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Research Article

The Relationship between Premenstrual Syndrome, Dietary, Lifestyle Behaviors and Its Correlation with Body Weight Status among Females: A General Review

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Abstract

Premenstrual Syndrome (PMS), is a worldwide phrase present in all cultures and has been the subject of consideration for many biomedical researchers. A large number of reproductive age women experience at least some form of menstrual symptoms. The severity and chronic nature of PMS has led to the prevalence of this disorder in women and interrupts their work, family relationships, and daily activities. Furthermost menstruating women (80-95%) experience physiological changes in the premenstrual period. Many Pharmacological and non-pharmacological methods employed to remedy PMS symptoms. Therefore, physicians should modify therapy based on patient tolerance and response to each medication. Regarding diet, although "PMS diets" have been recommended, few of the recommendations were founded on scientific fact. There is a link between premenopausal women following a Western diet containing high fat and low fiber with vegetarians exposed that a low-fat vegetarian diet decreased plasma oestrogen levels and the duration of premenstrual symptoms. Therefore, changing dietary guidelines towards consuming more complex carbohydrates and vegetables, proteins, less simple carbohydrates, animal proteins and saturated fatty acids and increasing fiber intake. Severe PMS symptoms have a negative impact on female students' academic performance; consequently, mental health professionals have a major role in defining factors that buffer severity of PMS among females.

Keywords: Academic performance; Mental health; Menstrual symptoms; Premenstrual syndrome; Western

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Introduction

Menstruation is the cyclic, orderly sloughing of the uterine lining, in response to the interactions of hormones produced by the hypothalamus, pituitary, and ovaries. The menstrual cycle may be divided into two phases: (1) follicular or proliferative phase, and (2) the luteal or secretory phase. The length of a menstrual cycle is the number of days between the first days of menstrual bleeding of one cycle to the onset of menses of the next cycle [1]. The menstrual cycle in women is described as high variability in cycle length (26-35 days), five day menses, a fertile phase from five days before to the day of ovulation, and low fertility which is reliant on cycle length and age [2].

Premenstrual Syndrome (PMS) is characterized by the presence of physical, behavioral and emotional symptoms that occur repetitively in the luteal phase of the menstrual cycle and interfere with certain aspects of life [3]. Most common PMS symptoms are irritability, depressive mood, muscle pain and arthralgia anxiety, changes in appetite and sleep quality, nausea, vomiting, weight gain, water retention headache, , enlargement and increase in the sensitivity of breasts, , fatigue, acne and diarrhea [4]. The most severe form of PMS, premenstrual dysphoric disorder, is characterized by more severe symptoms that are associated with psychological dominance and intense mood swings, which may exacerbate and/or weaken the existing symptoms [5].

These symptoms are a frequent source of concern for women of reproductive age and can impair their work productivity, relationships, social activities and life quality [6]. Overall results show, that up to 90% of women of reproductive age experience several premenstrual symptoms varying from mild to severe; In the United States, the prevalence of the syndrome varies between twenty percent and forty percent for cases of moderate severity and between 3% and 8% for severe cases [7]. A recent prevalence meta-analysis shows that the worldwide prevalence sways between 10% and 98% [8].

Apart from the pathological factors that disrupt women's cycles, dietary or lifestyle trends have also been reported to influence the menstrual pattern like depression, cigarette smoking, and changes in body weight and stress [9]. Although the aetiology of PMS has not been clearly defined, factors such as dietary intake (excessive energy intake, deficiency of calcium, magnesium or thiamine), genetic predisposition and psychological abnormalities play a major role in the occurrence of PMS. It seems that these factors frequently result in hypoglycaemia, insulin resistance, dysmenorrhea and symptoms of depression, anxiety or irritability in women with PMS [10].

Different aspects of nutritional status have been associated with the presence and/or severity of PMS. First, obesity has been suggested as a risk factor for PMS according to the results of cross-sectional studies conducted on adult women aged 25-52 years [11]. Because obesity is diagnosed using anthropometrics, one of the four components of nutritional assessment, and is generally an inevitable outcome of over nutrition, it is considered as a factor that linked to nutritional status. Second, cross-sectional studies showed that consumption of certain specific food and beverages such as tea, coffee, soft drinks, alcohol and chocolate was associated with the presence of PMS symptoms in adult women [12]. Finally, excessive or deficient intake of certain specific macronutrients (e.g. total carbohydrates, total fat, saturated and polyunsaturated fatty acids) and micronutrients (e.g. thiamine, riboflavin, vitamin B6, vitamin D, calcium, magnesium, sodium, potassium and zinc) were associated with the presence or severity of PMS symptoms in adult women [13]. Under nutrition and overweight is a global problem, especially overweight and obesity spreading even to developing world, where it is an increasing threat to health. There are number of factors associated in the prevention of PMS and maintaining healthy weight is one of them. Previous studies suggested that maintaining a healthy body mass may be important for preventing the development of PMS and concluded that all the underweight female students had PMS and 93.4% and 90.9% of overweight and obese students, respectively, had PMS [11].

Premenstrual Syndrome (PMS)

Definition of Premenstrual syndrome

Premenstrual Syndrome (PMS), is a worldwide phrase present in all cultures and has been the subject of consideration for many biomedical researchers. A large number of reproductive age women experience at least some form of menstrual symptoms [14]. Over 150 PMS symptoms have been recognized [15]. There is no single precise definition of the PMS, but it is generally accepted that can be broadly is a condition characterized by physical, affective, and behavioral symptoms that significantly impair the daily lives of women, including work and personal activities, during the luteal phase and spontaneously resolve within a few days of the onset of menstruation through reproductive age [16]. Alternative definition is a disorder that affects the lives of millions of women from menarche to menopause. Pre-Menstrual Dysphoric Disorder (PMDD) is a more severe condition that consist of functional impairment and disruption of personal relationships such as chronic depression [17]. PMS has undesirable lifetime effects on women's lives as they are distracted from their occupational and academic activities and interpersonal relationships, and experience degraded quality of life, and aggravating impulsivity, particularly in young adults. PMS has rendered students vulnerable to academic-performance impairment, comprising absenteeism and poor grades. In spite of the high prevalence of PMS among young adults, few seek help or demonstrate awareness, and many engage in immature coping [14]. PMS affects the day to day life of menstruating women of any age, race, and part of the world. Prescribed medications as oral contraceptives and antidepressants, some over the counter drugs such as ibuprofen, paracetamol, and home cures are taken as a treatment [18].

The prevalence of PMS

The severity and chronic nature of PMS has led to the prevalence of this disorder in women and interrupts their work, family relationships, and daily activities [19]. In the United States, twenty eight million women suffer from PMS [20]. Furthermost menstruating women (80-95%) experience physiological changes in the premenstrual period [20]. A prospective study conducted in 2016 by Shehadeh and Hamdan-Mansour (2018) to examine the prevalence of PMS, and their relationship with academic performance among female university students in Jordan, their result showed prevalence of PMS was 92.3%. There were significant differences in self-determination levels between students with PMS. An additional study conducted by Albsoul-Younes et al., (2018) to investigate the frequency, associated factors, and management approaches PMS in Jordanian women, they found moderate-severe PMS was reported by 29% of women [21]. Younger unmarried women had the more severe condition [21].

Symptoms and clinical manifestations

Premenstrual symptoms are a symptom that perform throughout the week prior to menstruation and resolve within one to two days after onset of menstruation. Millions of women are suffering from PMS during their reproductive age (about 40% of women will experience this syndrome in their life span) and severity of the signs among five to ten percent is such that can impact daily routine. In PMS symptoms are relieved at or shortly after commencement of menstrual flow [22]. The American College of Obstetrics and Gynecology (ACOG) published the diagnosis criteria for PMS. It was considered if at least one of the six affective and one of the four somatic symptoms was reported five days prior to the onset of menses in the three prior menstrual cycles and ceased within four days of onset of menses [23]. The most significant somatic symptoms are feeling overwhelmed, food craving, insomnia or hypersomnia, headache, pelvic pain and discomfort, breast tenderness, joint pain, bloating; and the most common and distressing affective symptoms are irritability, anxiety, depression, mood swing, hostility, poor concentration, confusion, social withdrawal and interpersonal conflicts [22]. The classic symptoms of PMS include symptoms such as mood swings, anxiety, and irritability, and physical symptoms such as headache, fatigue, bloating, sleep disturbances, nausea, and breast tenderness [24].

Pathophysiology and etiology of PMS

Variation in gonadal steroids, in particular exposure to progesterone, is essential for triggering PMS [25]. In the past of menarche, during pregnancy and after menopause (without hormone replacement), PMS does not happen. Symptoms are also unusual during naturally anovulatory cycles and after ovarian suppression with GnRH agonists [25]. Whereas serum estradiol and progesterone levels do not differ between women with and without PMS, the central and peripheral responses to the rise and fall of sex steroids are characteristic. The most accepted hypothesis suggests a relationship between exposure to progesterone, allopregnanolone (Allo) serotonin and occurrence of PMS symptoms. These relationships also are the basis for some of the PMS treatments [25].

At present there are two theories assumed for the aetiology of PMS. Both involve the ovarian hormone cycle. The theories are: 1. some women are particularly sensitive to progesterone and progestogens, as serum estrogen or progesterone are the same in those with or without PMS. 2. The second theory is that estrogen and progesterone decrease serotonin levels, a chemical neurotransmitter known to control mood. This theory is proven by Selective Serotonin Reuptake Inhibitors (SSRIs) reducing PMS symptoms by increasing serotonin levels. Low serotonin levels are also associated with depression and anxiety [10].

Pharmacological and non-pharmacological methods used to treat PMS

Many Pharmacological and non-pharmacological methods employed to remedy PMS symptoms. Therefore, physicians should modify therapy based on patient tolerance and response to each medication [10].

Pharmacological and Herbal Treatment

Selective serotonin reuptake inhibitors and serotonin-norepinephrine reuptake inhibitors

Women who undergo from severe PMS, pharmacological treatment is the recommended, predominantly Selective Serotonin Reuptake Inhibitors (SSRIs) and Serotonin-Norepinephrine Reuptake Inhibitors (SNRIs), included paroxetine, fluoxetine, sertraline, venlafaxine, citalopram, escitalopram, and duloxetine [26]. In most cases, antidepressants were used continuously, nonetheless in some other studies antidepressants were provided intermittently (only during the luteal phase) or were even narrowed to or initiated by the onset of PMS symptoms [9]. SNRIs represent the first-line therapy for premenstrual dysphoric disorder and severe, mood-related premenstrual syndrome. Generally, SSRIs recover symptoms (i.e., irritability, mood swings, and emotional lability) and global functioning, whether they are used continuously or intermittently [9]. Continuous consumption seems to be effective to alleviate depressed mood and somatic (e.g., pain) symptoms. Additional antidepressants, such as fluvoxamine and bupropion, have not formed positive results and should not be selected as a first-line treatments for PMS [26].

Hormonal treatment: combination of oral contraceptives

Pearlstein T [27]. Mentioned the Combined Oral Contraceptives (COCs) containing ethinyl estradiol 20 μg and 3 mg of drospirenone, administered as 24 days of active pills followed by a four days hormone-free interval, were additional first-line treatment decision for relieving the emotional and physical symptoms of severe PMS. In 2006, this medication met FDA approval for the treatment of severe PMS in women desiring oral contraception (Rapkin et al., 2019). The effectiveness of this particular COCs for reducing premenstrual symptoms may be due to its administration in a 24/4 regimen which delivers more stable hormone levels or to the unique anti-mineralocorticoid and anti-androgenic properties of drospirenone [26].

Complementary and alternative medicine for Premenstrual Syndrome (PMS)

Many diverse alternative methods have been learned for treatment of premenstrual symptoms (e.g., light healing, acupuncture, herbal supplements and massage), but for the most part these treatments are not appropriate for widespread clinical use. Of the several herbal supplements that have been tried for PMS [26]. Vitexagnuscastus, belongs to the family Verbenaceae, under the common names of chaste tree and monk's pepper. The fruit has been suggested as a hormone like medication for improving menstrual disorders and as an antiepileptic, carminative, energizer, sedative, anticonvulsant, tranquilizer, and for treating digestive disorders [28]. European Medicines Agency and German health experts verified the beneficial effect of V. agnuscastus on adjustable the menstrual cycle and treating the PMS and mastalgia [29]. The chief active components of this plant are flavonoids which contain casticin, apigenin, vitexin, isovitexin, luteolin, orientin, isoorientin, santin, 6" caffeoylisoorientin, and the possible estrogenic component which is documented as an estrogen receptor ligand due to its selective affinity, molecular weight, and retention time; an in vitro study indicated that linoleic acid could bind to estrogen receptors and induce certain estrogen inducible genes [28].

Chasteberry extract may be related with reduced gonadotropin, estrogen, progesterone, and prolactin levels, inferior to its role as a dopamine agonist [29]. In one randomized controlled trial, fourteen drops (range: 2-10 drops, each of approximately 4.5 mg) of Chasteberry, ordered for six days before menstruation for six consecutive months, significantly reduced the severity of several different PMS symptoms. In cooperation Chasteberry and fluoxetine have been shown to confer benefits for severe PMS [30].

Non-Pharmacological Treatment

Modification in lifestyle

Lifestyle modifications may improve some symptoms for affected women, but they are often insufficient treatment for patients with severe symptoms [31]. Patients should be encouraged to trial lifestyle modifications while they are finishing their prospective symptom tracking. Often, exercise has been advised as an effective lifestyle change for treatment of PMS, and it had been formerly supported by the American Congress of Obstetrics and Gynecology (ACOG) [32]. In the general population, exercise has been confirmed to alleviate symptoms which are also found in women with PMS-depressed mood, fatigue, bloating, and constipation-thus supporting the assumption that exercise would progress symptoms in women with PMS. Dietary changes are regularly recommended, but continue to lack any systematic evaluation of their effectiveness [33]. (Annapoorani B. 2017). Advising a decrease in alcohol, caffeine, and sugar intake, whereas increasing complex carbohydrates during the luteal phase may decrease PMS symptoms [31]. Lifestyle modifications include regular aerobic exercise, avoidance of stressful events, and adjustment of sleeping habits, especially during the premenstrual period [33]. Dietary therapists suggest increasing the intake of complex carbohydrates, which increase the level of tryptophan, a serotonin precursor [34].

Dietary supplements

Calcium supplements (six hundred milligram twice daily) have been shown to reduction both negative mood symptoms as well as somatic symptoms, the data are less compelling for vitamin B6 supplementation with marginal improvement in symptoms. Patients should not take more than one hundred milligram daily as higher doses can cause peripheral neuropathy [31]. There is limited data on vitamin E for treatment of PMS symptoms. Smaller studies have directed that it may alleviate symptoms, but further data are needed to support it as an effective treatment [35]. A study conducted by Bharati M [36]. To assess the effects of oral calcium administration in alleviating symptoms of PMS in medical undergraduates, he affirmed boosting a regular practice of yoga or taking a tablet of calcium daily in the medical schools can improve psychological well-being and work efficiency of students Bharati M [36].

A four-blind placebo-controlled clinical trial finished by Samieipour et al., [37]. To compare the effect of calcium, vitamin B1 and placebo on treatment of PMS in students residing at dormitories of Ilam University of Medical Sciences in 2016, the result concluded treatment with vitamin B1 or calcium reduces the severity PMS

symptoms but concurrent use of both vitamin B1 plus calcium is more effective in reducing PMS symptoms. Therefore, this treatment can be used to reach a major goal of midwifery, by decreasing the severity of PMS symptom [37]. Another study conducted by Tartagni et al., [38]. To assess whether administration of vitamin D (200,000 IU at first, followed by 25,000 IU every 2 weeks) for a 4-month period might lessen the appearance and the intensity of mood disorders associated with PMS in young girls with severe hypovitaminosis D, they found vitamin D therapy can be planned as a safe, effective, and convenient method for improving the quality of life in young women with severe hypovitaminosis D and concomitant mood disorders associated with PMS [38].

Cognitive behavior therapy

Non-drug psychosocial intervention therapy is suggested for women with any kind of discomfort or distress caused by PMS Maddineshat et al [39] studied the effectiveness of group cognitive-behavioral therapy on the symptoms of PMS at a girls' dormitory of North Khorasan University of Medical Sciences, they found Group cognitive-behavioral therapy effectively alleviates PMS symptoms in female college students [39]. Additional study done by Karimi et al [40] to investigate the effect of cognitive behavior therapy as well as the ingesting of calcium plus vitamin D supplement on improvement of symptoms of PMS, their result showed cognitive behavior therapy has long-term positive effects due to its own therapeutic programs, including relaxation and modification of negative thoughts and attitudes. As women are important pillars of family and community, the use of this treatment for PMS could improve the social performance and well-being of women in the long term. Consequently, cognitive behavior therapy could potentially have social, economic, and health benefits. It is recommended that counselors, psychologists, and gynecologists should apply cognitive behavior therapy methods and calcium plus vitamin D as a supplement to relieving the physiological aspect and also somatic symptoms, such as pain, during the PMS [40].

Surgical Management

Bilateral Oophorectomy (BSO) is the everlasting solution but is invasive and should only be reflected in severe cases not responding to medical therapy and as a final resort. Hormone replacement therapy will be necessary in these cases. If a hysterectomy is performed as well, then oestrogen only is required. GnRH analogues should be given for several months as a test of cure prior to making a decision for this intervention [23]. Surgical treatment by way of a BSO should be considered a last resort for severe PMS. Before the decision for surgery, patients should be trialed through all available medical therapies. Although studies are small, data suggest significant improvement with BSO in women who have failed conservative, management [31].

Factors associated with PMS

A study conducted by Mishra A, et al. [9] to evaluate symptoms of PMS in medical students and to find the association of sociodemographic variables and lifestyle factors with severe PMS. Their result mentioned severe PMS was significantly related to lifestyle factors, namely, sleep, physical activity, total tea/coffee intake, and change in tea/coffee and food intake under stress. The most mutual physical and psychological symptoms were body ache/joint pain and feeling depressed/blue, respectively [9]. Females with severe PMS in their study reported less sleeping hours as in contradiction of those with mild symptoms [41]. Both insomnia and excessive sleepiness have been informed in women with severe PMS [42]. Unpleasant dreams, awakenings, failure to wake at the expected time and tiredness in the morning, and heightened mental activity during the night and on awakening are sleep disturbances reported to be initiate in women with severe PMS [9]. A study conducted by Ghaffarilaleh et al., [43] to examine the effects of yoga on quality of sleep of women experiencing PMS, their result concluded that there was a yoga declined the disturbances of sleep in the subjects with PMS, which afterward enhanced the efficiency of their sleep. Therefore, they accomplish that yoga can be prescribed for improving sleep disturbances in women with PMS and medical therapy will probably be needed in severe situations [43]. Even in the absence of high-quality research and strong evidence base, a recent comprehensive review on exercise interventions in PMS [44]. Supports the findings of our work which shows a significant association between severe PMS and fewer hours spent in physical activities, as also described by a study evaluating PMS in college-aged women [45]. ACOG has advised that regular aerobic exercise may help relieve PMS, and it is substantiated by preliminary data [46]. Students with severe PMS were more probable to take caffeine and tea compared with those having mild symptoms [11]. The association is strongly maintained by a host of studies, which pointed out that consumption of caffeinated beverages including tea and coffee was strongly related to the presence of PMS and also established that the effect is clearly dose-dependent; the effect being only slightly reduced when daily total fluid consumption was controlled for [47].

According to tobacco consumption, the multiple logistic regression analysis done by Hashim M, et al. [11] showed that smoking (cigarettes or shisha/hookah) status was associated with increased risk of reporting psychological symptoms and behavioral symptoms. Like in their work additional case control study done by Fernández MDM, et al. [8] found smokers are more likely to develop PMS, its due to tobacco decreases the activity of Monoamine Oxidase (MAO), an enzyme that degrades serotonin, a neurotransmitter involved in the pathophysiology of PMS This inhibition seems to be related to the amount of tobacco and the time of consumption [48].

Dietary intake during menstrual cycle and PMS

The menstrual cycle presents itself as a unique model for regulating food intake and craving [49]. The findings of Souza et al., [49] study they suggest that, during the menstrual cycle, the participants presented changes in food craving, with a higher desire for caloric foods, as well as for foods rich in fats, sugars and salt during the luteal phase associated with the follicular phase, thus identifying PMS as a possible determinant of dietary desires in women of childbearing age. Nonetheless, despite the changes in food craving, the total intake of calories and also of macro and micronutrients did not fluctuate across the menstrual cycle [49].

This is in similarity with previous report that consumption of foods and beverages that are high in sugar content or taste sweet is associated with severe PMS [50]. However, the extrapolation that restricting sugar may relieve symptoms of PMS does not find research support [51] rather, studies of diets that increase the relative intake of complex carbohydrates suggest benefit, which might be due to an improved transport of the serotonin precursor tryptophan into the brain, leading to a transient increase in the synthesis of this transmitter [34]. Since synthesis of brain serotonin increases after carbohydrate intake, it has been postulated that PMS subjects may over consume carbohydrates in an attempt to improve their dysphoric mood state [52]. Intake of carbohydrates, fats, proteins, vitamins, and minerals has been found to increase in women premenstrually symptoms [53],

and significantly so in women with PMS [54]. High calorie/fat/sugar/salt food consumption recognized as strong risk factors for PMS [11].

A study that likened with premenopausal women following a Western diet containing high fat and low fiber with vegetarians exposed that a low-fat vegetarian diet decreased plasma oestrogen levels and the duration of premenstrual symptoms [55]. Changing dietary guidelines towards consuming more complex carbohydrates and vegetable proteins, less simple carbohydrates, animal proteins and SFA and increasing fiber intake for 3-6 months resulted in raised serum progesterone levels, whereas serum oestradiol 17-β fell in the middle of the luteal phase. Outcomes from food-intake studies show that excess consumption of sweet-tasting food items, fast food, deep-fried meals, coffee and alcohol and low intakes of vegetables and fruits are significantly related to PMS incidence [55].

Higher consumption of red meat and fast foods and lower consumption of fruits and vegetables, fish and olive oil was related to higher depression risk [56]. Depression is the most outstanding feature of severe PMS. Following consumption of protein or protein plus fat-rich meals, plasma concentrations of tryptophan (the essential amino acid precursor of serotonin) show a greater decrease likened with that of large neutral amino [34]. Tryptophan and compete with each other for blood-brain barrier transport [34]. Individuals with lower levels of brain serotonin are recognized to be vulnerable to affective disorders such as depression [57]. They observed that subjects with PMS consumed more refined grains and less vegetables and fruits. Preceding study revealed that fruit and vegetable diets with whole grains can treat mild forms of PMS and decrease the menstrual pain [4]. Dietary fiber intake has shown a significantly converse relationship to menstrual pain scale in this study, the western dietary pattern was high in Na from salty meals and snacks [55]. Study have recommended that excess salt intake, by decreasing Mg levels, may worsen premenstrual symptoms [58]. In addition, Western diets with low vegetable intakes and high intakes of refined grains and meats are poor sources of Mg [59].

Whole-grain foods constitute one of the valuable foods that its three main components, namely, germ, bran and endosperm, in contrast to refined grains, remain in it and are rich in dietary fibres, vitamin B, Fe, Mg and vitamin E [60]. A daily consumption of 16-48 g of whole grains was related to receiving more sufficient amounts of vitamins and minerals [61]. In some studies, consumption of components of whole grains including vitamins B1, B6 and D, Ca, Zn and Mg, as dietary supplements caused the relief of some PMS symptoms [62,63] and a positive relationship was reported between dietary B vitamins and the risk of PMS [61]. Supplementation of wheat germ extract reduced physical and psychological symptoms [63].

Regarding diet, although "PMS diets" have been recommended, few of the recommendations were founded on scientific fact. On the other hand, there is some evidence that sufficient calcium, magnesium, vitamin E and restricted caffeine and salt are beneficial for PMS patients with different symptoms [55]. Data is rare concerning the role of fast food on the occurrence of PMS; most studies tend to discuss a healthy diet as a general rule [55].

Yurt et al, [13] studied the effect of dairy products intake in women with PMS, they reported that the results of consumption of adequate dairy products, at least 3 portions per day indicated that sufficient dairy and calcium intake affects women's PMS symptoms and improved the quality of life. Davison et al, [64] found that insufficient intake of minerals such as calcium, potassium, phosphorus, magnesium and iron, and vitamins such as pentatonic acid, B2, B3, B6, B12, and folate is related to depression and mood disorders [64]. Chocano-Bedoya et al, (2013) found that group B vitamins (thiamine, niacin, riboflavin, folic acid, B6, and B12) might have a role in PMS development by affecting neurotransmitters such as serotonin and GABA. Chronic zinc deficiency reduces zinc in the hippocampus and glucocorticoid secretions, causing neurological symptoms [13].

Another study conducted by Yilmaz-Akyuz and Aydin-Kartal [65] to determine the effectiveness of aerobic exercise and diet in female students with Premenstrual Syndrome Scale who were studying at the public university. The aerobic exercise program was given to the students individually for 12 weeks, 3 days a week and 30 minutes at the sports center with an experienced trainer. Students were advised to drink water and use running shoes during the exercise. Warm-up exercises were performed for 8 to 10 minutes before exercise, in addition to the dietary habits of the students were evaluated, and their diets were organized by an expert dietitian. They were given PMS diet and applied for 12 weeks. PMS diet contains 50-55% carbohydrate, 25-30% fat and 15-20% protein. Diet, rich in complex carbohydrates, refined sugar was limited. Individuals were given 1-2 times a week of fish, daily>1000mg of calcium and 20 grams of dried nuts per day and<300mg of caffeine consumption. The consumption of, acidic, carbonated foods and the addition of extra salt to the food, was limited their results reported that It was found that diet and aerobic exercise were effective in reducing the symptoms of premenstrual syndrome and dysmenorrhea intensity in female students with premenstrual syndrome [65].

The effect of PMS on academic performance

University students are at an age where they absence psychological and social capability to manage their daily life stressors [66]. They struggling for higher academic achievement in order to secure better jobs and satisfy their own actualization needs while lacking resources and are loaded with psychological and social demands. Severe PMS symptoms have a negative impact on female students' academic performance; accordingly, mental health professionals have a major role in defining factors that buffer severity of PMS among females [19]. An additional study done by Arafa et al., [67] to determine the score and frequency of PMS among female college students in Egypt, they reported that 80.2% of the participants practiced various degrees of PMS symptoms which were significantly related to a family history of PMS.

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