Health Problems of Civilization

eISSN: 2354-0265, ISSN: 2353-6942

REVIEW PAPER

NUTRITION AND THE PREMENSTRUAL SYNDROME: A LOOK AT THE CURRENT STATE OF KNOWLEDGE

Bartłomiej Kucharski[1(A,B,C,D,E,F)], **Agnieszka Kluz**[2(A,B,C,D,E,F)], **Mateusz Koper**[3(A,B,C,D,E)], **Oliwia Bochenek**[4(A,B,C,D,F)], **Marzena Walasek**[5(C,D,E,F)], **Klaudia Kozłowska**[6(A,C,E,F)], **Marek Rudziński**[7(A,D,E,F)]

[1]The Infant Jesus Hospital, Warsaw, Poland

[2]Faculty of Medicine, Medical College, Warsaw Medical University, Warsaw, Poland

[3]National Medical Institute of the Ministry of the Interior and Administration, Warsaw, Poland

[4]Grochowski Hospital, Warsaw, Poland

[5]Public Independent Healthcare Services of the Ministry of Internal Affairs and Administration in Białystok, Poland

[6]Mazovian Regional Hospital, Siedlce, Poland

[7]Marshal Józef Piłsudski Memorial Hospital, Płońsk, Poland

Kucharski B, Kluz A, Koper M, Bochenek O, Walasek M, Kozłowska K, et al. Nutrition and the premenstrual syndrome: a look at the current state of knowledge. Health Prob Civil. https://doi.org/10.5114/hpc.2025.148147

Tables: 0

Figures: 0

References: 49

Submitted: 2024 Jul 9

Accepted: 2025 March 4

Health Problems of Civilization
eISSN: 2354-0265, ISSN: 2353-6942

Address for correspondence: Marek Rudziński, Marshal Józef Piłsudski Memorial Hospital, Sienkiewicza 7, 09-100 Płońsk, Poland, e-mail: marek.j.rudzinski@gmail.com, phone: +48 23 661 34 00

ORCID: Bartłomiej Kucharski https://orcid.org/0000-0001-7672-9576, Agnieszka Kluz https://orcid.org/0009-0006-7427-5818, Mateusz Koper https://orcid.org/0000-0002-1048-2774, Oliwia Bochenek https://orcid.org/0009-0005-1482-2544, Marzena Walasek https://orcid.org/0000-0002-8824-2148, Klaudia Kozłowska https://orcid.org/0009-0009-4685-4216, Marek Rudziński https://orcid.org/0009-0005-0756-2932

Summary

The premenstrual syndrome (PMS) is a set of physical, psychological, and behavioral symptoms affecting women in the luteal phase of the menstrual cycle. While pharmacological treatments exist, dietary interventions offer a promising, non-invasive approach. The narrative review examines the role of diet in PMS management, focusing on key nutrients and dietary patterns. A literature search was conducted in PubMed, ScienceDirect, and Google Scholar for studies published between 2018 and 2024 on dietary influences on PMS. Evidence suggests that calcium, magnesium, vitamin D, B vitamins, and omega-3 fatty acids can alleviate PMS symptoms. Calcium and vitamin D help regulate hormones and neurotransmitters, while

eISSN: 2354-0265, ISSN: 2353-6942
magnesium has anti-inflammatory and muscle-relaxing effects. Vitamin B6 supports serotonin metabolism, reducing mood disturbances, and omega-3 fatty acids help lower inflammation and emotional stress. Mediterranean diet, rich in anti-inflammatory components, is associated with reduced PMS severity. Dietary modifications may be an effective and accessible strategy for PMS symptom relief. Further studies are needed to determine optimal dietary recommendations.

Keywords: premenstrual syndrome, dietary patterns, supplements, nutrients, prevention

Introduction

Premenstrual syndrome (PMS) is a collection of mental, physical and behavioral symptoms observed in the second half of the menstrual cycle in woman. The symptoms may manifest as early as two weeks before the onset of the new menstrual cycle, though they typically emerge seven days before menstruation and do not occur during the follicular phase. The severity of ailments typically increases a few days before the onset of menstruation, reaching its peak in the two days preceding the event. The intensity and duration of the symptoms may vary, but they tend to recur in a consistent manner in a particular woman. For a considerable group of women, the symptoms impede daily functioning and impair quality of life. PMS affects around 48% of women, and prevalence varies widely from region to region, from 33% in China, 65% in Egypt, 79% in Japan and as high as 91% in Türkiye [1]. The syndrome affects about 76% of women in Poland [2].

Diagnostic criteria for PMS have been developed by the American College of Obstetricians and Gynecologists (ACOG). PMS is also included in the International Classification of Diseases (ICD-10). The syndrome is diagnosed when: 1) the symptoms occur 5 days before the start of menstruation and subside 4 days after; 2) they do not occur during the

eISSN: 2354-0265, ISSN: 2353-6942

follicular phase; 3) they interfere with daily activities of a woman; 4) the symptoms manifest in most menstrual cycles; 5) they are not an exacerbation of an existing psychiatric malady or any other [3]. Mental and physical symptoms characteristic of PMS include breast soreness, headaches, nausea, back pain, lower abdominal cramps, bloating, water retention, increased appetite, cravings for certain foods, trouble concentrating, drowsiness, fluctuations in libido, irritability, emotional tension and lowered mood [4]. During the diagnosis of PMS, other illnesses should be considered, such as depression, anxiety, thyroid disease, endometriosis and autoimmune diseases, as they can present with similar symptoms.

The causes of PMS are complex and still not fully understood. It is not yet clear what is the main factor of the development and severity of PMS symptoms. It is believed that the disturbance of balance in an organism is caused by changes in the levels of hormones such as estrogen and progesterone that occur during ovulation and the transformation of the ovarian follicle into corpus luteum. Estrogens can cause oedema and affect blood pressure. Progesterone, on the other hand, can affect insulin sensitivity, increases diuresis, which reduces the risk of water retention in the body, and influences body temperature and the secretion of cervical mucus [5,6]. Other theory emphasizes the role of inflammatory markers such as INF-gamma, IL-2, IL-6, IL-10 in the pathogenesis of PMS. Those factors were found to be increased in affected women [7,8]. The prevalence of PMS may also be connected to a genetic predisposition and the effect of estrogen and progesterone on the activity of neurotransmitters in the central nervous system (serotonin and gamma-aminobutyric acid) [9].

A much more severe form of PMS is a premenstrual dysphoric disorder (PMDD) characterized by particularly troublesome psychiatric symptoms such as compulsive-obsessive disturbances, severe mood disorders, anxiety and even personality distortions, which significantly disrupt daily functioning [10]. It is estimated that PMDD affects up to 8% of women. The diagnosis is based on the American Psychiatric Association (APA) criteria

eISSN: 2354-0265, ISSN: 2353-6942

included in the DSM-5 classification. Treatment involves the use of selective serotonin reuptake inhibitors (SSRIs), such as escitalopram and fluoxetine, or serotonin-norepinephrine reuptake inhibitors (SNRIs), such as venlafaxine. The beneficial effect of SRIs begins rapidly in PMDD, even after 1 or 2 days. It enables the drugs to be administered only in the luteal phase and minimize the side effects such as sexual dysfunction, flatulence, light headedness and nausea. As an alternative, hormonal therapy or the gonadotropin-releasing hormone (GnRH) analogue may be used. Psychological and therapeutic help, including cognitive behavioral therapy (CBT) and relaxation therapy, may prove to be beneficial [11-13].

Before starting pharmacological treatment, it is recommended to make lifestyle modifications, especially regarding diet and physical activity. Current guidelines by the ACOG emphasize the role of dietary modification in PMS management, recommending adequate intake of calcium, magnesium, vitamin D, and B vitamins to alleviate symptoms. Furthermore, lifestyle changes, such as regular physical activity and stress management, are suggested as first-line interventions before pharmacological treatment is considered [14]. A number of dietary factors have been identified as significant in affecting the severity of PMS symptoms [15].

Aim of the work

The aim of the narrative review is to examine the potential impact of specific dietary components on PMS symptoms. The study focuses on summarizing current evidence regarding the role of key nutrients, dietary patterns, and supplementation in PMS management, based on recent scientific literature.

eISSN: 2354-0265, ISSN: 2353-6942

Methods

A literature search was conducted to examine the relationship between dietary factors and PMS. The search was performed in PubMed, ScienceDirect, and Google Scholar, covering the period from 2018 to 2024. A few older articles were included due to their key relevance to the topic. The following keywords were used: premenstrual syndrome, prevention, dietary patterns, nutrients, supplements. The selection of studies was based on their relevance to the topic and publication date, with a primary focus on 2018-2024. The review follows a narrative approach rather than a systematic review; therefore, PRISMA guidelines were not applied.

Literature review results

A number of studies have suggested that certain dietary components, such as calcium, iron, zinc, magnesium, B vitamins, vitamin D and some supplements, may have a beneficial effect on reducing PMS symptoms.

Minerals and PMS

Calcium

The macroelement mineral has important functions in the body, particularly in building and maintaining strong bones and teeth. It is also involved in nerve conduction and muscle contraction. The complex mechanism of the effect of calcium on PMS may be related to its role in regulating neurotransmitters involved in mood regulation and modulating the sensitivity of cells to hormones such as estrogen and progesterone. In addition, low calcium levels may lead

eISSN: 2354-0265, ISSN: 2353-6942

to increased release of the hormone aldosterone, which causes fluid retention [16,17]. Good dietary sources of calcium include milk and dairy products, and fish eaten with bones. Among plants, the richest sources of calcium are nuts, seeds, some pulses, vegetables of the brassica family, and certain grains [18].

In a systematic review of 14 studies (8 interventional and 6 observational), lower serum calcium levels were observed in subjects with PMS, highlighting the potential benefits of calcium supplementation in reducing PMS symptoms. The review identified that calcium supplementation significantly improved the incidence of PMS and its related symptoms in the reviewed studies. However, the necessity for further dose-response clinical trials with larger sample sizes and improved methodological designs is also emphasized to establish a more definitive link between calcium intake and relief from PMS symptoms [19]. Moreover, the newest ACOG's guidelines highlighted the significance of calcium supplementation. They recommend taking 1,200 milligrams of calcium per day in order to reduce both the physical and mood symptoms of PMS [14].

Iron

Iron deficiency can intensify some of the symptoms of PMS, such as fatigue, weakness and irritability, because of its role in red blood cell production and oxygen transport. An adequate intake of iron-rich foods or supplements can help reduce the conditions. The study by Zeitoun et al. [20] focused on assessing the impact of predictors of iron overload and low iron levels on premenstrual symptoms. They found that participants with an increased risk of iron overload were less likely to experience premenstrual symptoms such as confusion, headache and nausea than those with a typical one [20].

eISSN: 2354-0265, ISSN: 2353-6942

Zinc

The microelement is present in the body in small quantities, yet its impact on health is vital. It influences the activity of many enzymes, is involved in the metabolism of proteins, fats and carbohydrates, and is essential for growth processes, cell division and the regulation of gene expression. Zinc is also important for the optimal functioning of the endocrine system and reproductive processes [6,21]. Dietary sources of zinc include meat, seafood, whole grain cereals, tofu, tempeh, pulses, nuts, pumpkin seeds and dairy products [18]. Anti-inflammatory and antioxidant effects of zinc, as well as its involvement in regulating hormone secretion, may be beneficial in relieving PMS symptoms. A sufficient intake of zinc, either through diet or supplements, can support hormonal balance. Jafari et al. showed that supplementation with 30 mg of zinc gluconate for 12 weeks was associated with a reduction in both physical and psychological symptoms of PMS while increasing total antioxidant capacity [22].

Magnesium

Magnesium is another component to consider in the context of PMS. The macroelement mineral is one of the main intracellular cations necessary for normal nerve conduction, muscle contraction, blood pressure regulation and proper thermoregulation. It acts as an activator of over 300 enzymes and is involved in protein synthesis, carbohydrate metabolism and ATP synthesis [21]. Dietary sources of magnesium include buckwheat groats, pumpkin seeds, nuts, whole grain cereals and cocoa [18]. In several studies, increasing magnesium intake has been shown to help with PMS symptoms. Women who did not have sufficient magnesium intake experienced more severe PMS symptoms, as compared to those who maintained the correct amounts. The results were most relevant to symptoms such as anxiety, difficulty concentrating,

eISSN: 2354-0265, ISSN: 2353-6942

sweet cravings, weight gain, breast pain and headaches [23,24]. However, the results of studies on the relationship between serum magnesium levels and premenstrual syndrome are not conclusive. A 2019 systematic review of the literature and meta-analysis of observational studies found no significant association between serum magnesium levels and the premenstrual syndrome. However, a subgroup analysis showed that outside the United States, lower serum magnesium levels were observed in women with PMS during the luteal phase, suggesting a possible association in the group [25].

Vitamins and PMS

B group vitamins

Pyridoxine (vitamin B6) plays an important role in the reduction of PMS symptoms, as well as in the absorption of magnesium. It is also involved in many enzymatic reactions in the body, including serotonin metabolism. B vitamins are found in legumes, meat, dairy products, vegetables and fruits [18]. A study by Fathizadeh et al. [26] investigated the potential effect of a combination of magnesium and vitamin B6 supplementation on PMS symptoms. The results showed a reduction in symptoms in all study groups, including the placebo control group. It should be noted, that the decrease was the greatest in the group receiving magnesium and vitamin B6 and the smallest in the placebo group [26]. Similar results were obtained by McCabe et al., in a study in which a combination of magnesium supplementation and vitamin B6 was effective in reducing premenstrual stress, and vitamin B6 alone reduced anxiety in older women [27].

Other B group vitamins that have been studied for reducing PMS symptoms include thiamine (B1), riboflavin (B2), niacin (B3), folic acid (B9) and cobalamin (B12). The vitamins

eISSN: 2354-0265, ISSN: 2353-6942

are essential for the synthesis of neurotransmitters that may be involved in the pathophysiology of PMS. Studies on supplementation of the above-mentioned vitamins have not shown its association with a lower risk of PMS diagnosis or severity of PMS symptoms. However, a lower risk of PMS was observed in women with a high dietary intake of thiamine and riboflavin [28]. In the Nurses' Health study II (NHS II), which lasted over 10 years, women who consumed more thiamine and riboflavin for more than two years had a 25-35% reduced occurrence of the syndrome. On average, the women consumed 1.9 mg of vitamin B1 and 2.5 mg of vitamin B2 per day. In comparison, the recommended daily intake for adult women of vitamin B1 and B2 is 1.1 mg [29]. Interestingly, when the vitamins were taken as supplements, no similar effects were seen. There was also a higher risk of PMS in the group, which may be related to the greater bioavailability of vitamins from standard foods [6]. Rich dietary sources of vitamin B1 include cereal products, innards, fish, cereal groats, pulses, while B2 includes meat, beans, milk and dairy products [18].

Vitamin D

The optimal absorption and use of calcium in the body requires cooperation of vitamin D. In addition to its effects on calcium metabolism, vitamin D also has systemic effects. It affects the expression of more than 200 genes and regulates calcium-phosphate metabolism and, as a result, bone mineralization. It is also involved in the function of the muscular, immune, nervous and endocrine systems [21]. Vitamin D is also known for its antioxidant and anti-inflammatory role [30]. The impact of vitamin D on women's reproductive health is likely due to its role in regulating calcium homeostasis, cyclic fluctuations in sex hormone concentrations and neurotransmitter function [31,32]. Vitamin D affects PMS symptoms by regulating levels of calcium, neurotransmitters and sexual steroids in the body. Low vitamin D levels during the

eISSN: 2354-0265, ISSN: 2353-6942

menstrual cycle can exacerbate PMS symptoms, whereas maintaining adequate levels can help alleviate them. Additionally, vitamin D plays a role in cell growth and differentiation, which can affect severity of the PMS symptoms [17].

Heidari et al. [33] conducted a study analyzing vitamin D supplementation by women with the vitamin D insufficiency affected with PMS symptoms. After following the women for four months, the study showed a significant improvement in managing the symptoms [33].

Interesting results on the aspect were presented by the study by Bertone-Johnson et al. [34]. The authors, who analyzed the prevalence of PMS symptoms in premenopausal women, showed that those with the highest vitamin D intake had a 41% lower risk of premenstrual syndrome than those with the lowest intake. Likewise, women consuming the most calcium had a 30% lower risk of PMS than those consuming the least. In addition, drinking skimmed or low-fat milk was also associated with a lower risk of PMS. The authors suggest that, because of the beneficial effects of calcium and vitamin D in preventing osteoporosis and some cancers, it is reasonable to recommend supplementation of the nutrients even in younger women [34]. In a study by Tartagni et al. [35] of women with symptoms of severe premenstrual syndrome and low vitamin D levels, vitamin D supplementation was first given at a dose of 200000 IU and then 25000 IU every 2 weeks for 4 months. Results showed that vitamin D levels normalized within the first month of treatment and remained stable throughout the study, leading to a significant reduction in anxiety, irritability and other symptoms of mood disorders [35]. Another study, by Karimi et al, found that supplementation with vitamin D and calcium, along with cognitive behavioral therapy, led to a significant reduction in PMS symptoms [36].

Another study investigating the effect of vitamin D supplementation on painful menstruation and premenstrual syndrome showed that taking 50000 IU of cholecalciferol every week for nine weeks significantly reduced the incidence of conditions such as back pain and the tendency to cry [37]. Although there is no certainty that vitamin D and calcium prevent the

eISSN: 2354-0265, ISSN: 2353-6942

development of PMS, supplementation with the nutrients is widely recommended as an inexpensive and safe approach to reducing the troublesome symptoms of the syndrome [17].

Supplements and PMS

Supplements recommended for alleviating PMS symptoms are mainly anti-inflammatory ones. Their aim is to reduce physical symptoms, which may in turn result in a reduction in psychological and behavioral ones. They include omega-3 fatty acids, particularly the eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which are recognized for their beneficial effects on the cardiovascular system, the brain and in reducing inflammation. One study found that the intake of 1 g of fish oil containing the mentioned acids per day was associated with improvements in both mental and physical symptoms in women with PMS [38]. According to the 2022 research review, the longer the duration of supplementation, the greater the chance of beneficial effects [39]. To provide adequate amounts of the acids in the diet, it is recommended to eat at least two portions of fish per week, including one oily portion (for example salmon). If this is not achievable, daily supplementation is an option worth considering. Other substances with a potentially beneficial effect on reducing PSM symptoms are phosphatidylserine and phosphatidic acid. A randomized controlled trial by Schmidt et al. found a significant reduction in physical symptoms in the group taking the supplements, as compared with a placebo control group. Nevertheless, the evidence for the effectiveness of dietary supplements for PMS is often inconclusive and requires further research [24].

eISSN: 2354-0265, ISSN: 2353-6942

Dietary patterns, physical activity and PMS

Analysis of the relationship between the incidence of PMS and dietary patterns showed that western diet, characterized by an excess consumption of monosaccharides, saturated fats, fast food, red meat and industrially produced processed food was associated with a 49% higher occurrence of PMS. In contrast, diet based on healthy, unprocessed products, rich in vegetables, fruits and nuts was linked with a 70% lower incidence [40]. The study by Hashim et al. showed that consumption of high-calorie products rich in sugar, monosaccharides and salt correlated with a three times higher incidence of physical symptoms, whereas eating fruits led to a 65% lower risk of psychological and behavioral symptoms [41]. Latif et al. conducted a study showing the association of junk food consumption and premenstrual symptoms. They proved that diet full of refined grains, sweet snacks and carbonated beverages may be responsible for menstrual abnormalities [42].

Similar conclusions were reached in a study by Thakur et al., carried out among 330 women, where more frequent consumption of monosaccharides and fat correlated with a higher incidence of PMS [43].

When it comes to spices and herbs, cur cumin is believed to provide anti-inflammatory effects. Safari et al. highlights garlic as the possible nonconventional therapy in prevention and relieving severity of premenstrual symptoms [44].

Studies have shown that women with PMS are likely to consume more non-milk extrinsic sugars (NMES), such as sucrose, fructose and glucose, found in sweets and processed foods, during the premenstrual period, which correlates with increased intensity of symptoms [45]. Intake of carbohydrates that increase the production of serotonin can improve mood and alleviate the brain's potential lack of this neurotransmitter, acting as a self-regulating mechanism.

eISSN: 2354-0265, ISSN: 2353-6942

There is no single, ideal diet that will reduce PMS symptoms, but it seems that the optimal solution for women suffering from the syndrome is to follow a healthy, diverse and balanced diet. Research confirms that a high-quality diet rich in fruit, vegetables, whole grains, fish, nuts and olive oil is significantly associated with lower symptom intensity [42,46].

It should also be noted that physical activity, known for its general health benefits, may have a positive effect on reducing PMS symptoms [47,48]. It is proved that body movement has a great impact on regulating hormones and anti-inflammatory substances levels that is believed to be responsible for PMS symptoms. Physical exercises can elevate endorphins, stabilize progesterone and estrogen balance and increase body's own anti-inflammatory agents. Many studies have been conducted in order to prove whether aerobic or anaerobic exercises are more likely to relieve PMS symptoms. A study by Kawabe et al. suggested that women with high levels of physical activity experienced milder PMS symptoms [48]. Ravichandran et al. showed that 30 min of aerobic exercise, such as walking, swimming or running, performed 3 to 5 times a week could be effective in reducing both physical and psychological symptoms [49]. However, due to the limited variability, further studies should be considered.

Conclusions

PMS is a common condition that affects many women around the world, with varying intensity of symptoms. Diet plays a key role in mitigating PMS symptoms by modulating the secretion of hormones and neurotransmitters. Research confirms that a healthy diet, rich in fruit, vegetables, fish and nuts, can reduce the risk and severity of PMS. In addition, an adequate consumption of minerals and vitamins, such as zinc, calcium, magnesium and vitamin D, can significantly reduce PMS symptoms. Implementation of dietary changes is an effective and safe therapeutic approach to support the treatment of PMS before potential pharmacotherapy.

eISSN: 2354-0265, ISSN: 2353-6942

Disclosures and acknowledgements

The authors declare no conflicts of interest with respect to the research, authorship, and/or publication of this article.

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Artificial intelligence (Gemini Google Translate) was used only in the process of checking the grammatical and stylistic correctness when translating initially the text into English. The entire text of the manuscript was originally written by the authors.

References:

1. Frey Nascimento A, Gaab J, Kirsch I, Kossowsky J, Meyer A, Locher C. Opel-label placebo treatment of women with premenstrual syndrome: study protocol of a randomized controlled trial. BMJ Open. 2020; 10(2): e032868. https://doi.org/10.1136/bmjopen-2019-032868
2. Drosdzol A, Nowosielski K, Skrzypulec V, Plinta R. Premenstrual disorders in Polish adolescent girls: prevalence and risk factors. J Obstet Gynaecol Res. 2011; 37(9): 1216-1221. https://doi.org/10.1111/j.1447-0756.2010.01505.x
3. WHO. International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) Version: 2016 . Code N94.3 – Premenstrual syndrome [Internet]. Geneva: WHO [access Jun 2024]. Available from: https://icd.who.int/browse10/2016/en#/N94.3

4. Siuda I, Rabe-Jabłońska J. [Premenstrual syndrome and premenstrual dysphoric disorder – diagnosis and treatment]. Psychiatr. Psychol. Klin. 2007; 7(1): 29-35 (in Polish).
5. Yonkers KA, O'Brien PS, Eriksson E. Premenstrual syndrome. Lancet. 2008; 371(9619): 1200-1210. https://doi.org/10.1016/S0140-6736(08)60527-9
6. Siminiuc R, Ţurcanu D. Impact of nutritional diet therapy on premenstrual syndrome. Frontiers in Nutrition. 2023; 10. https://doi.org/10.3389/fnut.2023.1079417
7. Modzelewski S, Oracz A, Żuków X, Iłendo K, Śledzikowka Z, Waszkiewicz N. Premenstrual syndrome: new insights into etiology and review of treatment methods. Front Psychiatry. 2024; 15: 1363875. https://doi.org/10.3389/fpsyt.2024.1363875
8. Tiranini L, Nappi RE. Recent advances in understanding/management of premenstrual dysphoric disorder/premenstrual syndrome. Far Rev. 2022; 11: 11. https://doi.org/10.12703/r/11-11
9. Gudipally PR, Sharma GK. Premenstrual syndrome. Treasure Island (FL): StatPearls Publishing; 2024.
10. Lin PC, Ko CH, Lin YJ, Yen JY. Insomnia, inattention and fatigue symptoms of women with premenstrual dysphoric disorder. International Journal of Environmental Research and Public Health. 2021; 18(12): 6192. https://doi.org/10.3390/ijerph18126192
11. Marjoribanks J, Brown J, O'Brien PMS, Wyatt K. Selective serotonin reuptake inhibitors for premenstrual syndrome. Cochrane Library. 2013. https://doi.org/10.1002/14651858.CD001396.pub3
12. Anagha K, Shihabudheen P, Uvais NA. Side effect profiles of selective serotonin reuptake inhibitors: a cross-sectional study in a naturalistic setting. Prim Care Companion CNS Disord. 2021; 23(4): 20m02747. https://doi.org/10.4088/PCC.20m02747
13. Turan A, Kaya İG, Çakır HB, Topaloğlu S. Prevalence and correlates of premenstrual syndrome and premenstrual dysphoric disorder among women aged 18-25 in Turkey.

International Journal of Psychiatry in Medicine. 2023; 59(1): 101-111. https://doi.org/10.1177/00912174231189936

14. The American College of Obstetricians and Gynecologists (ACOG). Clinical practice guideline. management of premenstrual disorders. Washington, DC: ACOG; 2023.
15. Isgin-Atici K, Kanbur N, Akgül S, Buyuktuncer Z. Diet quality in adolescents with premenstrual syndrome: a cross-sectional study. Nutrition & Dietetics. 2019; 77(3): 351-358. https://doi.org/10.1111/1747-0080.12515
16. Takashima-Uebelhoer BB, Bertone-Johnson ER. Calcium intake and premenstrual syndrome. In: Hollins-Martin C, Van der Akker O, Martin C, Preedy V. Handbook of diet and nutrition in the menstrual cycle, periconception and fertility. Wageningen: Wageningen Academic Publishers; 2014. p. 978-90. https://doi.org/10.3920/978-90-8686-767-7_6
17. Abdi F, Ozgoli G, Rahnemaie FS. A systematic review of the role of vitamin D and calcium in premenstrual syndrome. Obstetrics & Gynecology Science. 2019; 62(2): 73. https://doi.org/10.5468/ogs.2019.62.2.73
18. Przygoda B, Kunachowicz H. [Nutritional value of selected foods and typical dishes]. 7th edition. Warsaw: PZWL; 2019 (in Polish).
19. Arab A, Rafie N, Askari G, Taghiabadi M. Beneficial role of calcium in premenstrual syndrome: A systematic review of current literature. International Journal of Preventive Medicine. 2020; 11(1): 156. https://doi.org/10.4103/ijpvm.IJPVM_243_19
20. Zeitoun T, Dehghan Noudeh N, Garcia-Bailo B, El-Sohemy A. Genetics of iron metabolism and premenstrual symptoms: a Mendelian randomization study. J Nutr. 2021; 151(7): 1747-1754. https://doi.org/10.1093/jn/nxab048

21. Oregon State University. Linus Pauling Institute. Micronutrient Information Center [Internet]. Corvallis: Oregon State University; 2019 [access Jun 2024]. Available from https://lpi.oregonstate.edu/mic

22. Jafari F, Amani R, Tarrahi MJ. Effect of zinc supplementation on physical and psychological symptoms, biomarkers of inflammation, oxidative stress, and brain-derived neurotrophic factor in young women with premenstrual syndrome: a randomized, double-blind, placebo-controlled trial. Biological Trace Element Research. 2019; 194(1): 89-95. https://doi.org/10.1007/s12011-019-01757-9

23. Parazzini F, Di Martino M, Pellegrino P. Magnesium in the gynecological practice: a literature review. Magnesium Research. 2017; 30(1): 1-7. https://doi.org/10.1684/mrh.2017.0419

24. Khine K, Rosenstein DL, Elin RJ, Niemela JE, Schmidt PJ, Rubinow DR. Magnesium (MG) retention and mood effects after intravenous MG infusion in premenstrual dysphoric disorder. Biological Psychiatry. 2006; 59(4): 327-333. https://doi.org/10.1016/j.biopsych.2005.07.022

25. Moslehi M, Arab A, Shadnoush M, Hajianfar H. The Association between serum magnesium and premenstrual syndrome: a systematic review and meta-analysis of observational studies. Biological Trace Element Research. 2019; 192(2): 145-152. https://doi.org/10.1007/s12011-019-01672-z

26. Fathizadeh N, Ebrahimi E, Valiani M, Tavakoli N, Yar MH. Evaluating the effect of magnesium and magnesium plus vitamin B6 supplement on the severity of premenstrual syndrome. Iran J Nurs Midwifery Res. 2010; 15(Suppl. 1): 401-405.

27. McCabe D, Lisy K, Lockwood C, Colbeck M. The impact of essential fatty acid, B vitamins, vitamin C, magnesium and zinc supplementation on stress levels in women: a

systematic review. JBI Database of Systematic Reviews and Implementation Reports. 2017; 15(2): 402-453. https://doi.org/10.11124/JBISRIR-2016-002965

28. Chocano-Bedoya PO, Manson JE, Hankinson SE, Willett Walter C, Johnson Susan R, Chasan-Taber L, et al. Dietary B vitamin intake and incident premenstrual syndrome. The American Journal of Clinical Nutrition. 2011; 93(5): 1080-1086. https://doi.org/10.3945/ajcn.110.009530
29. Jarosz M, Rychlik E, Stoś K, Charzewska J, Mojska H, Przygoda B, et al. [Human nutrition standards and their application]. Warsaw: National Institute of Public Health – National Institute of Hygiene; 2019 [access Jun 2024]. Available from https://www.pzh.gov.pl/wpcontent/uploads/2020/12/Normy_zywienia_2020web-1.pdf (in Polish).
30. Heidari H, Amani R, Feizi A, Askari G, Kohan S, Tavasoli P. Vitamin D supplementation for premenstrual syndrome-related inflammation and antioxidant markers in students with vitamin D deficient: a randomized clinical trial. Sci Rep. 2019; 9(1): 14030. https://doi.org/10.1038/s41598-019-51498-x
31. Chen Y, Zhi X. Roles of vitamin D in reproductive systems and assisted reproductive technology. Endocrinology. 2020; 161(4). https://doi.org/10.1210/endocr/bqaa023
32. Moridi I, Chen A, Tal O, Tal R. The association between Vitamin D and anti-Müllerian hormone: a systematic review and meta-analysis. Nutrients. 2020; 12(6): 1567. https://doi.org/10.3390/nu12061567
33. Heidari H, Abbasi K, Feizi A, Kohan S, Amani R. Effect of vitamin D supplementation on symptoms severity in vitamin D insufficient women with premenstrual syndrome: a randomized controlled trial. Clin Nutr ESPEN. 2024; 59: 241-248. https://doi.org/10.1016/j.clnesp.2023.11.014

34. Bertone-Johnson ER, Hankinson SE, Bendich A, Johnson SR, Willett WC, Manson JE. Calcium and vitamin D intake and risk of incident premenstrual syndrome. Archives of Internal Medicine. 2005; 165(11): 1246. https://doi.org/10.1001/archinte.165.11.1246

35. Tartagni M, Cicinelli MV, Tartagni MV, Alrasheed H, Matteo M, Baldini D, et al. Vitamin D Supplementation for premenstrual syndrome-related mood disorders in adolescents with severe hypovitaminosis D. Journal of Pediatric & Adolescent Gynecology. 2016; 29(4): 357-361. https://doi.org/10.1016/j.jpag.2015.12.006

36. Karimi Z, Dehkordi MA, Alipour A, Mohtashami T. Treatment of premenstrual syndrome: appraising the effectiveness of cognitive behavioral therapy in addition to calcium supplement plus vitamin D. PsyCh Journal. 2018; 7(1): 41-50. https://doi.org/10.1002/pchj.206

37. Bahrami A, Avan A, Sadeghnia HR, Esmaeili H, Tayefi M, Ghasemi F, et al. High dose vitamin D supplementation can improve menstrual problems, dysmenorrhea, and premenstrual syndrome in adolescents. Gynecological Endocrinology. 2018; 34(8): 659-663. https://doi.org/10.1080/09513590.2017.1423466

38. Behboudi-Gandevani S, Hariri FZ, Moghaddam-Banaem L. The effect of omega 3 fatty acid supplementation on premenstrual syndrome and health-related quality of life: a randomized clinical trial. Journal of Psychosomatic Obstetrics and Gynecology. 2017; 39(4): 266-272. https://doi.org/10.1080/0167482X.2017.1348496

39. Mohammadi MM, Nayeri ND, Mashhadi M, Varaei S. Effect of omega-3 fatty acids on premenstrual syndrome: a systematic review and meta-analysis. Journal of Obstetrics and Gynaecology Research. 2022; 48(6): 1293-1305. https://doi.org/10.1111/jog.15217

40. Pearce E, Jolly K, Jones LL, Matthewman G, Zanganeh M, Daley A. Exercise for premenstrual syndrome: a systematic review and meta-analysis of randomised controlled

trials. BJGP Open. 2020; 4(3): bjgpopen20X101032. https://doi.org/10.3399/bjgpopen20X101032

41. Hashim MS, Obaideen AA, Jahrami HA, Radwan H, Hamad HJ, Owais AA, et al. Premenstrual syndrome is associated with dietary and lifestyle behaviors among university students: a cross-sectional study from Sharjah, UAE. Nutrients. 2019; 11(8): 1939. https://doi.org/10.3390/nu11081939
42. Latif S, Naz S, Ashraf S, Jafri SA. Junk food consumption in relation to menstrual abnormalities among adolescent girls: a comparative cross sectional study. Pat J Med Sci. 2022; 38(8): 2307-2312. https://doi.org/10.12669/pjms.38.8.6177
43. Thakur H, Pareek P, Sayyad MG, Otiv S. Association of premenstrual syndrome with adiposity and nutrient intake among young Indian women. International Journal of Women's Health. 2022; 14: 665-675. https://doi.org/10.2147/IJWH.S359458
44. Jafari F, Tabarrai M, Abbassian A, Jafari F, Avanti MH. Effect of garlic (Allium sativum) supplementation on premenstrual disorders: a randomized, double-blind, placebo-controlled trial. Evil Based Complement Alternat Med. 2021; 2021: 9965064. https://doi.org/10.1155/2021/9965064
45. MoradiFili B, Ghiasvand R, Pourmasoumi M, Feizi A, Shahdadian F, Shahshahan Z. Dietary patterns are associated with premenstrual syndrome: evidence from a case-control study. Public Health Nutrition. 2019; 23(5): 833-842. https://doi.org/10.1017/S1368980019002192
46. Meneghesso BR, Constâncio GR, Rinaldi MM, Ferreira de Silva N, Dalmaso PT, Marcello VZ, et al. Evaluation of premenstrual syndrome and its relationship with changes in food consumption during the luteal phase in a university center in northwest Paulista: a prospective observational cross-sectional study. International Journal of Nutrology. 2022; 15(3). https://doi.org/10.54448/ijn2236

47. Dózsa-Juhász O, Makai A, Prémusz V, Ács P, Hock M. Investigation of premenstrual syndrome in connection with physical activity, perceived stress level, and mental status-a cross-sectional study. Frontiers in Public Health. 2023; 11. https://doi.org/10.3389/fpubh.2023.1223787

48. Kawabe R, Chen CY, Morino S, Mukaiyama K, Shinohara Y, Kato M, et al. The relationship between high physical activity and premenstrual syndrome in Japanese female college students. BMC Sports Science, Medicine and Rehabilitation. 2022; 14(1). https://doi.org/10.1186/s13102-022-00569-0

49. Ravichandran H, Janakiraman B. Effect of aerobic exercises in improving premenstrual symptoms among healthy women: a systematic review of randomized controlled trials. Int J Women Health. 2022; 14: 1105-1104. https://doi.org/10.2147/IJWH.S371193