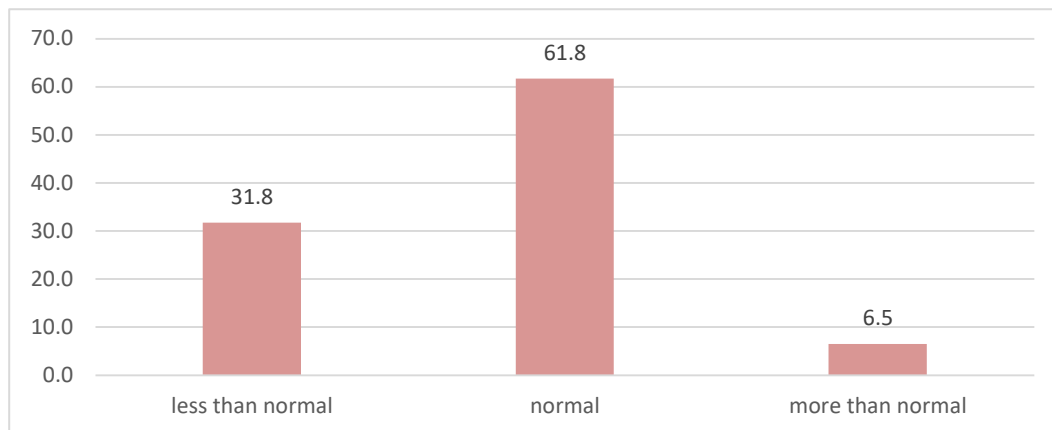
Figure 4. 13 BMI Chart

4.5 Prevalence of PMS:

This Study shows that the severity of symptoms varied among the participant as (2.0%) experience no symptoms ,(18.8%) had mild symptoms ,(41.0%) had moderate symptoms, (34.3%) had severe symptoms and only (4.0%) of participants had very severe symptoms. As show below this(figure 4.14).
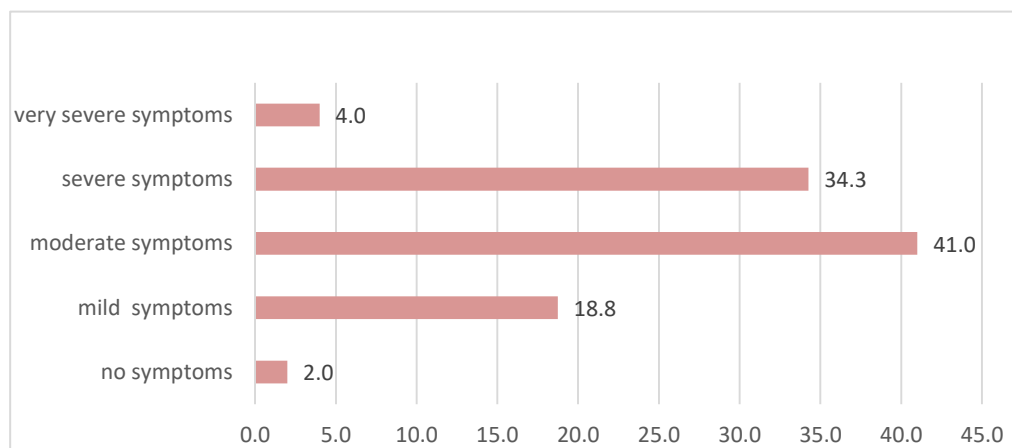
Figure 4. 14 Prevalence of PMS

4.5.1 Association Between Sociodemographic Characteristics And PMS:

This study examines the association between the severity of premenstrual syndrome (PMS) and several demographic factors, including age, academic level, marital status, and mother's education level. Symptom severity is categorized as "no symptoms," "mild," "moderate," "severe," and "very severe," as shown in Table(4.5).

1. **Age:** Participants are divided into two age groups: those 16 years or younger and those older than 16. Among those over 16, the majority experience moderate to severe PMS. This finding shows a statistically significant relationship with P value (0.05) between age and the severity of PMS, the prevalence of PMS increases with age.

2. **Academic Level:** Participants are grouped based on their academic level (Level 2 and Level 3). It appears that those in Level 3 experience higher levels of symptom severity more than level 2, with a noticeable portion reporting severe symptoms. This finding shows a statistically significant relationship with P value (0.02) between higher academic levels and increased PMS severity.

3. **Marital Status:** Among singles and married grils, the single group shows a higher prevalence of moderate and severe symptoms compared to the married group, which has fewer participants overall but no significant relationship with P value (0.08).

4. **Mother's Education:** A clear relationship exists between the mother's education level and symptom severity. Daughters of mothers with higher education report a balanced symptom distribution, while those with less-

educated mothers are more likely to report moderate to severe symptoms. However, there is no statistically significant relationship with P value (0.48).

Table (4.5) presents each category along with its corresponding p-value, which indicates the statistical significance of the association between the demographic factors and the severity of PMS.

Table 4. 5 Demographic characteristics and PMS symptoms

		level of symptoms					Total	p-value
		no symptoms	mild symptoms	moderate symptoms	severe symptoms	very severe symptoms		
age	<=16	6	35	58	47	4	150	0.05
		4.0%	23.3%	38.7%	31.3%	2.7%	100.0%	
	>16	2	40	106	90	12	250	
		0.8%	16.0%	42.4%	36.0%	4.8%	100.0%	
Academic level	Level 2	7	47	86	60	8	208	0.02
		3.4%	22.6%	41.3%	28.8%	3.8%	100.0%	
	Level 3	1	28	78	77	8	192	
		0.5%	14.6%	40.6%	40.1%	4.2%	100.0%	
Marital status	Single:	8	73	164	136	15	396	0.08
		2.0%	18.4%	41.4%	34.3%	3.8%	100.0%	
	married	0	2	0	1	1	4	
		0.0%	50.0%	0.0%	25.0%	25.0%	100.0%	
1s the mother educated	yes	6	49	118	95	14	282	0.48
		2.1%	17.4%	41.8%	33.7%	5.0%	100.0%	
	no	2	26	46	42	2	118	
		1.7%	22.0%	39.0%	35.6%	1.7%	100.0%	
what is the mother's education level?	Elementary	0	12	17	13	2	44	0.19
		0.0%	27.3%	38.6%	29.5%	4.5%	100.0%	
	Preparatory	1	15	30	32	3	81	
		1.2%	18.5%	37.0%	39.5%	3.7%	100.0%	
	Secondary	4	16	41	22	3	86	
		4.7%	18.6%	47.7%	25.6%	3.5%	100.0%	
	University	1	6	30	28	6	71	
		1.4%	8.5%	42.3%	39.4%	8.5%	100.0%	
	Illiterate	2	26	46	42	2	118	
		1.7%	22.0%	39.0%	35.6%	1.7%	100.0%	

4.5.2 Association Between Menstrual Characteristics and PMS:

Table (4.6) Focusing on four main elements of menstrual cycle (age at menarche, cycle regularity, cycle length, and menstruation duration) and it relation to PMS.

1. Age at Menarche:

The participants are categorized into four age groups:

- Ages 10-11: This group, representing the earliest age of menarche, showed no instances of participants without symptoms. However, the majority reported mild (9.5%) and moderate symptoms (52.4%), with fewer reporting severe (23.8%) and very severe (14.3%) symptoms.

- Ages 12-13: The participants who experienced menarche at ages 12-13, show a spread of symptom severities. Only(0.7%) reported no symptoms, while mild symptoms were present in (17.5%), moderate in (36.5%), severe in (40.1%), and very severe symptoms in (5.1%).

- Ages 14-15: Participants in this group displayed an increased prevalence of moderate symptoms (43.0%) and severe symptoms (32.2%), with fewer experiencing very severe symptoms (2.3%).

- Ages 16-17: This group, which represents later menarche, exhibits a unique distribution, with (3.6%) reporting no symptoms, (25.0%) experiencing mild symptoms, and the highest report of moderate symptoms among all groups (39.3%). Severe symptoms were (28.6%), and very severe symptoms (3.6%). Overall, while some variations exist among age groups, the p-value of(0.20) indicates no statistically significant relationship between age at menarche and PMS severity.

2. Cycle Regularity:

Among participants with regular cycles, the data shows that (3.4%) reported no symptoms, with mild symptoms in (23.7%) and moderate symptoms in (40.3%). Severe symptoms were also common (30.1%), while only (2.5%) experienced very severe symptoms. For participants with irregular cycles, the distribution shows that no instances of participants reporting no symptoms, with mild symptoms in (11.6%) and moderate symptoms in(42.1%), severe symptoms in(40.2%), while(6.1%) experienced very severe symptoms. The relationship between cycle regularity (regular vs. irregular) and PMS, the analysis reveals a statistically significant association with a p-value of (0.001).

3. Cycle Length:

The analysis of menstrual cycle length (shorter than 21 days, 21-35 days, and longer than 35 days) and PMS severity.

Less than 21 days: In this shortest cycle group, participants displayed a spread of symptoms, with no symptoms reported by (0.8%)of participants, mild symptoms in (18.8%), and moderate symptoms in (44.5%), severe symptoms were present in (31.3%), and very severe symptoms in (4.7%) .

While on 21-35 Days: This group, representing a typical cycle length, showed(2.3%)with no symptoms and(19.5%) with mild symptoms, moderate symptoms were most common(38.6%), severe symptoms in(36.8%) and very severe symptoms in (2.7%).

More than 35 Days: For participants with the longest cycle length, the distribution indicates that only (3.8%) had no symptoms,(15.4%) had mild symptoms, (42.3%) had moderate symptoms, (30.8%) had severe symptoms while the highest report of severe symptoms (30.8%) was seen, and (7.7%) very severe symptoms. However, there is no statistically significant relationship between PMS and cycle length, with a p-value of(0.56).

4. Menstrual Duration:

The data categorizes participants based on their menstrual duration and examines the severity of their symptoms:

Less than 3 Days: Among participants with menstrual periods lasting less than three days,(4.2%) reported no symptoms. Mild symptoms were reported by(22.9%), while(29.2%) experienced moderate symptoms. Severe symptoms were noted by 935.4%), and very severe symptoms were relatively uncommon at 8.3%.

3-7 Days: This group, representing the typical duration for menstrual periods, (2.0%) reported no symptoms, (18.2%) experienced mild, and (43.6%) moderate symptoms. Severe symptoms were present in (33.0%) of participants, with very severe symptoms occurring in a(3.3%).

More than 7 Days: For those with periods exceeding seven days, there were no reports of asymptomatic participants. Mild symptoms were observed in (18.4%) of this group, with moderate symptoms reported by (36.7%). Severe symptoms were the most prevalent at (40.8%), while very severe symptoms remained low at (4.1%).

The analysis showed no statistically significant relationship between menstrual duration and symptom severity (p-value = 0.40).

Table 4. 6 Relationship of PMS & Menstrual Characteristics

		level of symptoms					Total	
		no symptoms	mild symptoms	moderate symptoms	severe symptoms	very severe symptoms		
What was your age at menarche?	10-11	0	2	11	5	3	21	0.20
		0.0%	9.5%	52.4%	23.8%	14.3%	100.0%	
	12-13	1	24	50	55	7	137	
		0.7%	17.5%	36.5%	40.1%	5.1%	100.0%	
	14—15	6	42	92	69	5	214	
		2.8%	19.6%	43.0%	32.2%	2.3%	100.0%	
	16—17	1	7	11	8	1	28	
		3.6%	25.0%	39.3%	28.6%	3.6%	100.0%	
Is your cycle regular?	yes	8	56	95	71	6	236	0.001
		3.4%	23.7%	40.3%	30.1%	2.5%	100.0%	
	no	0	19	69	66	10	164	
		0.0%	11.6%	42.1%	40.2%	6.1%	100.0%	
How long is your cycle?	Every less than21 day	1	24	57	40	6	128	0.56
		0.8%	18.8%	44.5%	31.3%	4.7%	100.0%	
	35-21	5	43	85	81	6	220	
		2.3%	19.5%	38.6%	36.8%	2.7%	100.0%	
	every more than 35 days	2	8	22	16	4	52	
		3.8%	15.4%	42.3%	30.8%	7.7%	100.0%	
How many days does your period last?	Less than 3 days	2	11	14	17	4	48	0.40
		4.2%	22.9%	29.2%	35.4%	8.3%	100.0%	
	3-7 days	6	55	132	100	10	303	
		2.0%	18.2%	43.6%	33.0%	3.3%	100.0%	
	More than 7 days	0	9	18	20	2	49	
		0.0%	18.4%	36.7%	40.8%	4.1%	100.0%	

4.5.3 Association between Lifestyle Factors with PMS:

The analysis examines the relationship between lifestyle factors and PMS based on six key elements: smoking, coffee or tea consumption, physical activity, chewing qat, chronic diseases, and painkiller use Table (4.7).

1. Smoking and PMS Severity:

In comparison between smoker and non-smoker group, the analysis revealed that there is a statistically significant association between smoking and the severity of PMS symptoms (p = 0.001).

2. Coffee or Tea Consumption and PMS Severity:

The results indicate that there is not any significant relation among the participants who consumed coffee or tea even not taking any drinks with PMS (p = 0.55).

3. Physical Activity and PMS Severity:

The findings suggest that there is no significant relationship between physical activity and PMS severity (p = 0.26). The distribution of symptom levels were similar between students who engage in exercise and those who do not, indicating that physical activity does not appear to have a notable impact on the severity of PMS in this study.

4. Chewing Qat and PMS Severity:

The data shows no significant association between chewing qat and the severity of PMS experienced by the participants (p = 0.44). This suggests that qat consumption does not appear to influence the severity of PMS symptoms in this study.

5. Chronic Illness and PMS Severity:

The data shows no significant association between the presence of chronic illnesses and the severity of PMS symptoms ($p = 0.49$).

6. Painkiller Use and PMS Severity:

There is a statistically significant relationship ($p = 0.001$) between painkiller use and the severity of PMS symptoms. This suggests that participants experiencing more intense PMS are more likely to use painkillers as a means of managing their condition.

Table 4. 7 Lifestyle Factors Associated with PMS		level of symptoms					Total	p-value	Result
		no symptoms	mild symptoms	moderate symptoms	severe symptoms	very severe symptoms			
Do you drink a lot of coffee or tea?	yes	2	39	86	72	10	209	0.55	No Relation
		1.0%	18.7%	41.1%	34.4%	4.8%	100.0%		
	no	6	36	78	65	6	191		
		3.1%	18.8%	40.8%	34.0%	3.1%	100.0%		
Do you smoke	yes	0	3	34	35	7	79	0.00	There is a relation
		0.0%	3.8%	43.0%	44.3%	8.9%	100.0%		
	no	8	72	130	102	9	321		
		2.5%	22.4%	40.5%	31.8%	2.8%	100.0%		
Do you chew qat? -	never	7	51	96	75	7	236	0.44	No Relation
		3.0%	21.6%	40.7%	31.8%	3.0%	100.0%		
	rarely	0	15	43	37	4	99		
		0.0%	15.2%	43.4%	37.4%	4.0%	100.0%		
	sometimes	1	8	16	17	3	45		
		2.2%	17.8%	35.6%	37.8%	6.7%	100.0%		
	always	0	1	9	8	2	20		
		0.0%	5.0%	45.0%	40.0%	10.0%	100.0%		
Do you exercise?	yes	4	49	92	81	13	239	0.26	No Relation
		1.7%	20.5%	38.5%	33.9%	5.4%	100.0%		
	no	4	26	72	56	3	161		
		2.5%	16.1%	44.7%	34.8%	1.9%	100.0%		
Do you suffer from any chronic physical or mental illness	Diabetes	0	0	1	0	0	1	0.49	No Relation
		0.0%	0.0%	100.0%	0.0%	0.0%	100.0%		
	Asthma	0	2	7	4	2	15		
		0.0%	13.3%	46.7%	26.7%	13.3%	100.0%		
	none	8	67	125	94	8	302		
		2.6%	22.2%	41.4%	31.1%	2.6%	100.0%		
What methods do you use to alleviate symptoms?	Natural remedies such as herbs and exercise	1	9	21	25	3	59	0.001	There is a relation
		1.7%	15.3%	35.6%	42.4%	5.1%	100.0%		
	Medications like painkillers	0	8	36	20	7	71		
		0.0%	11.3%	50.7%	28.2%	9.9%	100.0%		
	Vitamins or supplements	0	0	1	0	1	2		
		0.0%	0.0%	50.0%	0.0%	50.0%	100.0%		
	Other	0	0	2	3	0	5		
		0.0%	0.0%	40.0%	60.0%	0.0%	100.0%		

4.5.4 Association between BMI and PMS prevalence:

The study found that there is no significant relationship between body mass index and the severity of PMS p value(0.18) ,Table (4.8).

Table 4. 8 Relationship between BMI and PMS prevalence

		level of symptoms					Total	p-value	RESULT
		no symptoms	mild symptoms	moderate symptoms	severe symptoms	very severe symptoms			
BMI	less than normal	4	20	59	42	2	127	0.18	No Relation
		3.1%	15.7%	46.5%	33.1%	1.6%	100.0%		
	normal	4	53	96	82	12	247		
		1.6%	21.5%	38.9%	33.2%	4.9%	100.0%		
	more than normal	0	2	9	13	2	26		
		0.0%	7.7%	34.6%	50.0%	7.7%	100.0%		

4.5.5 Impact of PMS On Daily Life:

The data reveals that PMS interfere with performing household routines in (73.3%) of participants. Additionally, (18.5%) experienced absenteeism from school due to PMS symptoms, while (8.8%) reported that PMS did not interfere with their daily activities as shown in (Table 4.9). Overall, the data demonstrates that there is a significant relationship (P-value 0.01) between PMS severity and its impact on daily activities.

Table 4. 9 The Impact of PMS On Daily Lifestyle

What are the daily activities that affect your symptoms?	Frequency	Percent
Absence from school	74	18.5%
Negligence in performing household routines	293	73.3%
none	35	8.8%

CHAPTER 5: DISCUSSION

CHAPTER 5

DISCUSSION

5.1 Prevalence of PMS:

This study explored the prevalence, severity, and associated factors of premenstrual syndrome (PMS) among female secondary school students in Ma'een District, Sana'a City, Yemen. The overall PMS prevalence was 98.1% in our study, which found that 41% of participants experienced moderate PMS symptoms, with 34.3% reporting severe symptoms and 18.8% mild symptoms. These high prevalence rates are agreed with a study by Ababneh, Alkhalil & Rababa'h (2023) among female students in Jordan, which found the prevalence rates of 94%, where cultural, social, and environmental factors contribute to elevated PMS. The comparable rates highlight that stigma surrounding menstruation, limited access to healthcare, and academic pressures may intensify PMS symptoms across this region.

5.2 Sociodemographic Factors and PMS Severity:

Our study investigated the role of various sociodemographic factors in influencing PMS severity among secondary school students in Yemen. Notably, age and academic level showed a significant association with PMS severity, while factors such as marital status, and mother's education, showed no significant association. These findings provide insight into how sociodemographic characteristics may shape the experience and reporting of PMS within the cultural and social context of Yemen.

5.2.1 Age

In our study, age was a significant factor in PMS severity, with students over the age of 16 reporting more severe symptoms. This finding aligns with researches from Saudi Arabia and Turkey, where studies by Al-Ghamdi et al. (2020) and Yilmaz et al.

(2022) observed that older adolescents experience more intense PMS symptoms than younger students. This age-related increase may stem from several factors, including hormonal changes associated with later puberty stages, which can exacerbate PMS. Additionally, older adolescents often face greater academic and social pressures, potentially amplifying PMS symptoms like mood swings and fatigue. In societies such as Yemen's, where cultural expectations and academic demands increase with age, older students may feel heightened pressure to excel, intensifying stress-related PMS symptoms.

In contrast, a study by Suleiman et al. (2023) in Nigeria found no significant age-related differences in PMS occurrence. This difference may reflect cultural variations in how adolescents perceive and report PMS symptoms, as well as the differing societal pressures students face in Middle Eastern and Western societies.

5.2 2 Academic Level

Academic level was another significant factor in our study, with students in higher academic levels (e.g., final years of secondary school) reporting more severe PMS. This may reflect the increased academic responsibilities and higher expectations placed on students in these final years. The increased workload and pressure to achieve high marks in higher academic levels may elevate stress, which can exacerbate both physical and psychological PMS symptoms. In Yemen, students in their last years of secondary school may face additional stress due to the impending transition to university or career paths, further compounding PMS severity.

However, a study has been observed in the USA, where Schmidt et al. (2021) noted that higher academic demands correlated with lower PMS severity among students. .

5.2.3 Mother's Education

Mother's education showed no significant association with PMS severity in our study. Similarly, a study by Lghoul et al. (2022) in Morocco found no correlation,

contrasting with findings from other countries where higher parental education, particularly among mothers, has been linked to milder PMS symptoms. For instance, researches by Lee & Choi (2020) in South Korea and Salem et al. (2020) in Saudi Arabia found that students whose mothers held advanced degrees reported less severe PMS. This was attributed to greater awareness of menstrual health and more open family communication about PMS.

In Yemen, however, cultural factors may influence this association differently. Although maternal education can improve health literacy, traditional norms surrounding menstruation may limit open discussions about PMS within families, regardless of the mother's education. Additionally, economic situations in Yemen often restrict access to healthcare and resources for menstrual health management, potentially reducing the impact of maternal education on PMS severity. These findings suggest that in Yemen, factors other than maternal education—such as community awareness and healthcare access—may play a more substantial role in shaping students' experiences of PMS.

5.2.4 Marital Status

The vast majority of participants in our study were single, and marital status was not significantly associated with PMS severity, which most of our sample consisted of unmarried students. Similarly, research by Suleiman, et al. (2023) in Kaduna State, Nigeria found no significant association between the occurrence of PMS and marital status of the participants. This means that being single or married did not seem to influence the likelihood of experiencing PMS, and the study focused on secondary school students, and most were single.

While studies in other regions have examined the influence of marital status on PMS severity, particularly among adult women. For instance, researches by Çakmak et al. (2022) in Turkey and Sharma et al. (2023) in India found that married women reported less severe PMS symptoms, possibly due to emotional support from partners, which can alleviate stress-related symptoms. However, research by Ababneh, Alkhalil and Rababa'h (2023) in Jordan demonstrated that PMS symptoms were more severe

among married women. The lack of association in our study likely reflects the predominantly single status of Yemeni adolescents, making marital status a less relevant factor in this context.

5.3 Menstrual Characteristics and PMS Severity:

5.3.1 Menstrual Regularity

This study found a significant association between menstrual irregularity and PMS severity in our sample, agreed with finding by Tabassum et al. (2019), where irregular cycles were linked to heightened PMS symptoms due to hormonal imbalances. This parallel underscores the global relevance of menstrual regularity as a key factor in PMS severity.

5.3.2 Age at Menarche

While this study found no significant association between age at menarche and PMS severity, other researches have identified early menarche as a risk factor. For instance, Li et al. (2019) reported that later onset of menstruation is sometimes associated with fewer PMS symptoms, though the connection varies by individual. Likewise, Cheng et al. (2022) found that earlier menarche (<12 years) correlated with higher PMS severity due to fluctuating hormone levels make the individuals more sensitive to PMS-related hormonal changes. The discrepancy in findings may reflect cultural or lifestyle differences.

5.3.3 Cycle Length

Cycle length did not show a significant relationship with PMS severity in this study. This contrasts with Hernandez et al. (2020) reported that extended cycles disrupted the hormonal rhythm, aggravating PMS symptoms. Similarly, Yi, Kim, and Park (2023), who found that both shorter (<21 days) and longer (>35 days) cycles increased PMS symptoms due to irregular hormonal patterns.

5.3.4 Menstrual Duration

This study showed no significant link between menstrual duration and PMS severity. Additionally, the relatively homogenous cycle length among participants in our sample may have limited our ability to detect such associations.

5.4 Lifestyle Factors and PMS Severity:

5.4.1 Smoking

Smoking, particularly shisha smoking, was significantly associated with PMS severity in our study. This finding aligns with researches from Saudi Arabia by Salem et al. (2020) and from the United States by Garcia et al. (2022), where smoking was linked to increased PMS severity due to its effects on hormonal regulation and stress levels. Smoking is known to disrupt estrogen levels, which can intensify PMS symptoms such as mood swings, anxiety, and irritability. The high prevalence of shisha smoking among Yemeni students may contribute to this association, as shisha smoking has similar physiological effects to cigarette smoking and may likewise exacerbate PMS symptoms.

5.4.2 Coffee/Tea Consumption

Coffee or tea consumption did not show a significant association with PMS severity in our study similar to research by Ababneh, Alkhalil, and Rababa'h (2023) in Jordan noted that coffee consumption did not reveal a statistically significant relationship with PMS symptoms.

This finding diverges from research by Lghoul et al. (2022) in Morocco, which found that caffeine consumption was associated with worsened PMS. As a stimulant, caffeine can increase anxiety, disrupt sleep, and raise heart rate, potentially aggravating PMS. The lack of significance in our study may reflect differences in the

quantity of caffeine consumed or variations in how adolescents metabolize it.

5.4.3 Physical Activity

Physical activity did not show a significant association with PMS severity in our sample, contrasting with other researches that link regular exercise to PMS relief. For instance, studies from Saudi Arabia (Salem et al., 2020) and Tunisia (Ben Salah et al., 2022) found that students who exercised regularly experienced less severe PMS symptoms, likely due to exercise's endorphin-boosting effects, which can help alleviate pain and reduce stress. The lack of significance in our study may reflect differences in exercise frequency, intensity, or type among participants. This finding highlights the need for further research to assess the potential benefits of specific types of exercise (e.g., aerobic vs. strength training) on PMS among Yemeni adolescents.

5.4.4 Qat Chewing

Our study also found no significant association between qat chewing and PMS severity. Qat is widely consumed in Yemen and is known for its stimulant effects, which include increased alertness and mild euphoria. Despite these physiological effects, qat use did not appear to impact PMS in our sample. This may be because qat's stimulant effects do not directly affect the hormonal or emotional fluctuations typical of PMS. The limited research on qat's influence on PMS suggests this is an area that warrants further exploration.

5.4.5 Chronic Illnesses

Chronic illnesses, including asthma and diabetes, were not significantly associated with PMS severity in our study. This finding is similar to studies in Palestine (Abu Alwafa et al., 2022) and Ethiopia (Chekol et al., 2023), where adolescents with

chronic health issues reported no associated with PMS severity. The lack of association in our sample may reflect the relatively low prevalence of chronic illnesses or differences in symptom reporting and perception. Additionally, Yemeni adolescents with chronic illnesses may prioritize managing these primary health concerns, which could influence how they perceive or report PMS symptoms.

5.4.6 Painkiller Use

This study found a significant association between severe PMS symptoms and painkiller use, reflecting findings from other research. For example, studies from Canada and Saudi Arabia indicate that around 30-65% of adolescents with PMS use over-the-counter (OTC) pain relief, often self-administered without medical guidance (Brown & Taylor, 2020; Al-Ghamdi et al., 2020). Notably, students reporting very severe PMS were more likely to use painkillers than those with milder symptoms, supporting the idea that pain intensity influences the likelihood of resorting to medication. In addition, a study by Ababneh, Alkhalil and Rababa'h (2023) demonstrated a significant correlation between PMS symptoms and analgesic use, with approximately 75% of participants in Jordan reporting the use of painkillers during PMS; nearly 46.8% of participants reported using paracetamol, while over two-fifths utilized nonsteroidal anti-inflammatory drugs (NSAIDs). While painkillers offer immediate relief, concerns about unsupervised use among adolescents include potential dependency, side effects from long-term use, and a lack of awareness regarding non-pharmaceutical options.

On the other hand, the study highlights that non-pharmaceutical strategies such as lifestyle adjustments, exercise, and dietary changes may be underutilized among Yemeni students. The students reported using natural remedies, like herbal options (e.g., tea, thyme, anise, ginger) or lifestyle modifications (e.g., heat application), which may limit broader adoption of these methods. Promoting awareness of these safer, non-drug alternatives could help reduce dependence on painkillers and provide long-term symptom management benefits for adolescents with PMS.

5.5 Body Mass Index (BMI):

While our study observed trends suggesting that a higher BMI might correlate with more severe PMS symptoms, this association was not statistically significant. Contrast studies in Saudi Arabia (Salem et al., 2020) and Ethiopia (Momina Ali et al., 2023) have found that higher BMI is associated with increased PMS severity, potentially due to elevated body fat levels affecting hormonal balance, specifically estrogen and progesterone. The nonsignificant findings in our study could be attributed to the relative homogeneity of BMI within our participant sample; a more varied BMI distribution might give clearer associations. These results suggest that, within this specific group, factors such as diet, stress levels, and physical activity may exert a stronger influence on PMS severity than BMI alone.

5.6 Impact of PMS on Daily Life:

The impact of PMS on daily life was substantial in our study, with 18.5% of students missing school and 73.3% reporting difficulties with household chores. These disruptions align with findings from studies, which also noted significant effects on school attendance and social functioning. For instance, Persich & Robinson (2022) found that PMS increased absenteeism among the students, while Suleiman et al. (2023) reported that PMS symptoms, especially fatigue and mood swings, hindered students' academic performance and social interactions. This underscores the need for in-school support systems, such as flexible attendance policies, counseling services, and educational programs, to help students manage PMS effectively and mitigate its effects on their academic and social development.

CHAPTER 6: CONCLUSION, LIMITION, AND RECOMMENDATIONS

CHAPTER 6
CONCLUSION, LIMITIONS AND RECOMMENDATIONS

1.1 Conclusion:

This study reveals the high prevalence and substantial impact of premenstrual syndrome (PMS) among female secondary school students in the Ma'een District, Yemen. The findings show that 98.1% of participants experienced PMS, with 41% reporting moderate symptoms, 34.3% severe symptoms, and 18.8% mild symptoms. These elevated rates align with findings from a study conducted in Jordan, which identified contributing factors such as social stigma surrounding menstruation, limited access to healthcare services, and academic pressures that exacerbate PMS symptoms.

Furthermore, the study identified several sociodemographic and lifestyle factors associated with PMS severity. Older students and those with irregular menstrual cycles reported higher levels of PMS severity, underscoring the need for targeted health programs that address these specific risk factors. Additionally, smoking was found to be linked with increased PMS severity, suggesting that anti-smoking initiatives could also play a role in PMS management.

Conversely, factors such as coffee/tea consumption, physical activity, and chronic illness showed no significant association with PMS in this study, which contrasts with findings from some international research. This discrepancy suggests that sociocultural or environmental differences in Yemen may influence how these factors affect PMS.

The findings emphasize the need for in-school support systems and educational programs aimed for helping students manage PMS effectively. Such programs should focus on reducing social stigma, improving access to healthcare, and providing strategies to cope with academic and personal stressors. Future research should explore the underlying reasons for the lack of association between certain lifestyle factors and PMS in this context and investigate additional variables that may

influence PMS severity among Yemeni adolescents.

In conclusion, handling the high prevalence and significant impact of PMS through comprehensive, culturally sensitive interventions can enhance the academic and social well-being of female students in Ma'een District, Yemen.

1.2 Limitations:

1. **Lack of Face-to-Face Interviews**
   Due to time constraints, the study used a questionnaire instead of conducting face-to-face interviews. Although detailed explanations were provided for all questions, the absence of direct communication may have limited some participants' ability to fully convey their experiences, potentially impacting the depth and accuracy of the responses.

2. **Variability in Participant Responses**
   Given the sensitive nature of the topic, some students might have felt uncomfortable or embarrassed to report specific symptoms accurately. This variability in response openness could impact the reliability of symptom-related data, as some participants may underreport or alter their responses.

3. **Reliance on Self-Reported Symptoms**
   Since the study relied heavily on self-assessment, there may be inconsistencies in the accuracy of reported symptoms. Some participants might struggle to distinguish PMS symptoms from other health issues, which could lead to variations in data reliability.

4. **Environmental and Social Influences**
   Conducting the study in a specific school or environment introduces the possibility of social and cultural influences affecting responses. These contextual factors may limit the applicability of the findings to the broader adolescent population, as certain responses may be shaped by the specific social environment in which data was collected.

1.3 Recommendations:

1. **Education and Awareness Programs:** Schools should implement educational programs to raise awareness about PMS among both students and staff. These programs can help demystify PMS, reduce stigma, and provide students with practical knowledge on recognizing and managing symptoms. Workshops could also include guidance on menstrual health, emphasizing that PMS is a common condition with manageable symptoms.

2. **Access to Multidisciplinary Support Teams:** A comprehensive approach is needed to support students experiencing PMS. Schools should consider forming multidisciplinary teams that include school nurses, gynecologists, and mental health professionals such as psychologists or counselors. These professionals can offer personalized care, addressing both the physical symptoms (such as cramps, bloating, and fatigue) and the emotional challenges (such as mood swings, irritability, and anxiety).

3. **Mental Health and Emotional Support:** PMS can often exacerbate emotional issues such as stress, depression, or anxiety. Schools should provide mental health support through counseling services, ensuring students have access to emotional care when needed. Peer support groups or student counseling sessions can also offer a safe space for students to share experiences and learn coping strategies.

4. **Lifestyle and Nutritional Interventions:** Students should be encouraged to adopt healthy lifestyle choices, as these can significantly reduce PMS symptoms. Schools can promote physical activities like yoga or light exercises, which help alleviate cramps and improve mood. Additionally, providing guidance on proper nutrition—such as increasing intake of

magnesium, calcium, and vitamins—can help reduce symptoms like fatigue and irritability. Schools could consider offering healthier food options in cafeterias that align with these recommendations.

5. **Flexible Academic Policies:** PMS may interfere with a student's ability to concentrate, complete tasks, or even attend classes. School administrations should adopt flexible academic policies that take into account the challenges faced by students with PMS. This could include extending deadlines, offering more flexible attendance requirements, or providing alternative assessment methods during particularly difficult days of the menstrual cycle.

6. **Risk Factor Modification:** Students should be educated on how to identify and manage risk factors that may worsen PMS, such as high stress levels, lack of sleep, or unhealthy dietary habits. Schools can organize workshops or counseling sessions focusing on stress management techniques, time management, and relaxation exercises.

7. **School Staff Training:** Teachers and school staff should be trained to recognize the effects of PMS on students and respond with empathy. This includes understanding when a student may need additional academic or emotional support and ensuring that the school environment is sensitive to their needs. Teachers can also help create a more supportive classroom environment by avoiding pressure or negative comments about academic performance during PMS-affected periods.

8. **Parental Involvement:** Parents should be involved in their child's PMS management. Schools can facilitate parent-student-teacher workshops or counseling sessions where parents learn how to support their child at home, ensuring consistency in care and empathy both at school and at home.

References :

1. Ababneh, M., Alkhalil, M. and Rababa'h, A. (2023). The prevalence, risk factors and lifestyle patterns of Jordanian females with premenstrual syndrome: a cross-sectional study. [online] Available at: 10.2144/fsoa-2023-0056 2023 [Accessed 24 Jul. 2023].

2. Abu Alwafa, R., Badrasawi, M. and Haj Hamad, R. (2021). Prevalence of premenstrual syndrome and its association with psychosocial and lifestyle variables: a cross-sectional study from Palestine. BMC Women's Health, 21(1). doi:https://doi.org/10.1186/s12905-021-01374-6.

3. Aklile Tsega Chekol, Reta, Y., Fikadu Ayinewa, Hailu, L., Mulualem Tesema and Mastewal Aschale Wale (2024). Determinants of premenstrual dysphoric disorder and associated factors among regular undergraduate students at Hawassa University Southern, Ethiopia, 2023: institution-based cross-sectional study. BMC public health, 24(1). doi:https://doi.org/10.1186/s12889-024-18798-y.

4. Al-Azzam, S., Al-Husseini, A., & Naji, T. (2022). Prevalence of premenstrual syndrome among high school students in Palestine: A cross-sectional study. BMC Women's Health, 22(1), 112. https://doi.org/10.1186/s12905-022-01730-8

5. Al-Ghamdi, A., et al. (2020). Pain management practices for premenstrual syndrome among Saudi adolescents. International Journal of Women's Health, 14, pp. 291-298. Available at: https://doi.org/10.2147/IJWH.S348765.

6. Al-Qarbi, N., Al-Hamadi, A., & Al-Mansoori, S. (2023). Assessment of premenstrual syndrome prevalence and its impact on academic performance among high school girls in Bahrain. Journal of Adolescent Health, 71(4), 465-472. https://doi.org/10.1016/j.jadohealth

7. Al-Rousan, M., Matar, A., & Al-Mansoori, S. (2023). Prevalence of premenstrual syndrome and its effects on high school students in Jordan.

International Journal of Adolescent Medicine and Health, 35(3), 321-328. https://doi.org/10.1515/ijamh-2022-0060

8. Al-Shahrani, S., Hussein, A., & Al-Jubouri, S. (2022). Prevalence of premenstrual syndrome among high school students in Iraq. Archives of Women's Mental Health, 25(5), 795-802. https://doi.org/10.1007/s00737-022-01273-9

9. Al-Shammari, S., Al-Mutairi, A., & Al-Awadhi, S. (2022). Prevalence of premenstrual syndrome among high school students in Kuwait: A cross-sectional study. Archives of Women's Mental Health, 25(3), 315-322. https://doi.org/10.1007/s00737-021-01290-0

10. Amal Al Mulla, Lotfi, G. and Amar Hassan Khamis (2022). Prevalence of Dysmenorrhea among Female Adolescents in Dubai: A Cross-Sectional Study. Open Journal of Obstetrics and Gynecology, 12(08), pp.686–705. doi:https://doi.org/10.4236/ojog.2022.128061.

11. Armour, M., Parry, K., Manohar, N., Holmes, K., Ferfolja, T., Curry, C., MacMillan, F. and Smith, C.A. (2019). The Prevalence and Academic Impact of Dysmenorrhea in 21,573 Young Women: A Systematic Review and Meta-Analysis. Journal of Women's Health, 28(8), pp.1161–1171. doi:https://doi.org/10.1089/jwh.2018.7615.

12. Babapour F, Elyasi F, Shahhosseini Z, Hosseini Tabaghdehi M. The prevalence of moderate-severe premenstrual syndrome and premenstrual dysphoric disorder and the related factors in high school students: A cross-sectional study. Neuropsychopharmacol Rep. 2023 Jun;43(2):249-254. doi: 10.1002/npr2.12338. Epub 2023 May 8. PMID: 37154790; PMCID: PMC10275287.

13. Ben Salah, N., Gharbi, A., & Khalfallah, N. (2022). Prevalence of premenstrual syndrome among high school students in Tunisia: A cross-sectional study. BMC Women's Health, 22(1), 112. https://doi.org/10.1186/s12905-022-01730-8.

14. Bhandari, S., Yam Prasad Dwa, Meenu Maharjan, Maskey, S., Thakur, M.K. and Santosh Kumar Sharma (2023). Premenstrual Syndrome among Medical Students of a Medical college: A Descriptive Cross-sectional Study. Journal

of Nepal Medical Association, 61(260), pp.347–350.
doi:https://doi.org/10.31729/jnma.8136.

15. Brown, L., and Taylor, R. (2020) 'Patterns of pain relief medication usage among adolescents in Canada', Journal of Adolescent Health, 67(5), pp. 612-618. Available at: [https://doi.org/10.1016/j.jah.2020.03.014] (Accessed: 18 October 2024).

16. Çakmak, H., Yılmaz, M., and Aydın, G. (2022). 'The Role of Marital Status in the Experience of Premenstrual Syndrome Among Turkish Women', Women's Health Issues, 32(1), pp. 25-31. DOI: [10.1016/j.whi.2021.08.003].

17. Charan, J. and Biswas, T. (2013) 'How to calculate sample size for different study designs in medical research?,' Indian Journal of Psychological Medicine, 35(2), pp. 121–126. https://doi.org/10.4103/0253-7176.116232.

18. Cheng, S.H., Shih, C.C., Lee, I.H., Hou, Y.W., Chen, K.C., Chen, K.T., & Yang, Y.K. (2022). Premenstrual syndrome and dysmenorrhea among high school girls in Taiwan. The Journal of Pediatric and Adolescent Gynecology, 24(5), pp. 251-257.

19. Collins, S., Sabaratnam Arulkumaran, Hayes, K., Jackson, S. and Impey, L. (2023). Oxford Handbook of Obstetrics and Gynaecology. [online] Oxford Oxford University Press -07-01. Available at: https://oxfordmedicine.com/view/10.1093/med/9780199698400.001.0001/med 9780199698400.

20. Dutta, D.C. and Hiralal Konar (2020). DC Dutta's textbook of obstetrics : including perinatology and contraception. New Delhi, India: Jaypee, The Health Sciences Publisher.

21. El-Hadi, A., Mohamed, S., & Hassan, R. (2022). Prevalence of premenstrual syndrome among high school students in Sudan: A cross-sectional study. Journal of Adolescent Health, 68(6), 1122-1128. https://doi.org/10.1016/j.jadohealth.2021.12.001.

22. El-Sherif, A., Mostafa, H., & Hassan, R. (2022). Prevalence of premenstrual syndrome among high school students in Egypt: A cross-sectional study. BMC Women's Health, 22(1), 123. https://doi.org/10.1186/s12905-022-01740-6

23. Frye, C.A., & Hall, J.M. (2017). Menstrual cycle-related fluctuations in pain perception and symptoms. Women & Health, 57(8), pp. 1-20.

24. Garcia, A., Smith, J., and Lee, R. (2022). 'The Impact of Marital Status on Premenstrual Syndrome Symptoms', Women's Health Issues, 32(1), pp. 45-52. doi:10.1016/j.whi.2021.09.002.

25. Ghosh, S., Roy, D. & Mukherjee, S. (2022). 'Prevalence and impact of premenstrual syndrome among schoolgirls in Kolkata, India', BMC Women's Health, 22(1), 135. [DOI: 10.1186/s12905-022-01603-2]

26. González, M., Pérez, J., & López, R. (2021). Prevalence of premenstrual syndrome in high school students in Mexico City: A cross-sectional study. BMC Women's Health, 21(1), 90. [https://doi.org/10.1186/s12905-021-01212-1].

27. Gudipally, P.R. and Sharma, G.K., 2021. Premenstrual syndrome. StatPearls. Treasure Island (FL): StatPearls Publishing. Available at: https://pubmed.ncbi.nlm.nih.gov/32809533

28. Hernandez, E., Colón, C., & Miranda, J. (2020). Menstrual cycle irregularities and the prevalence of premenstrual syndrome in adolescent girls. Pediatric Research, 13(3), pp. 287294.

29. Jankowska, A., Nowicki, M. & Wróblewska, A. (2024). 'Lifestyle factors and premenstrual syndrome among Polish adolescents', Reproductive Health, 21(1), 10. [DOI: 10.1186/s12978-024-01440-9]

30. Kassem, H., Moukarzel, M., & Zein, M. (2022). Prevalence of premenstrual syndrome among high school students in Lebanon: A cross-sectional study. Journal of Adolescent Health, 68(6), 1122-1128. https://doi.org/10.1016/j.jadohealth.2021.12.001

31. Lee, J. & Choi, J. (2020). 'The Influence of Parental Education on PMS Among Korean Adolescents', Korean Journal of Family Medicine, 41(6), pp. 387-393. doi:10.4082/kjfm.20.0022.

32. Lghoul, S., Loukid, M., Benksim, A. and Hilali, M.K. (2022). Factors Associated with Premenstrual Syndrome: A Cross-Sectional Study of Female Adolescents (Morocco). EuropeanJournalofMedicalandHealthSciences,4(6),pp.1–5. doi:https://doi.org/10.24018/ejmed.2022.4.6.1468.

33. Li, R., Chen, X., Yan, L., Ma, T., Li, L., Chen, Q., et al. (2019). Effects of menarche age on menstrual cycle characteristics and health outcomes. BMC Women's Health, 19(1), p. 6.

34. Lobo, R.A., Gershenson, D.M., Lentz, G.M. and Valea, F.A. (2016). Comprehensive Gynecology E-Book. Elsevier Health Sciences. Matsuura Y, Inoue A, Kidani M, Yasui T. Change in appetite and food craving during menstrual cycle in young students. Int. J. Nutr. Metab. 12(2), 25–30 (2020).

35. Maharaj, S. et al. (2021) 'Prevalence and impact of premenstrual syndrome among high school girls in Canada', Journal of Adolescent Health, 68(4), pp. 675-681. doi:10.1016/j.jadohealth.2020.09.014.

36. Mbati, D.D., Alit, N.K. and Hidayati, L. (2021). LITERATURE REVIEW: ANALYSIS OF FACTORS AFFECTING PREMENSTRUAL SYNDROME IN GIRLS ADOLESCENT. Indonesian JournalofCommunityHealthNursing,6(2),p.75. doi:https://doi.org/10.20473/ijchn.v6i2.29691.

37. Mbati, D.D., Alit, N.K. and Hidayati, L. (2021). LITERATURE REVIEW: 56 11(2), pp.161–170.ANALYSIS OF FACTORS AFFECTING PREMENSTRUAL SYNDROME IN GIRLS ADOLESCENT. Indonesian Journal of Community Health Nursing, 6(2), p.75. doi:https://doi.org/10.20473/ijchn.v6i2.29691.

38. Momina Ali, Yesuneh Dejene, Teklemariam Gultie, Rediet Gebreselassie, Mickiale Hailu et al. (2023) Premenstrual Syndrome and Associated Factors among Students in Secondary Schools in Arba Minch Town, Southern Ethiopia: A Cross-Sectional Study, 2021 . Journal of Woman's Reproductive Health - 2(4):23-35. https://doi.org/10.14302/issn.2381-862X.jwrh-23-4505.

39. Núñez-Troconis, J. (2022). Premenstrual Syndrome and Premenstrual Dysphoric Disorders: A Narrative Review of Etiology, Pathophysiology, and Diagnosis. Gaceta Médica de Caracas, 130(3). doi:https://doi.org/10.47307/gmc.2022.130.3.5.

40. Núñez-Troconis, J., Carvallo, D. and Martínez-Núñez, E. (2021). Primary Dysmenorrhea: pathophysiology. Investigación Clínica, 62(4), pp.378–406. doi:https://doi.org/10.22209/ic.v62n4a08.

41. Oats, J., Abraham, S. and Llewellyn-Jones, D. (2023). Llewellyn-Jones fundamentals of obstetrics and gynaecology. Edinburgh; New York: Elsevier Mosby.

42. Özlem Akbulut, Jafari, L., Demet Aygün Arı, Melis Pehlivantürk Kızılkan, Derman, O. and Sinem Akgül (2024). Prevalence of premenstrual syndrome in adolescent girls. The Turkish Journal of Pediatrics, pp.1–6. doi:https://doi.org/10.24953/turkjpediatr.2024.4669.

43. Padmavathi, P., Sankar, R., Kokilavani, N., Dhanapal, K. and Ashok, B., 2014. Validity and reliability study of premenstrual syndrome scale (PMSS). Int J Adv Nurs Manag, 2(1), pp.4-10.

44. Persich, M., and Robinson, T. (2022) Social competence and school absenteeism in youth: The role of social support and engagement. Frontiers in Psychology. Available at: https://www.frontiersin.org.

45. Reed, S.C., Levin, F.R., & Evans, S.M. (2023). Changes in mood, cognitive performance, and hormone levels across the menstrual cycle in women with PMS. Journal of Psychosomatic Research, 142, p. 110362. Available at: https://doi.org/10.1016/j.jpsychores.2023.110362

46. Rosenfield, M., Johnson, L., & Martinez, C. (2021). Prevalence of premenstrual syndrome in California high school students: A cross-sectional study. American Journal of Public Health, 111(6), 1020-1027. [https://doi.org/10.2105/AJPH.2021.306197]

47. Salem, I.M.W., Alsamti, M.Y. and Murad, M.A. (2020). Predictors of Premenstrual Syndrome among Female Students at Governmental Secondary Schools in Jeddah, Saudi Arabia: A Cross-sectional Study. The Egyptian Journal of Hospital Medicine, 78(2), pp.337–347. doi:https://doi.org/10.21608/ejhm.2020.76614.

48. Sánchez, E., Martín, P. & Ruiz, S. (2024). 'Cultural perceptions of premenstrual syndrome among adolescents in Spain', Archives of Women's Mental Health, 27(1), pp. 67-75. [DOI: 10.1007/s00737-024-01234-9].

49. Schmidt, P., Thompson, R. & Miller, K. (2021). 'The Impact of Educational Attainment on PMS Symptoms: A National Study', Health Education Research, 36(1), pp. 45-53. doi:10.1093/her/cyab001.

50. Sharma, P., Gupta, R., & Verma, A. (2023). 'Impact of Marital Status on PMS Symptoms in Indian Adolescents', Indian Journal of Adolescent Health, 15(2), pp. 95-102. doi:10.1016/j.ijah.2023.04.009.

51. Silva, A., Ribeiro, C., & Martins, E. (2021). Premenstrual syndrome in Brazilian adolescents: A prevalence study in São Paulo high schools. International Journal of Adolescent Medicine and Health, 33(2), 145-152. [https://doi.org/10.1515/ijamh-2020-0245]

52. Smith, J., Johnson, R. & Garcia, T. (2023). 'Household Income and PMS Symptoms Among High School Girls in California', BMC Women's Health, 23(1), p. 45. doi:10.1186/s12905-023-02156-z.

53. Smith, M., Brown, L. & Jones, R. (2020). 'Prevalence of premenstrual syndrome among high school students in the UK', Journal of Adolescent Health, 67(4), pp. 523-529. [DOI: 10.1016/j.jadohealth.2020.06.030]

54. Suleiman, A. ed., (2023). Prevalence and Pattern of Premenstrual Syndrome among Secondary School Students in Kaduna State. doi:https://doi.org/10.4103/njbcs.njbcs_23_23.

55. Suleiman, A., Yahya, A., and Oguntayo, A.O. (2023) Effect of Premenstrual Syndrome on School Absenteeism and Academic Performance among Female Secondary School Students in Sabon Gari Local Government Area, Kaduna State, Nigeria. DUJOPAS, 9(3a), pp. 147-155

56. Tabassum, S., Afridi, B., Aman, Z., Tabassum, W., & Durrani, R. (2019). Premenstrual syndrome: Frequency and severity in young college girls. Journal of the College of Physicians and Surgeons Pakistan, 15(8), pp. 546-549.

57. Taylor, R., Smith, J. & White, C. (2024). 'Prevalence of premenstrual syndrome among high school students in Scotland', Journal of Psychosomatic Obstetrics & Gynecology, 45(2), pp. 115-121. [DOI: 10.1080/0167482X.2024.2001234]

58. Tschudin, S., Bertea, P.C., & Zemp, E. (2021). Prevalence and predictors of premenstrual syndrome and premenstrual dysphoric disorder in a representative Swiss population sample. Archives of Women's Mental Health, 24(5), pp. 855-864. Available at: https://doi.org/10.1007/s00737-021-01142-3

59. Verma, R., Singh, S. & Gupta, A. (2024). 'Cultural factors influencing premenstrual syndrome among adolescents in India', International Journal of Environmental Research and Public Health, 21(2), 567. [DOI: 10.3390/ijerph21020567]

60. Wang, S., Li, J. & Liu, X. (2023). 'Prevalence of premenstrual syndrome and its associated factors among high school girls in China', Asian Journal of Psychiatry, 75, 103156. [DOI: 10.1016/j.ajp.2023.103156]

61. Weber, A., Lange, J. & Koch, T. (2024). 'Prevalence of premenstrual syndrome among high school students in urban Germany', International Journal of Environmental Research and Public Health, 21(3), 567. [DOI: 10.3390/ijerph21030567]

62. Yazdani, N., Esmaeilzadeh, S., Faraji, R., & Alavi, A. (2018). The relationship between the menstrual cycle and premenstrual symptoms in adolescents. International Journal of Adolescent Medicine and Health, 30(4).

63. Yi, S.J., Kim, M., & Park, I. (2023). Investigating influencing factors on premenstrual syndrome (PMS) among female college students. BMC Women's Health, 23, p. 592. doi:10.1186/s12905023-02752-y.

64. Yilmaz, M. et al. (2022) 'Age-related changes in the severity of premenstrual syndrome among adolescents in Turkey', BMC Women's Health, 22(1), pp. 1-9. doi:10.1186/s12905-022-01795-3.

65. Yonkers, K.A., O'Brien, P.M.S., & Eriksson, E. (2022). Premenstrual syndrome. The Lancet, 381(9862), pp. 1200-1210. Available at: https://doi.org/10.1016/S0140-6736(13)61519-3.

66. Zhao, R., Chen, X. & Yang, L. (2024). 'Cultural perceptions and their impact on the reporting of premenstrual syndrome in Chinese adolescents', Reproductive Health, 21(1), 56. [DOI: 10.1186/s12978-024-01478-8]