

## Evaluation of Non-Pharmacological Strategies, Therapeutic and Cognitive-Behavioral Interventions in the Treatment of Premenstrual Syndrome: A Review Study

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### Abstract

#### Background

Premenstrual syndrome (PMS) is one of the most common problems in women of childbearing age that often interferes with their work and social relationships. The aim of the present study was to evaluate the pharmacological and non-pharmacological strategies in the treatment of PMS.

#### Materials and Methods

Medline, Scopus, Cochrane, EMBASE, and Google Scholar were searched along with SID, Magiran and Irandoc for randomized control trial and non-randomized prospective or retrospective clinical studies published to Dec. 2019 that use Pharmacological and Nonpharmacological treatment for the treatment of PMS in reproductive-age women with PMS. Study selection was done by two reviews.

#### Results

Findings of the present study revealed that pharmacological treatment of PMS include lithium and fluoxetine and non-pharmacological treatment include herbal remedies: ginger, fennel, chamomile, lavender, dietary supplements: omega-3 capsules, turmeric, citrus sinensis essential oil, carbohydrate-rich foods, soy, behavioral-psychological therapies, exercise activities such as walking and yoga, and minerals (vitamin E, B<sub>6</sub>, and calcium).

#### Conclusion

PMS treatment includes pharmacological and non-pharmacological strategies. Considering its popularity and fewer complications, non-pharmacological drugs are suggested to improve the symptoms of PMS.

**Key Words:** Non-pharmacological, Premenstrual syndrome, Treatment, Women.

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## 1- INTRODUCTION

The human reproductive system encompasses sexual and reproductive issues, which has always triggered emotional reactions; therefore, healthcare practitioners are expected to pay particular attention to both the physical and psychological aspects of women's health (1). PMS is one of the most common problems in women that is characterized with a range of physical, psychological, and behavioral symptoms occurring in 95% of women with low severity and in 5% with disabling severity during late luteal phase of the menstrual cycle (2). A series of physical symptoms include abdominal pain, weight gain, breast pain, lack of energy, headache, exacerbation of chronic illnesses such as (asthma, allergies, epilepsy and migraines) and mental symptoms, including irritability, anxiety, stress, inability to perform daily tasks, loss of control, and other psychological problems that disappear with onset of menstruation (3).

According to the last review study in 2017 in Iran, the overall prevalence of this syndrome was reported to be 70.8% in the female population of childbearing age, 80.4% in high school students, 68.9% in students, and 54.9% in general population (4). This syndrome is more common in women who do not have regular physical activity and exercise programs, consume foods high in salt and sugar, and have a stressful life. Monozygotic twins (97%) are also more likely to develop PMS than dizygotic twins (37%). The underlying cause of this syndrome is unclear, so many experts consider it a multifactorial disorder with multiple genotypes and phenotypes starting with ovulation and there is no specific laboratory test that can detect it (5). Although reviewing previous studies have suggested low levels of neurotransmitters such as serotonin and dopamine in the etiology of PMS, especially the incidence of severe

neurological disorders that require antidepressant medications. Since the causes of PMS are not fully known, its treatment is also affected by various factors. PMS management ranges from systematic non-pharmacological strategies, to antidepressants, hormonal strategies, and cognitive-behavioral therapies (6). In fact, a considerable series of physical, psychological and behavioral symptoms that, to varying degrees, interfere with women's routine lives and disrupt their daily activities, employment and family care, affect their quality of life largely (7).

Stress, behavioral fluctuations, loss of control, depression and anger, drowsiness, and incompetency in coordinating affairs, and increasing or decreasing sexual desire highlight the importance of pursuing a treatment for this disorder (8). Considering the importance of the subject matter, many studies have investigated the prevalence, etiology, and treatment of symptoms of this syndrome in the last two decades. However, despite previous researches, medical and non-medical communities indicate a periodic and debilitating disease among women of childbearing age that is associated with symptoms of PMS in the clinical setting, thus, it is essential to perform more accurate evaluation of symptoms of this syndrome and pharmacological and non-pharmacological treatments. Besides, as healthcare costs increase worldwide, the use of traditional and alternative medicine is becoming increasingly important.

Considering the increasing popularity of these treatments, healthcare providers must be prepared to answer patient questions regarding these treatments. In other words, they must have reliable, evidence-based information to deliver high quality services. Therefore, the aim of the present study was to review the therapeutic interventions of PMS in women of childbearing age with PMS symptoms.

## 2- MATERIALS AND METHODS

All clinical trials and non-randomized prospective or retrospective clinical studies evaluating the effect of non-pharmacological treatment, pharmacological treatment on PMS were searched on the electronic databases of Scopus, EMBASE, Cochrane, Web of Science and Medline (via PubMed) with no language or time restrictions (up to end of August 2019), using the combination keywords of: (PMS OR Premenstrual syndrome) AND (Therapy OR therapeutics, treatment OR Non-pharmacological OR Pharmacological OR Pharmacology OR Drugs OR Herbal medicine OR Medicinal plants OR Herbal Remedies OR Alternative medicine OR Complementary therapies OR Dietary adjustments OR Exercise) and their Persian synonyms were searched in the national databases (Magiran, SID, and IranDoc). Two independent researchers performed the search process and a supervisor judged any disagreement in this regard. After reviewing the titles of the articles, they were evaluated at the next stage in terms of abstract communication with the intended purpose. Selected items were thoroughly studied and the important notes were extracted. In cases where it was required, the authors for better clarity provided additional comments and descriptions for the content.

## 3- RESULTS

The results were classified into two categories: pharmacological treatment and non-pharmacological treatment, which are described below.

### 3-1. Non-pharmacological treatment

#### 3-1-1. Herbal Medicine

Ginger is one of the herbs traditionally used to treat painful menstruation and its scientific name is *Zingiber Officinale*. Ginger is a tropical herb and its dried or fresh root is used as a medicine in

traditional medicine. Previous studies showed that ginger is effective in preventing nausea, vomiting, motion sickness, dizziness, and rheumatism. Studies have also shown that ginger can also affect prostaglandins. Khayat et al. carried out a double-blind clinical trial on 70 students with PMS who were randomly divided into ginger and placebo groups. Results of statistical analysis showed that ginger may be effective in reducing the severity of mood, physical, and behavioral symptoms of PMS, but it was finally noted that therapeutic use of this drug needs further research (4). Valerian (*Nardostachys jatamansi*) belongs to the valerianaceae family, known as cat grass. The name valerian may be derived from the Latin word "Valere", which means healthy, strong and good. Valerian root is used for medicinal purposes.

Many compounds have been identified in the extract of this plant, the most important of which are valproates, iso-valproates and didro-valproates as well as essential oils and fractions of valproate. Today, the calming effects of valerian are attributed to its volatile oils, including valerenal and valeric acid. The three main areas of use for valerian include nervous emotion, nervous insomnia, and palpitations. In a double-blinded clinical trial, Behboodi et al. randomly divided 100 patients with PMS into sedamin (valerian root extract) and placebo groups. The findings showed that valerian root extract may be effective in reducing the severity of PMS-induced mood and behavioral symptoms as compared to the control group (5). Some studies have mentioned the beneficial effects of omega-3 fatty acids in the treatment of PMS. Omega-3 fatty acids stimulate the secretion of anti-inflammatory leukotrienes and prostaglandins (PGs) (PE3, P13 and thromboxane), which reduce uterine contractions and thus reduce ischemia and pain. Rose extract is also used as a

treatment for depression and decreased sexual desire and has long been used in Iranian traditional medicine as a cheerful substance, an anti-depressant and anti-anxiety drug and, as a mild antidepressant and libido-boosting agent in aromatherapy. The drug has effects similar to amphetamine in the brain. Jamilian carried out a clinical trial on 120 patients with PMS. The participants were randomly assigned to three equal groups: one omega 500 mg capsule rose oral drop, and placebo. Psychological and mood symptoms, including nervous stress, irritability, anxiety, depression, fatigue, forgetfulness, decreased libido, lack of concentration, crying, suicidal tendency, and increased appetite in the rose extract-treated group were reduced more significantly than Omega-3 and placebo groups ( $p=0.001$ ).

However, physical symptoms, including edema, breast pain, flatulence, and palpitations in the omega-3 treated group were significantly improved as compared the two other groups ( $p=0.001$ ). There was no significant difference between all three groups in terms of severity of headache and forgetfulness symptoms before intervention (6). Among the herbs used traditionally as a decoction to treat menstrual disorders, including PMS, is fennel. Fennel (*foeniculum vulgare*), belongs to the apiaceae family. The usable parts of the herb include root, leaf, and fruit. This herb has anti-inflammatory, antispasmodic, anti-bloating, diuretic, expectorant, laxative, and analgesic effects and is effective in the treatment of gastrointestinal disorders considering its anti-ulcer and antioxidant properties. It is also used for the treatment of neurological problems. In a single-blinded clinical trial, Kialashaki et al., randomly assigned 60 students with PMS symptoms studying at Shahrekord University of Medical Sciences into fennel and placebo groups ( $n=30$  patients per group). The severity of

the syndrome was determined 2 months before treatment and compared with the post-treatment phase. There was a statistically significant difference between the two groups in terms of the mean scores of PMS symptoms after the intervention and it was concluded that fennel extract was likely to be effective in reducing PMS symptoms (9). In a clinical trial on 60 patients with a history of PMS, Yazdani et al., also reported a significant decrease in severity of symptoms between the control (placebo) cycle with fennel and chamomile cycles only in three pain symptoms, including abdominal and pelvic pain, fatigue, lack of energy, and depression with anger among the 16 symptoms listed in the questionnaire ( $p<0.05$ ) (1).

In addition, containing 10-12% of oil, fennel fruit comprised of a little mucilage and essential oil and phenol ethers that are responsible for its medicinal properties. The main constituents of this herb include trans-anethole, limonene, and fenchone. The fennel fruit is the best part for the extraction of trans-anethole. In a clinical trial aimed at comparing the effects of *echinophora sibthorpiana*, fennel, and placebo on 90 students with moderate to severe PMS studying at Shahrekord University of Medical Sciences, Delaram et al., found that the extract of the above herbs was able to reduce the severity of PMS symptoms during treatment and *echinophora sibthorpiana* and fennel had a similar effect, far greater than placebo (10). Flax (*Linum.usitotism*) is a native plant of the Middle East. Flaxseed is rich in alpha-linolenic acid (ALA), and omega-3 fatty acids as well as a type of phytoestrogen named lignan. Vitagnus, an herb with finger-shaped leaves and the scientific name of chasttree, was traditionally used by the ancient Greeks for the treatment of female reproductive disorders such as dysmenorrhea, infertility, menopausal complications, periodic breast pain, and PMS. Vitagnus reduces FSH

production and release of LH and increases progesterone level, and, therefore, decreases the estrogen-progesterone ratio by affecting hypothalamic-pituitary-axis. Vitagnus is a safe herbal drug and its side effects are mild and reversible. There has also been no report of drug interactions; however, theoretically, the receptor may interfere with dopamine receptors. In a three-blind randomized controlled trial, Mirghafourvand et al. randomly divided 159 women with PMS into 3 groups (n=53 per group). They administered Group I with powdered flaxseed and placebo, group II with vitagnus tablets, placebo of flaxseed, and group III with placebo of both drugs. The findings showed that PMS symptoms were significantly improved in both intervention groups in the first and second months and it was thus concluded that flaxseed and vitagnus were effective in improving PMS symptoms (11).

Among the herbs traditionally used as a decoction to treat menstrual disorders, including PMS, is *echinophora sibthorpiana*. This herb belongs to apiaceae family and is considered as an exclusively endemic herb in Iran. It is used as a spice and as a flavoring agent. It is known by the local names of Khosharooz, Tigh Tooragh, and Koshander. Previous studies have shown that this herb consists of saponins, flavonoids, and alkaloids. The methanol extract of *echinophora sibthorpiana* has inhibitory effect on the growth of three species of bacteria and fungi. In a single-blind clinical trial, Delaram and Haeri randomly divided 60 students with PMS into two groups of 30 patients receiving *echinophora sibthorpiana* extract and placebo. The results showed that *echinophora sibthorpiana* extract is likely effective in reducing the symptoms of PMS and it was recommended to use the above herb in the treatment of PMS (12).

Another herb is *Vitex agnus-castus* that grows in Mediterranean countries and Central Asia. As a hormone-free herb,

*Vitex agnus-castus* is effective on pituitary hormone production, particularly luteinizing hormone using a new mechanism and regulates women's menstrual cycle by increasing progesterone level. Aghajani Delavar et al. randomly divided PMS patients into two groups, namely experimental and control groups (n= 10 patients per group). The patients then underwent the treatment process for three successive cycles using 30 vitagnus drops or placebo twice a day for at least 5 days before menstruation. Findings showed that 70% and 30% of the subjects recovered in the vitagnus and placebo groups, respectively, and the difference was statistically significant (13).

St John's-wort perforate, with the scientific name of *hypericum perforatum*, is one of the medicinal plants, which prevents amino oxidase activity and serotonin reuptake, the reduction of which plays an important role in the development of PMS. *Hypericum perforatum* is also called prozac considering its high similarity with fluoxetine in terms of mechanism of action and therapeutic properties. PMS patients were divided into two groups (n=35 individuals per group), and were treated with 30 drops *hypericum perforatum* or placebo twice a day, at least 7 days before menstruation for two consecutive cycles (Pakgohar et al.). The severity of PMS symptoms was reduced by 46.45% in the *hypericum perforatum*-treated group and 1.18% in the placebo group. The results of t-test also showed a significant difference between the two groups in terms of reduced severity of PMS symptoms (p= 0.000) (14). The name lavender is derived from the word lavare, which means to wash. Numerous properties have been attributed to lavender during the previous studies such as: antispasmodic, analgesic, diuretic, inducing general sweating, analgesic, increasing bowel movements, and regulating menstrual bleeding. One of the most important ingredients of lavender

essential oil includes linalyl acetate. Linalyl acetate is known as an analgesic and sedative component that may have an effect on PMS. In the study of Kialashaki et al., 90 students were randomly divided into case and control groups. The students were treated with lavender extract one week before menstruation (two drops/twice daily for 2 consecutive months), and pre- and post-treatment severity of PMS symptoms were then measured and compared. Findings showed that the severity of symptoms decreased in both groups, but such reduction was more pronounced in lavender group than placebo ( $p = 0.000$ ) (9).

### 3-1-2. Dietary supplementation

Turmeric is one of the drugs used in the traditional medicine. Curcumin, chemically known as diferuloylmethane, is a yellow polyphenol, is a major active ingredient of turmeric, and has potent antioxidant and anti-inflammatory effects. Curcumin has antioxidant effects similar to vitamins E and C. Curcumin affects inflammatory responses by inhibiting prostaglandins, and is known to be effective in treating inflammatory diseases, diabetes, tumors, cardiovascular, respiratory, nervous system, skin, liver, and bone diseases and menopausal symptoms. In their study, Khayat et al. randomly divided 70 students with PMS into curcumin and placebo groups. Patients received two curcumin capsules a day for three cycles starting from 7 days before menstruation to 3 days after menstruation. The findings showed that curcumin was effective in reducing the severity of mood, behavioral and physical symptoms of PMS (15). Citrus sinensis essential oil has the following effects: stimulating the central nervous system, improving mood status, and sedative, anti-spasmodic, anti-inflammatory, anti-bloating, digestive, hypotensive and diuretic effects. Clinical trials also reported that citrus sinensis essential oil has effects similar to

fluoxetine in the treatment of depression. Azgoli et al. carried out a randomized double blind, controlled trial on 80 students with PMS who resided in dormitories affiliated to Shahid Beheshti University of Medical Sciences. Subjects were divided into two groups ( $n=40$  per group) and then treated with 10 drops of citrus sinensis essential oil for two consecutive months or placebo three times daily, at least 14 days before menstruation. The findings showed that citrus sinensis essential oil was effective in improving the physical and psychological symptoms of PMS and it was suggested to take the drug in the luteal phase for at least two months (16). Through the mechanism of action of insulin, which increases uptake of amino acids except tryptophan in muscles, carbohydrate-rich foods lead to a further increase in the blood tryptophan level as compared to other amino acids and the synthesis of serotonin increases as a result of increased transport of tryptophan across the blood-brain barrier because the cerebral deficiency of this neurotransmitter is known to be an important risk factor for PMS. In a study on 76 individuals with PMS, Mahmoudi et al. compared the effect of adding carbohydrates to diet as supplement and nutrient on the severity of PMS. Findings showed that adding carbohydrates to diet as supplement and nutrient was effective in reducing the severity of PMS in all three groups of mood, behavioral, and physical symptoms ( $p<0.001$ ); however, carbohydrate supplement was more effective than its nutrient form (17). Soy is one of the new products to treat PMS. Soy has been identified as a reliable source of isoflavones. The most important soy isoflavones include didzin, genistin, and glycitin. Isoflavones can bind to and act on estrogen receptors because of their structural similarity to estrogenic steroids, which is called phytoestrogenic effect. Soy isoflavones have estrogenic effects during the follicular phase when the

concentrations of endogenous estrogens are low and have potential anti-androgenic effects during the luteal phase when the concentrations of endogenous estrogens are high. Therefore, soy isoflavones theory is effective in reducing the severity of PMS symptoms by stabilizing cyclic estrogen fluctuations. In a study of the effect of soy on physical, psychological and behavioral symptoms of PMS, Beidokhti et al., gave the soy biscuit to the case group (50 mg of isoflavin, 2 times daily for 2 cycles), and a placebo containing plain flour biscuit to the other group at dose and duration similar to the case group. Results of the above study showed that soy can reduce physical and psychological symptoms as well as shorten the duration of PMS (18).

### 3-1-3. Cognitive behavior therapy

In a study, Bagheri and Sajjadian randomly assigned 30 patients with PMS into experimental and control groups. The experimental group received mindfulness-based stress reduction (MBSR) treatment during eight 90-minute group sessions, but the control group received no intervention. The findings indicated that MBSR treatment had a significant effect on decreasing the severity of physical and psychological symptoms and pain catastrophizing (rumination, magnification, and helplessness) in post-test and follow-up phases ( $p < 0.01$ ) (8). In another study by Pourfaraj, 30 women with PMS were selected and randomly assigned into experimental and control groups ( $n=15$  individuals per group). The experimental group underwent group-based acceptance and commitment therapy (ACT) for eight one-hour sessions, and the control group received no intervention. The results showed a significant difference between the experimental and control groups in terms of the overall scores of perceived stress and aggression components (19). In another study aimed at investigating the effectiveness of

mindfulness training on internal happiness and non-impulsive behavior in PMS women, the results of analysis of covariance (ANCOVA) showed that mindfulness training was effective in increasing internal happiness and decreasing non-impulsive behavior in PMS women. It has thus been concluded that MBSR treatment is effective in enhancing internal happiness and non-impulsive behavior because of its metacognitive monitoring (20).

### 3-1-4. Lifestyle modification: physical activity

A clinical trial was performed on 35 girls with PMS. The participants went walking for 2 months (two menstrual cycle, 30 minutes and 3 times a day) until two weeks before their monthly periods. Results of statistical analysis showed that the exercise improved physical symptoms (abdominal pain, low back pain, pain, and breast tenderness ( $p < 0.05$ )) improved mood symptoms (irritability, restlessness, weakness, fatigue, crying, depression, and the desire to stay home) ( $p = 0.05$ ), and improved anxiety symptoms ( $p = 0.08$ ) (9). Another research was conducted to evaluate the effectiveness of yoga techniques along with cognitive behavioral therapy on decreasing physical symptoms of PMS. Thirty students with PMS symptoms were selected using convenience sampling method and assigned into the intervention and control groups. The intervention group received 8 sessions of cognitive behavioral therapy and 24 sessions on yoga poses. Findings showed that yoga exercises along with cognitive behavioral therapy had a positive effect on decreasing physical symptoms of PMS (21). In a study aimed at comparing the effect of 8 weeks walking and running program on PMS symptoms on high school students, Ebadi et al. randomly divided the subjects into three groups ( $n=25$  per group). They then performed the running exercise during three sessions of

45 minutes per week at 65-70% of maximum heart rate for 8 weeks. The intervention group did their activities, which were of varying degrees of intensity, including normal, fast, and slow, during 5 sessions of 30 minutes per week for two months. The control group did not take any action throughout the 8-week study. Findings showed that running and walking exercises had significant positive effect on physical ( $p < 0.001$ ), and psychological symptoms ( $p < 0.002$ ) of PMS as compared to any other exercise activity (22). In another clinical trial aimed at investigating the effect of massage on 30 students with PMS, the subjects were divided into massage and control groups. Massage protocol was performed for 8 weeks. Comparison of PMS symptoms before and after massage intervention showed that massage significantly reduced the mean psychological (64.8%), and physical symptoms (56.7%). There was no significant difference between the intervention and control groups in terms of mean psychological symptoms after 8 weeks, but the mean psychological symptoms were significantly lower in the massage group than the control group ( $p = 0.01$ ) (2).

### 3-1-5. Effect of Minerals

A double-blind clinical trial was carried out on the effect of calcium on physical symptoms of PMS of 64 medical students in 2014. Results revealed that all physical symptoms of PMS (headache, low back pain, foot pain, depression, irritability, general pain, abdominal pain) were significantly reduced in the first cycle after calcium intake, except for cramp. The severity of all physical symptoms (cramp, headache, low back pain, foot pain, depression, irritability, general pain, abdominal pain) also decreased significantly in the second cycle after calcium intake ( $p < 0.05$ ) (23). Wyatt et al. (1999) performed a meta-analysis of nine clinical trials involving 934 patients with

PMS in the United States. The results of this meta-analysis showed that doses of vitamin B-6 up to 100 mg/day might be useful in reducing the symptoms of PMS. Of the 934 participants of this meta-analysis, one patient developed neuropathic complications due to high doses of vitamin B6 (24). A clinical trial was performed on 75 dormitory students with PMS. Subjects were divided into two groups of vitamin E and placebo. The vitamin E recipient group was given one vitamin E capsule (400 IU/day) for 7 days before menstruation and treatment continued for 2 months. Findings showed that the muscle pain severity score was significantly decreased in the vitamin E recipient group compared to the placebo group ( $p < 0.001$ ) (7).

### 3-2. Pharmacological treatment

Vitagnus corrects these changes and controls their symptoms by mimicking pituitary hormones (CTH-FSH-LH). This drug inhibits prolactin secretion by affecting the dopamine agonist, which can also play a role in improving PMS symptoms. Symptoms of PMS are commonly seen in women with higher levels of prolactin. In a study by Mohajerani and Rezvani, patients with PMS were randomly divided into two groups, namely, fluoxetine and vitagnus-treated groups. Statistical analysis showed that although headache, sleep disturbances and daily dysfunction were decreased significantly in both groups after taking the drug, there was no significant difference between the two groups ( $p > 0.05$ ) (25). A cross-sectional clinical trial was carried out on 50 patients diagnosed with PMS. Patients were randomly assigned into lithium-treated (600 mg/daily) or pyridoxine-treated groups (100-200 mg/daily) and received the doses for 7 days. The results showed that lithium treatment was more effective than pyridoxine one in reducing the symptoms of PMS and especially mood symptoms

(26). In a single-blind study, Mokhber et al. divided 84 patients with PMS into 2 groups, namely, fluoxetine (20 mg / day) and placebo (multivitamin capsule and salts). Results showed that fluoxetine was significantly more effective than placebo in improving PMS symptoms ( $p < 0.01$ ) (3).

#### 4- DISCUSSION

Considering an increase in social role of women in and achievement of high-demanding positions in the labor market of the modern era, premenstrual disorders have deprived women of the chance to perform their tasks as efficiently as possible and emphasized the importance of eliminating the problems of women during this period (27). Different treatments have been suggested for symptoms of PMS. Pharmacological treatments (diuretics, GNRH, progesterone), surgery, supplements (vitamins and minerals), exercise, massage, yoga, diet modification, and herbal remedies have been suggested to improve the symptoms of PMS. Other treatments include vitamin B<sub>6</sub>. Findings suggest the positive effect of vitamin B<sub>6</sub> on reducing PMS symptoms. Data analysis showed that vitamin B<sub>6</sub> plays a positive role in reducing symptoms of depression, anxiety, restlessness, and breast tenderness (24). Majority of relevant studies also indicate the positive effect of Vitamin B<sub>6</sub> in reducing PMS symptoms (28). Acceptance of the role of pyridoxal phosphate (active form of vitamin B<sub>6</sub>) in the proper synthesis of many neurotransmitters (29) may justify the reduction of symptoms of depression, anxiety, restlessness, drowsiness and the breast tenderness. Vitamin E and calcium were also more effective than placebo (7, 23). Some lifestyle changes and other safe interventions, such as removing caffeine from diet, smoking cessation, regular exercise, eating a tonic diet and regular meals, getting enough sleep, and reducing stress are effective in relieving symptoms of PMS in some patients (30). Some

studies have shown that cognitive-behavioral coping skills training can reduce the negative effects of PMS symptoms and maintain such reduction over time (8, 19, 20). Concerning the effectiveness of cognitive therapy and pharmacological treatment on PMS, it has been shown that coping skills training was more effective in improving PMS symptoms among women as compared to the mental and relaxation therapy (31). Previous studies have mentioned the beneficial effects of hypericum perforatum, saffron, evening primrose oil, starch diet, fennel and chamomile, vitagnus, ginkgo biloba, acupuncture and group counseling among herbal remedies and supplements (32).

#### 5- CONCLUSION

The findings of the present study showed the pharmacological treatment of PMS include 600 mg lithium for one week and fluoxetine 20 mg/daily for 3 months, and non-pharmacological treatments include: herbal remedies (ginger, valerian, fennel, chamomile, flaxseed, echinophora sibthorpiana, vitagnus, hypericum perforatum, lavender), dietary supplements (omega-3 capsule, turmeric, citrus sinensis essential oil, carbohydrate-rich foods, soy), psychological therapies (such as mindfulness-based stress reduction, mindfulness training on internal happiness, training acceptance and commitment therapy group-treatment), exercise activities (such as running and walking and yoga, and minerals (vitamin E, B<sub>6</sub>, and calcium), can be used for decreasing the PMS signs.

**6- CONFLICT OF INTEREST:** None.

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