

## Original Article

### Prevalence and Risk Factors of Premenstrual Syndrome in Turkey: A Systematic Review and Meta-Analysis

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#### Abstract

**Aim:** This study aims to determine the prevalence and risk factors of Premenstrual Syndrome (PMS) in Turkey through systematic review and meta-analysis.

**Methods:** In the study, 26 primary studies that were published between January 2017 and January 2022 and met the inclusion criteria were examined. The total number of participants included in the primary studies was 10,381 women. A random effects model was used for variances between the studies and Egger's and Begg's tests were utilized for publication bias. Heterogeneity was tested by calculating the Cochran Q and  $I^2$  values.

**Results:** The heterogeneity rate was 87.6% (95% Confidence Interval: 83.1%-91%) for the primary studies and the prevalence of PMS in Turkey was 60.77% according to the random effects model. In studies, variables such as smoking, painful menstruation, and income level were reported as risk factors for PMS.

**Conclusion:** This study showed that PMS, which has negative psychological and physiological effects on women, is an important problem in Turkey as well as all around the world.

**Keywords:** Premenstrual Syndrome, Prevalence, Risk Factors, Meta-analysis and Systematic Review, Turkey

#### Introduction

Premenstrual syndrome (PMS) manifests itself with somatic and psychological symptoms in the luteal phase of the menstrual cycle, causing deterioration in functional capacity and distress (Gudipally & Sharma, 2022). PMS causes physical symptoms such as swelling in breasts, headache, weakness, and weight gain in women; however, its psychological symptoms such as depressive mood, irritability, and tension usually disappear with the onset of menstruation (Citil & Kaya, 2018).

Although the cause of PMS is not known clearly, it is associated with reproductive hormones, age, metabolism, and genetic factors (Shrestha et al., 2019). Stress, neurotic

mood, and coping strategies are also directly associated with PMS (del Mar Fernandez et al., 2019). Lifestyle also affects PMS (Rad et al., 2018).

PMS is a common health problem among women of reproductive age and affects mental health and quality of life negatively (Ranjbaran et al., 2017). In a meta-analysis including 18 studies conducted in Turkey between 2014 and 2018, the prevalence of PMS was reported as 52.2% (Erbil & Yucesoy, 2021). The prevalence of PMS, which is an important health problem all over the world, is ever increasing. The prevalence of PMS was reported as 70.8% in a meta-analysis conducted in Iran (Ranjbaran et al., 2017) and 53% in a meta-analysis conducted

in Ethiopia (Geta et al., 2020). In a meta-analysis conducted in India, it was found that 43% of women experience PMS (Dutta & Sharma, 2021). PMS can increase the use of healthcare services, negatively affect academic achievement and decrease work efficiency. Therefore, knowing the prevalence of PMS and associated factors can provide information not only to clinicians but also to the literature in the management of PMS (Ranjbaran et al., 2017; Geta et al., 2020).

Due to the variability of the evidence, reliable and valid evidence is needed to plan preventive interventions for PMS symptoms and prevalence (Ranjbaran et al., 2017). Therefore, this study aimed to present a systematic summary of evidence obtained in studies conducted on the prevalence and risk factors of PMS in Turkey between January 2017 and January 2022. In this study, information will be sought on the prevalence of PMS and risk factors affecting PMS.

## **Methods**

### ***Information sources and screening methods in research:***

This research was conducted in accordance with the “Meta-analysis and Systematic Reviews of Observational Studies in Epidemiology Guidelines” (Munn et al., 2015). A retrospective screening was made in the research. Pubmed, Science Direct, Google Scholar Turkey Citation Index and Ebsco CINAHL Plus databases were used. The MESH index was used for keywords to be used for screening. The searches were carried out with different Turkish and English combinations of the keywords “Premenstrual Syndrome” OR “Premenstrual Tension” OR “Menstrual Disorders” AND “Turkey” AND “Prevalence”. Studies conducted between January 2017 and January 2022 were screened independently by both researchers. Gray literature studies and repetitive studies were not included in the study. Studies included in the evaluation were reviewed and discussed by both observers; the disagreements were resolved and a consensus was reached. As a result, a total of 26 quantitative studies, 7 international and 19 national studies, were included in the research. Table 1). The flow chart of the primary studies included in the review is presented in Figure 1.

***Inclusion criteria:*** Including a sample of women who were aged between 15-49 and

lived in Turkey, using the Premenstrual Syndrome Scale (PMSS), a measurement tool developed by Gencdogan (2006) and widely used in Turkey, and providing PMS incidence in % (Gencdogan, 2006), being accessible in full text, being carried out between January 2017 and January 2022.

### ***Premenstrual Syndrome Scale (PMSS):***

Various diagnostic tools are used in the diagnosis of PMS. One of the frequently used scales in the diagnosis of PMS in Turkey is the Premenstrual Syndrome Scale (PMSS). PMSS is a 44-item 5-point Likert-type scale based on DSM-III and DSM-IV-R. The lowest score in the total score of the scale is 44, and the highest score is 220. A score of 110 and above on the total of the scale indicates the presence of PMS. However, the scale has 9 factors. These are depressive affect (7 items), anxiety (7 items), fatigue (6 items), irritability (5 items), depressive thoughts (7 items), pain (3 items), appetite changes (3 items), sleep changes (3 items), swelling (3 items). Although there is no reverse item in the scale, as the scores increase in the sub-factors, the symptoms related to the factors increase (Gencdogan, 2006).

***Exclusion criteria:*** Using a measurement tool other than PMSS, using PMSS but not providing a PMS incidence in %, being within the scope of gray literature, not clearly answering the research question, being a review or a book chapter.

***Research process:*** Primary studies reached as a result of the screening were evaluated separately by the two authors according to the “Joanna Briggs Institute (JBI) Prevalence Studies Critical Appraisal Checklist”. In the checklist consisting of 9 questions, “yes” and “no” answers are scored as 1 point and 0 points. The total score of the checklist is 9 and the minimum acceptable score is 5. Scores were compared by the researchers and all disagreements were resolved before the calculation of a final evaluation score. As a result of the researchers’ evaluations, the lowest score was 5 and the highest score was 9. The Kappa agreement test was performed using the SPSS-20 statistical program for reliability between scores. The kappa score for all criteria was 0.801 and the interrater reliability was significant ( $p=0.000$ ).

***Data synthesis and analysis:*** The meta-analysis was performed using the “Generic inverse variance method”. A standard error

was calculated for each study. The “Randoms Effect” model was used when heterogeneity was significant. Weights in the total score calculated for each study with the random effects model were shown with a forest plot. Moreover, the overall random effect was shown in diamond on the forest plot. Publication bias was indicated by a Funnel plot. In order to mention that there is no publication bias, point distributions are expected to be symmetrical on the plot. Analyses were performed with MedCalc Statistical Software version 19.1 (MedCalc Software bv, Ostend, Belgium; <https://www.medcalc.org> ; 2019). Random effects model measures each study with the inverse of its internal variance and explains the variance between studies. Random effects model is more appropriate for meta-analysis in case of heterogeneity. Cochran Q and  $I^2$  values were calculated for heterogeneity. High  $I^2$  values indicate a higher heterogeneity among the statistics (For  $I^2$ , 25,50 and 75% correspond to low, medium, and high heterogeneity, respectively) (Borenstein et al., 2013).

**Ethical aspect of the study:** Ethical consent was not required since the studies included in this research were accessed through open-access electronic databases. The study complied with the principles of the Declaration of Helsinki.

### **Results - Features of studies**

This research included 26 studies conducted between January 2017 and January 2022. Of the studies, three were published in 2017; two in 2018; six in 2019; three in 2020; 11 in 2021; one in 2022 (Table 1). Of the studies, eight had a descriptive design; nine had a descriptive and cross-sectional design; two had a descriptive correlational design; four had a cross-sectional design; two had an analytical cross-sectional design; one had a correlational design (Table 1). Two of the studies were conducted with women aged between 15-49; one with married women aged between 15-49; one with married women aged between 20-45; and 22 with students. The size of the sample of 21 studies was >200. The smallest size of the sample in the studies was 82 (Topel & Pehlivan, 2021) and the largest sample size was 860 (Derya et al., 2017) (Table 1). Four of the studies were conducted

in a hospital setting and 22 were conducted at universities (Table 1).

The PMSS was used in all studies. In addition, the International Physical Activity Scale was used in two studies (Aba et al., 2018; Akarsu & Yalman, 2019); the SF-36 Quality of Life Questionnaire was used in two studies (Aba et al., 2018; Topatan & Kahraman, 2020); the Beck Depression Inventory was used in two studies (Acikgoz et al., 2017; Erbil, 2018), the Perception of Health Scale was used in one study (Ataman & Tan, 2021); the Dutch Eating Behavior Questionnaire was used in one study (Kartal & Kaykisiz, 2020); the Depression-Anxiety-Stress Scale was used in one study (Bakir & Beji, 2021); the Healthy Lifestyle Behaviors Scale-II was used in one study (Bakir & Yangin, 2019); the WHOQOL-BRIEF-TR Quality of Life Scale was used in two studies (Celik & Uskun, 2022; Topatan & Kahraman, 2020); the Perceived Stress Scale was used in two studies (Cevik & Alan, 2021; Erbas & Altunbas, 2021); the Pittsburg Sleep Quality Index was used in one study (Erbil & Yucesoy, 2020); the Childhood Trauma Questionnaire and Symptom Check List-90 were used in one study (Gumussoy et al., 2021); the Yale Food Addiction Scale was used in one study (Ongan et al., 2021); the Cervantes Personality Scale was used in two studies (Olcer et al., 2017; Sener & Tashan, 2021); the State-Trait Anger Scale was used in one study (Saglam & Basar, 2019); Life Satisfaction Scale was used in one study (Celik et al, 2019); the COVID-19 Related Psychological Distress Scale was used in one study (Yuksekol et al., 2021).

### **PMS and related characteristics**

The Q statistic was 202.2993 (SD=25) ( $p<0.0001$ ) ( $I^2=87.64\%$ ). Both statistical results showed that the studies were heterogeneous (95% Confidence Interval: 83.1%-91%). The random effects model was used and the prevalence of premenstrual syndrome was 60.77% among the total number of participants ( $n=10.381$ ) according to the random effects model (Figure 2). According to Begg's test result, there was no publication bias (Figure 3).

When the literature was examined, it was seen that age did not affect PMS as in most of the

studies included in our study (Citil & Kaya, 2018; Yoshimi et al., 2019). On the other hand, in a study, it was seen that older participants experienced PMS more (Farahmand et al., 2017). These results suggested that the age factor requires further investigation regarding PMS and increased evidence.

When the studies were examined, it was seen that being married was a risk factor for PMS in most studies (Farahmand et al., 2017; Arafa et al., 2018). On the other hand, in another study, being single was found to increase PMS (Shehadeh & Hamdan-Mansour, 2017). Although there is contradictory evidence regarding marital status, it was thought that being married would increase stress as it increased responsibilities, thus increasing the prevalence and symptoms of PMS. Although similar risk factors for PMS were questioned in the studies in general, there were some differences.

The number of risk factors questioned in the studies was 51. 20 of them were related to the demographic characteristics of the participants. 33 of them were related to the participants' habits, addictions, nutrition, and health characteristics. 8 of them were related to menstruation characteristics (Table 2).

In the studies, demographic characteristics that affected PMS were age (two studies), school year in studies with university students (four studies), family type, current place of residence, mother's education, department at the faculty, absenteeism, place of birth (one study), income level (five studies), and marital status (two studies). In one of the studies, a negative significant correlation was determined with age and it was observed that PMS symptoms decreased as age increased (Akarsu & Yalman, 2019) (Table 2).

When the studies conducted in Turkey and all around the world were examined, it was noticed that the prevalence of PMS was similar to that in this study and that most of the participants in most studies experienced PMS. This suggests that PMS is an important women's health problem all around the world.

### ***Discussion on PMS risk factors***

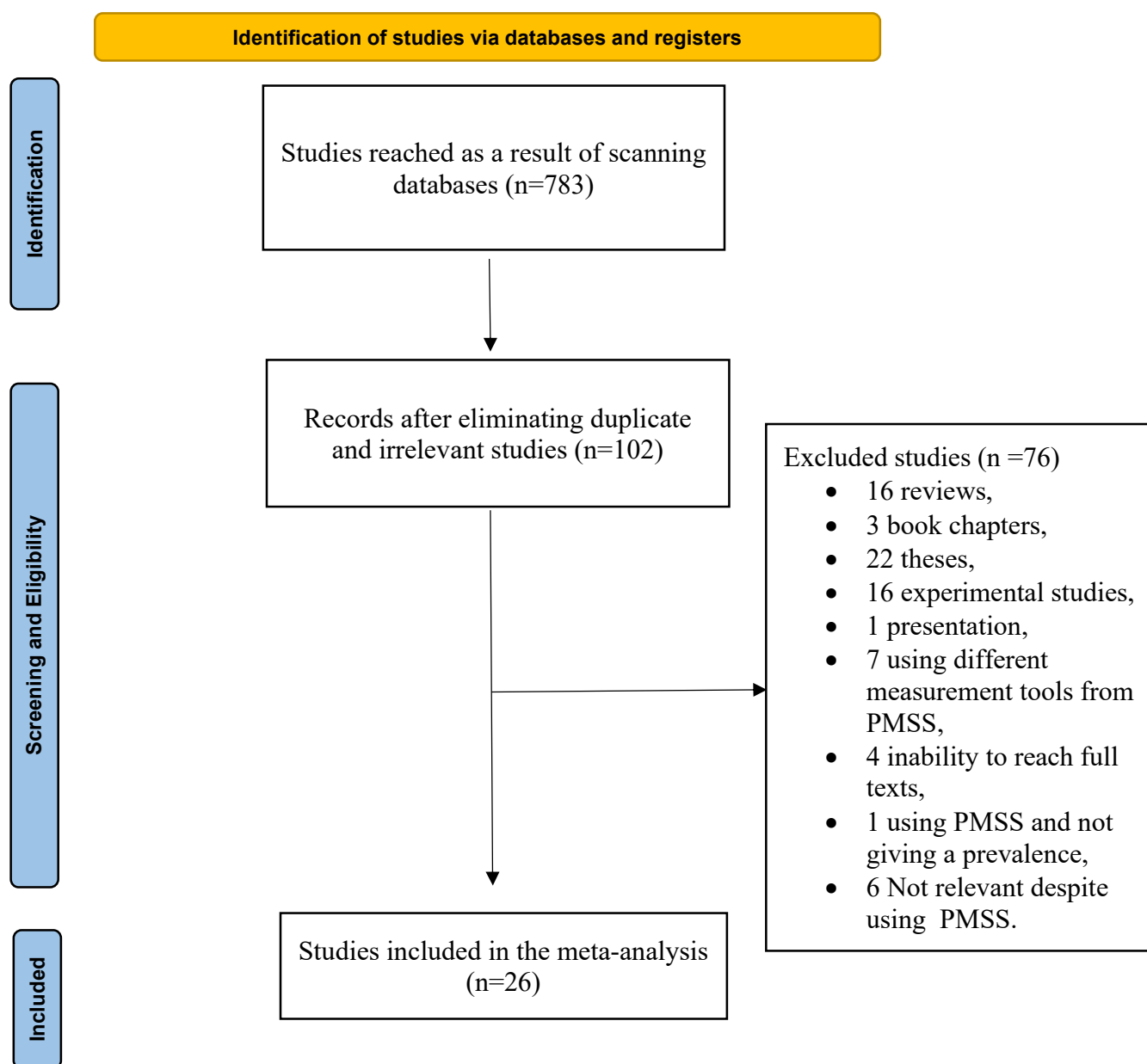
When the primary studies included in the study were examined, it was determined that the participants' sociodemographic characteristics that were the risk factors for PMS were income level, school year, age, family type, current place of residence, mother's education, place of birth, and marital status.

### **Discussion**

#### ***Discussion on PMS prevalence***

In this study, the prevalence of PMS in Turkey was found to be 60.77%. Findings in studies conducted in Turkey were found to be similar to our study results. In a systematic review and meta-analysis that included 18 studies published between 2014 and 2018, the prevalence of PMS was determined as 52.2% (Erbil & Yucesoy, 2021). In a study conducted with university students, the prevalence of PMS was found to be 64.89% (Uzuner & Kocak, 2019). In another study, the prevalence of PMS was determined to be 51% (Akmali et al., 2020). In a study conducted in Pakistan, the prevalence of PMS was reported as 78.7% (Ashfaq & Jabeen, 2017) whereas in another study it was found to be 80.6% (Majeed et al., 2019). In a study conducted with university students, the prevalence of PMS was determined as 65% (Shamnani et al., 2018). In a study conducted with 4122 university students in Egypt, the prevalence of PMS was found as 86.3% (Arafa et al., 2018). In another study, the prevalence of PMS was reported as 97.2% (Lan & Su, 2019). In a study conducted in Jordan, the prevalence of PMS was 92.3% (Shehadeh & Hamdan-Mansour, 2018). There are also results from some systematic reviews and meta-analyses conducted in different countries. In a meta-analysis including 24 studies in Iran, the prevalence of PMS was found as 70.8% (Ranjbaran et al., 2017). In a meta-analysis including 9 studies conducted in Ethiopia, it was found that 53% of women experienced PMS (Geta et al., 2020). In another meta-analysis conducted in India, the prevalence of PMS was determined as 43% (Dutta & Sharma, 2021).

**Table 1 Characteristics of included primary studies in meta-analysis**



**Figure 1 Flowchart to illustrate results of search strategy (<http://www.prisma-statement.org/>)**

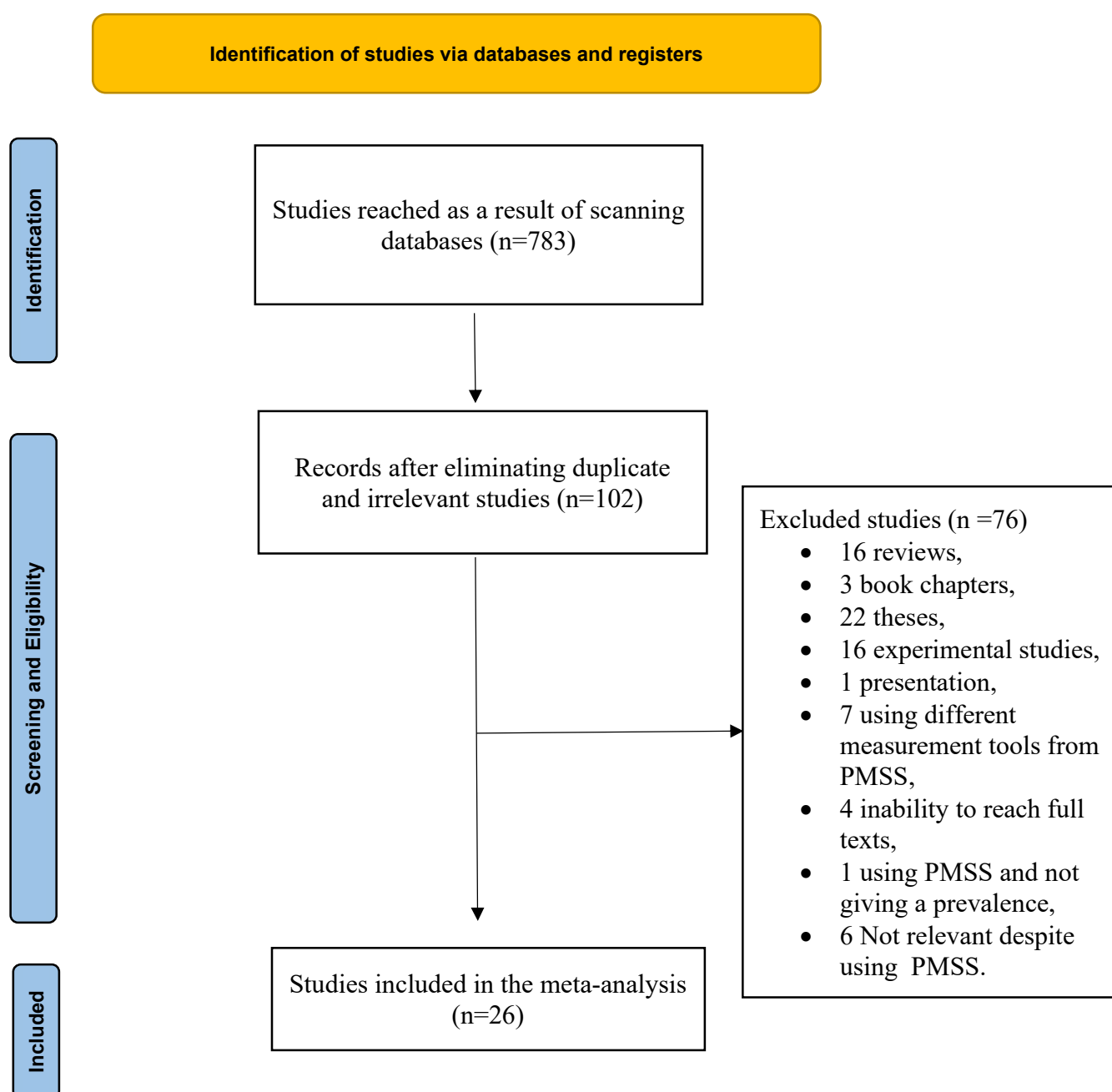
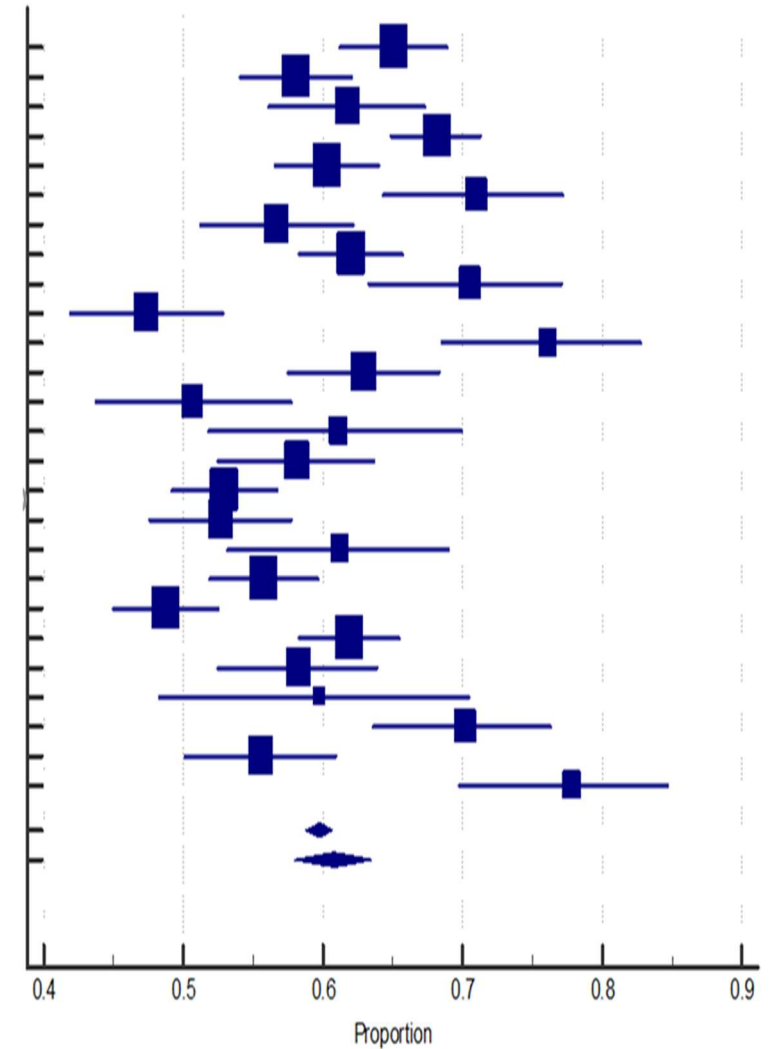


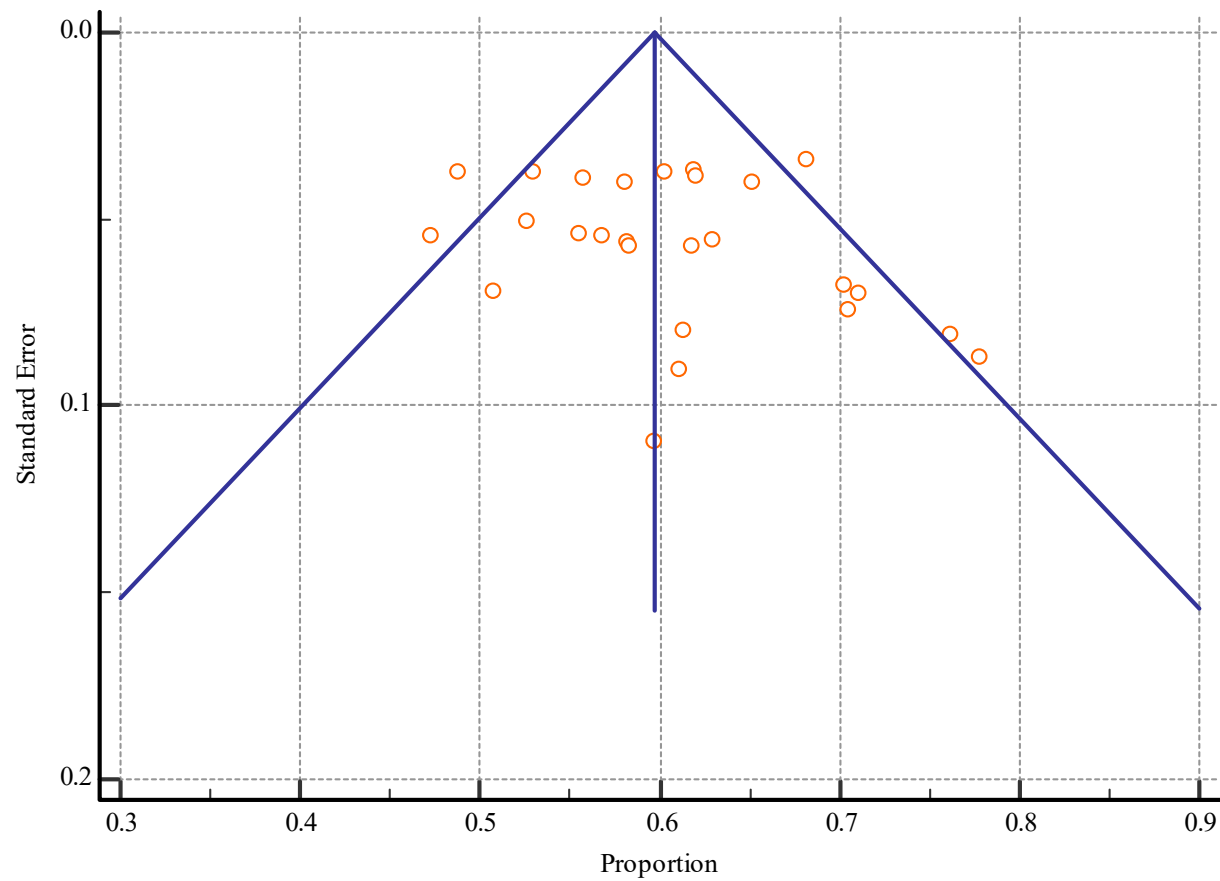
Figure 1 Flowchart to illustrate results of search strategy (<http://www.prisma-statement.org/>)

**Figure 2. Forest plot on PMS leves**

| Study                                                                                                                         | Sample size | Proportion (%) | 95% CI           | Weight (%) |        |
|-------------------------------------------------------------------------------------------------------------------------------|-------------|----------------|------------------|------------|--------|
|                                                                                                                               |             |                |                  | Fixed      | Random |
| 1.Aba et al. (2018)                                                                                                           | 617         | 65.154         | 61.248 to 68.914 | 5.94       | 4.21   |
| 2. Acikgoz et al. (2017)                                                                                                      | 618         | 58.091         | 54.089 to 62.015 | 5.95       | 4.21   |
| 3. Akarsu & Yalman (2019)                                                                                                     | 304         | 61.842         | 56.123 to 67.328 | 2.93       | 3.88   |
| 4. Derya et al. (2017)                                                                                                        | 860         | 68.140         | 64.909 to 71.245 | 8.27       | 4.31   |
| 5. Ataman & Tan (2021)                                                                                                        | 716         | 60.335         | 56.646 to 63.939 | 6.89       | 4.26   |
| 6. Kartal & Kaykısız (2020)                                                                                                   | 204         | 71.078         | 64.336 to 77.197 | 1.97       | 3.61   |
| 7. Bakır & Beji (2021)                                                                                                        | 333         | 56.757         | 51.245 to 62.147 | 3.21       | 3.94   |
| 8. Bakır & Yangın (2019)                                                                                                      | 677         | 62.038         | 58.263 to 65.708 | 6.51       | 4.25   |
| 9. Çağlar & Oskay (2021)                                                                                                      | 180         | 70.556         | 63.318 to 77.102 | 1.74       | 3.51   |
| 10. Çelik & Uskun (2022)                                                                                                      | 338         | 47.337         | 41.910 to 52.811 | 3.26       | 3.95   |
| 11. Çevik & Alan (2021)                                                                                                       | 151         | 76.159         | 68.553 to 82.709 | 1.46       | 3.36   |
| 12. Dönmez & Gümüşsoy (2019)                                                                                                  | 319         | 63.009         | 57.453 to 68.321 | 3.07       | 3.91   |
| 13. Erbaş & Altunbaş (2021)                                                                                                   | 207         | 50.725         | 43.705 to 57.723 | 2.00       | 3.62   |
| 14. Erbil (2018)                                                                                                              | 121         | 61.157         | 51.873 to 69.881 | 1.17       | 3.15   |
| 15. Erbil & Yücesoy (2020)                                                                                                    | 313         | 58.147         | 52.466 to 63.672 | 3.02       | 3.90   |
| 16. Gümüşsoy et al. (2021)                                                                                                    | 702         | 52.991         | 49.222 to 56.735 | 6.76       | 4.26   |
| 17. Kızmaz et al. (2021)                                                                                                      | 391         | 52.685         | 47.604 to 57.725 | 3.77       | 4.02   |
| 18. Ongan et al. (2021)                                                                                                       | 155         | 61.290         | 53.143 to 68.997 | 1.50       | 3.39   |
| 19. Ölçer et al. (2017)                                                                                                       | 645         | 55.814         | 51.885 to 59.690 | 6.21       | 4.23   |
| 20. Sağlam & Başar (2019)                                                                                                     | 720         | 48.750         | 45.041 to 52.469 | 6.93       | 4.26   |
| 21. Şener & Taşhan (2021)                                                                                                     | 736         | 61.957         | 58.339 to 65.478 | 7.08       | 4.27   |
| 22. Topatan & Kahraman (2020)                                                                                                 | 302         | 58.278         | 52.493 to 63.900 | 2.91       | 3.88   |
| 23. Topel & Pehlivan (2021)                                                                                                   | 82          | 59.756         | 48.342 to 70.444 | 0.80       | 2.75   |
| 24. Yaşar et al. (2019)                                                                                                       | 215         | 70.233         | 63.638 to 76.259 | 2.08       | 3.65   |
| 25. Çelik et al. (2019)                                                                                                       | 344         | 55.523         | 50.098 to 60.852 | 3.32       | 3.96   |
| 26. Yüksekol et al. (2021)                                                                                                    | 131         | 77.863         | 69.779 to 84.645 | 1.27       | 3.23   |
| Total (fixed effects)                                                                                                         | 10381       | 59.744         | 58.794 to 60.688 | 100.00     | 100.00 |
| Total (random effects)                                                                                                        | 10381       | 60.774         | 58.009 to 63.504 | 100.00     | 100.00 |
| <b>Test for heterogeneity:</b> Q=202.2993, DF=25, P<0.0001, I <sup>2</sup> =87.64%, 95% CI for I <sup>2</sup> =88.11 to 90.96 |             |                |                  |            |        |
| <b>Publication bias:</b>                                                                                                      |             |                |                  |            |        |
| <b>Egger's test:</b> Intercept= 2.3445, 95%CI=-1.4886 to 6.17.76, P=0.2189                                                    |             |                |                  |            |        |
| <b>Begg's test:</b> Kendall's Tau=0.2185, P=0.117                                                                             |             |                |                  |            |        |



**Figure 3. Publication bias in PMS prevalence of primary studies**



Although the prevalence of PMS, which is an important health problem among women worldwide and in Turkey, is similar to that in our study, it was found to be lower in a few studies. In a study conducted by Mohib et al. (2018), the prevalence of PMS was found as 23.9 (Mohib et al., 2018). In another study, the prevalence of PMS was determined as 35.3% (Hashim et al., 2019). In the study conducted by Izadi-Mazidi and Amiri (2019), the prevalence of PMS was reported as 32.1% (Izadi-Mazidi & Amiri, 2019).

When the evidence regarding the educational characteristics, income level, and employment status of the participants was examined, it was seen that low education level (Arafa et al., 2018), unemployment (Shehadeh & Hamdan-Mansour, 2017), and low income level (Farahmand et al., 2017) were the risk factors for PMS. Low education levels and unemployment can affect women's quality of life negatively as they can weaken women socioeconomically. This can increase the symptoms of PMS.

In the study conducted by Shehadeh and Hamdan-Mansour (2017), it was seen that the variables, department at the university and school year, were risk factors for PMS. It was determined that being in the fourth year of university and studying at a department related to human sciences were risk factors for PMS (Shehadeh & Hamdan-Mansour, 2017). In another study, it was shown that being a first-grader at university increased PMS symptoms (Citil & Kaya, 2018). The fact that the departments and lectures create more stress can negatively affect students in terms of PMS. Further studies on the subject should be carried out to determine the effect of school year on PMS and obtain more reliable results.

When the primary studies in this study were examined, it was determined that smoking and alcohol use, consumption of coffee, tea, fizzy drinks, fatty/high-calorie food, salt consumption, exercise status, presence of chronic disease and anemia, presence of PMS in the family, presence of PMS in the mother and sister, body mass index, presence of psychiatric disorder, and number of pregnancies were risk factors for PMS.

When the literature was examined, it was seen that the studies on the subject supported our research results. In the studies, it was

determined that smoking was a risk factor for PMS (Hashim et al., 2019; Arslantas et al., 2018; Salem et al., 2020). Moreover, in a meta-analysis, it was found that smoking increased PMS (Choi & Hamidovic, 2020). Alcohol use was also found to be a risk factor for PMS (Arslantas et al., 2018; Boyacioglu et al., 2021). In a meta-analysis, it was found that alcohol use aggravated PMS (Fernandez et al., 2018). Smoking and alcohol use can affect reproductive health negatively, which may pose a significant risk for PMS.

When the literature was examined, it was seen that nutrition and habits also affected PMS. Consumption of high-calorie, fatty, sugary, and salty food was found to be a risk factor for PMS (Hashim et al., 2019). In another study, it was found that consumption of fatty, fried, sweet foods, fast food, and coffee aggravated PMS (Rad et al., 2018). Furthermore, it was seen that an irregular diet aggravated the symptoms of PMS (Lan & Su, 2019). It was also reported that high BMI negatively affected PMS (Mohammadi, 2019). Nutrition and habits are very important for women of reproductive age. Therefore, improper nutrition can negatively affect women in terms of PMS and this can increase the prevalence of PMS.

When the literature was examined, it was determined that the medical history of the participants and their families may affect PMS. The presence of PMS in the family (Rad et al., 2018; Farahmand et al., 2019; Boyacioglu et al., 2021), presence of psychiatric disorder in women (Rad et al., 2018; Boyacioglu et al., 2021), and presence of chronic disease in women (Arslantas et al., 2018; Boyacioglu et al., 2021) were found to pose a risk for PMS. The presence of PMS in the family may have affected the participants through genetic factors. It was thought that the diseases present in the participants increased the level of PMS even more.

In the study conducted by Rad et al. (2018), it was found that not exercising was a risk factor for PMS (Rad et al., 2018). In another study, it was determined that irregular exercise was a risk factor for PMS (Lan & Su, 2019). These results suggested that exercise may be a curative factor for PMS since exercise and physical activity affect psychological and physical health positively.

When the primary studies included in our study were examined, the age of menarche, cycle duration, menstrual regularity, use of coping methods for PMS, and pain during menstruation were found to be risk factors for PMS.

In a study, age of menarche was not found to be a risk factor for PMS (Geta et al., 2020) whereas it was found to be a moderate risk for PMS in another study (Yoshimi et al., 2019). When the literature was examined, there was contradictory evidence stating that menstrual regularity was a risk factor for PMS. In a study, it was observed that menstrual regularity did not affect PMS (Geta et al., 2020) whereas, in another study, irregular menstruation was found to be a risk factor for PMS (Boyacioglu et al., 2021). Although studies provided contradictory evidence regarding menstrual characteristics, menstruation-related abnormal conditions can negatively affect PMS.

Studies also showed that the presence of pain in the menstrual period was a risk factor for PMS (Arafa et al., 2018; Arslantas et al., 2018; Yoshimi et al., 2019; Salem et al., 2020; Boyacioglu et al., 2021). Experiencing pain during the menstrual period may create negative experiences related to menstruation and this may increase PMS.

**Limitations and strengths:** This research was completed with 26 primary studies. Although methodological differences such as the size of the sample in the primary studies and the time when PMS was questioned were other limitations of the study, the publication bias was found to be at a negligible level. Another limitation of the study was that the research team consisted of two people. Studies should be evaluated independently by at least two researchers after screening to ensure interrater reliability (Crocetti, 2016). Although the studies were evaluated independently by both researchers, the study was sent to two more independent experts and organized in line with their evaluations and recommendations before publication.

**Conclusion:** PMS is a condition that negatively affects women psychologically and physically. Reliable evidence on the prevalence of PMS and risk factors is important. In this study, 26 primary studies examining the prevalence and risk factors of

PMS were reviewed. The prevalence of PMS among women in Turkey was determined to be high, 60.77%. Risk factors for PMS were found as demographic characteristics, menstrual characteristics, habits, addictions, and health characteristics.

**Acknowledgments:** We thank the authors of the studies included in this research for their contributions.

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