



## The relationship between Exercise and premenstrual syndrome

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### ABSTRACT

Premenstrual syndrome (PMS) starts during puberty years and it continues to the menopausal period. PMS manifests itself during every monthly luteal stage in the form of a complex of somatic, psychological and behavioral disorders. Exercises such as walking, cycling, swimming and slow running are a few suitable methods for settling down the tension and eliminating the PMS. It is evident that sport in comparison to the therapeutically drugs is free from side effects and it is devoid of any risks. Therefore, the objective of the present study is assessing the relationship between exercises and premenstrual syndrome (PMS). The present descriptive-analytical study has been conducted on 160 students of Zahedan University of Medical Sciences in 2014-2015 academic year. For gathering data a two-section questionnaire was used. The first section was related to the demographic features and the second section pertained to PSTT standard questionnaire. The questionnaires were completed in three consecutive periods of the menstrual cycle by the students based on a self-report method. Gathered data was analyzed by through SPSS 19.0. The statistical tests were used such as the descriptive statistical tests, Chi square and independent samples t-test. The participants' average age was  $21.06 \pm 2.19$ . The subjects did exercises (86 students) less than twice a week, did physical activities between 2 and 4 days in a week (44 students) and 30 subjects did exercises more than 4 times weekly. They had experiences of dysmenorrhea during their menstrual cycle (120 subjects). There was not observed a significant relationship between age and PMS ( $P > 0.05$ ). The relationship between the individuals citizenship with PMS was statistically significant ( $P = 0.04$ ). The relationship between sport and PMS in three measured periods was statistically significant ( $P < 0.05$ ). The results obtained from the present study indicated that doing regular physical exercises and continuous sport can be effective in preventing PMS.

**Keywords:** PMS, premenstrual syndrome, Exercise.

### INTRODUCTION

PMS begins during the fertility years and it ceases at menopausal period [1]. This syndrome manifests itself during the luteal stage in every monthly period in the form of a complex of physical, psychological and behavioral disorders. About 75% to 90% of the women experience this syndrome before their menstrual period [2, 3]. This syndrome usually starts 6 to 12 days before menstruation and it lasts 2 to 4 days after menstrual bleeding [4, 5]. Various studies have reported the premenstrual syndrome prevalence rate between 48% and 90% with different intensities [6]. This syndrome is accompanied with pain which is one likely reason behind menstrual pains, increase

in the uterine muscle contraction which is innervated by the sympathetic nerves [7]. Because long-term sport activities reduce stress [8], it is likely to decrease the sympathetic nerves activity and moderate the menstrual symptoms. On the other hand, doing sports causes the Endorphin Beta level increase [9], consequently they influence the painful feelings and it can reduce menstrual symptoms. During the past 28 to 35 years the researches evaluating the relationship between physical activity and menstrual disorders have significantly increased in number and it has been observed that performing aerobic physical activities once or twice a week for 1 to 6 month can be of great effect on menstrual disorders symptoms reduction [10].

Nowadays, medicinal and non-medicinal methods such as anti-inflammatory pain relievers, Cyclooxygenase controller drugs, contraceptives, psychotherapy, use of heat, nervous stimulation through the skin, and sports such as jogging and Yuga are applied for menstrual pains (dysmenorrhea) treatment [11]. According to the PMS side effects, medicinal treatments and surgery, their use only is recommended in acute cases or in cases where the patients do not react to the other treatment types. Therefore, non-medicinal treatments and sport activities are of more concern to the researchers and the women with premenstrual syndrome [12].

Sport, at the same time with increasing growth and development, has been the focus of the scientific communities more than ever before. One of the important and women-specific problems is their physical activity and its relationship with their menstrual cycle [13]. Various studies have shown that regular aerobic sport (endurance) can improve the women's physical and psychological-behavioral symptoms before menstruation [14]. Also, some of the researchers believe that doing physical activity more than three times per a week reduces the dysmenorrheal somatic symptoms during the menstruation period in women [15].

Aerobic sport activities such as walking and swimming in comparison with the anaerobic and strength sport activities are very much effective in reducing the PMS psychological symptoms [16]. It is clear that performing sport activities in comparison with medicinal treatments are without side effects and therefore they are devoid of any risks [17]. Sports such as walking, cycling, swimming and mild running are favorable methods for settling down and elimination of the premenstrual tension [18]. The results of the study conducted by Mosalla Nejad *et al.* indicated that eight weeks of aerobic exercises considerably reduces the physical and affective symptoms of the PMS [19].

Because doing sport in comparison with the medicinal treatment is without side effect and devoid of any risks its use seems to be more appropriate. Therefore, it is decided to perform a study aiming at the survey of the relationship between sport and premenstrual syndrome.

## MATERIALS AND METHODS

The present descriptive-analytical study was conducted on 160 collegians of Zahedan university of Medical Sciences, Zahedan, Iran in 2014-2015 academic year. These subjects were excluded: collegians with chronic diseases, psychological disorders, the individuals who took contraceptives, addicted to narcotics, married students and the students more than 30 years old. All of the selected students were resided in dormitories, then it can say that they were consumed an almost identical and similar dietary regimes. A two-part questionnaire was used for collecting data. The first part was related to the demographic characteristics (Exercise amount, citizenship and dysmenorrhea experience history) and the second part pertained to PSTT standard questionnaire. PSTT standard questionnaire validity has been confirmed in Iran and its reliability has been calculated by Cronbach Alpha and it was 0.09 [20]. PSTT questionnaire contained 19 items and it consisted of two sections. In the first section which included 14 dispositional, physical and behavioral signs; and the second section contained five items which evaluated the effect of these signs in the individuals' lives. For each item four scales of "not at all", "low", "moderate" and "severe" have been mentioned which are scored from 0 to 3. To diagnose severe PMS, the following three conditions should be met: first condition: from questions 1 to 4 there should exist at least one severe case. Second condition: plus the previous one there should be existing 4 moderate or severe cases and third condition: in the effective life factors section (five ending questions) there should be one severe case existing. Also, to prognosticate moderate PMS, the following three conditions should be met: first condition: from question 1 to 4 there should be 1 moderate or severe case. Second condition: besides the previous one there should be existing 4 moderate or severe cases from question 1 to question 14 and the third question: there should be one moderate or severe case in the 5 ending questions. The rest of the individuals are the ones whom are diagnosed to have light PMS. The data collection method was as follows: at first, the researcher explained the objective of the study design and project and the way the questionnaire should be completed to anyone who entered the study and also the

researcher assured them that the study results will be published in statistical format and in the form of general conclusions not individually and their information will remain quite confidential and they were opt not to participate in the study or they can choose to exist the project at any time and stage. After acquiring oral consent from each of the individuals participating in the study, the questionnaires were administered to the participants and they were to complete the questionnaire after each menstruation cycle termination in three consecutive periods. To measure the physical exercise for each individual there was not made use of any special tool and there was only one question in the demographic characteristics form "how often do you play sports regularly?" eventually. The collected data were entered and tabulated in SPSS 23.0 software. The descriptive statistical tests, Chi square and independent sample t-test were used by statistician.

## RESULTS

The participants' average age in the present study was estimated  $21.06 \pm 2.19$ . 86 individuals (53.8%) of the individuals played sports less than two times a week, 44 individuals (27.5%) had exercise 2 to 4 days a week and 30 individuals (18.8%) had exercise more than 4 days a week. 83 individuals (51.9%) were native and the remaining part was non-natives. 120 individuals (75%) had experienced dysmenorrhea in their menstruation cycle. There was not observed significant relationship between age and PMS ( $P > 0.05$ ) and the relationship between the individuals' citizenship and PMS was statistically significant ( $P = 0.04$ ). The relationship between dysmenorrhea and sport is inserted in table (1).

**Table 1: the relationship between dysmenorrhea and sport (Chi-square test)**

Experiencing Dysmenorrhea			Frequency of playing sports in a week			Total	P-value
			>4 times	2 to 4 times	>4 times		
Yes	Count		65	33	22	120(75.0%)	0.97
			54.2%	27.5%	18.3%	100.0%	
No	Count		21	11	8	40(25.0%)	
			52.5%	27.5%	20.0%	100.0%	
Total	Count		86	44	30	160	
			53.8%	27.5%	18.8%	100.0%	

According to table 1, individuals who had exercise less than twice weekly were known to have a higher percent of dysmenorrhea. Also, with an increase in physical activity and sport the number of the individuals with pain went down. But, there was not observed a significant relationship between PMS and dysmenorrhea ( $P > 0.05$ ). The relationship between PMS and exercise in each of the three periods are inserted in tables 2, 3 and 4, respectively.

**Table 2: the relationship between exercise and PMS in the first period (Chi-square test)**

PMS		Frequency of exercise in a week			Total	P value	
		<2 times	2 to 4 times	>4 times			
severe	Count		23	9	5	37	0.022
			26.7%	20.5%	16.7%	23.1%	
moderate	Count		46	18	10	74	
			53.5%	40.9%	33.3%	46.3%	
light	Count		17	17	15	49	
			19.8%	38.6%	50.0%	30.6%	
Total	Count		86	44	30	160	
			100.0%	100.0%	100.0%	100.0%	

**Table 3: the relationship between exercise and PMS in the second period (Chi-square test)**

PMS		Frequency of playing sports in a week			Total	P-value	
		<2 times	2 to 4 times	>4 times			
severe	Count		18	6	3	27	0.002
			20.9%	13.6%	10.0%	16.9%	
moderate	Count		54	18	13	85	
			62.8%	40.9%	43.3%	53.1%	
light	Count		14	20	14	48	
			16.3%	45.5%	46.7%	30.0%	
Total	Count		86	44	30	160	
			100.0%	100.0%	100.0%	100.0%	

According to table 2, the greatest number of the individuals with moderate and severe PMS belongs to the individuals who had exercise for less than twice a week. The relationship between exercise and PMS was significant in this period ( $P=0.022$ ).

According to table 3, the highest percent of the individuals with moderate to severe PMS belonged to the ones who had exercise less than twice a week and the relationship between exercise and PMS was also significant in this period ( $P=0.002$ ).

**Table 4: The relationship between exercise and PMS in the third period (Chi-square test)**

PMS		Frequency of exercise in a week			Total	P value
		<2 times	2 to 4 times	>4 times		
Severe	Count	27	9	8	44	0.010
		31.4%	20.5%	26.7%	27.5%	
Moderate	Count	42	17	7	66	
		48.8%	38.6%	23.3%	41.3%	
Light	Count	17	18	15	50	
		19.8%	40.9%	50.0%	31.3%	
Total	Count	86	44	30	160	
		100.0%	100.0%	100.0%	100.0%	

According to table 4, in this period also the greatest number of the individuals with severe and moderate PMS belonged to the individuals who had exercise less than twice a week and the relationship between playing sports and PMS was significant ( $P=0.010$ ). Also, the relationship between exercise and individuals' depression was significant ( $P=0.010$ ) and with an increase in the exercise activities the depression rate decreased.

## DISCUSSION

In the present study, the PMS expression rate was higher in non-athlete cohort in comparison to the athlete cohort and it was statistically significant which is consistent with the results obtained by Kroll [21]. In a study performed by Stoddard et al., PMS was lower in women who had more physical activities [22] and the relationship is significant. But, the results obtained by the present study are not consistent with the results obtained in the study conducted by Qanbari et al [16] which was performed on 210 individuals. As it is seen, the obtained results from various sources and articles in different countries are indicative of distinct discrepancies and part of these discrepancies relate to the cultural differences and having exerted constraints in the women's reaction to menstruation in different communities and societies [23].

It seems that performing aerobic sport activities cause a reduction in rennin level and it brings about a estrogen-progesterone equilibrium, therefore sodium and water intake is reduced. Therefore, playing sports and doing physical exercises reduce edema and improve the physical and psychological symptoms [19, 25]. Some of the researchers believe that if sport activity is performed 2 or 3 times a week and for a long period during 2 to 6 months it would be effective on many of the PMS symptoms reduction [26-28]. On the other hand, according to the fact that the Beta-endorphin level decreases in the late luteal phase due to the sex hormone variations performing aerobic sports can lead to an increase in the beta endorphin level and this will increase pain-tolerance in the individuals and it can be said that the physical symptoms which are created as a result of beta-endorphin reduction can be improved [24-26]. While playing sport provides for considerable health benefits and advantages to the individuals, some of the sports cause a collection of unique dangers and risks to the women athletes; in a manner that athlete women may become subjected to over-exercising and its effects on their reproduction system related organs. Female reproduction system is very sensitive to the physiological pressures resulting from sport activities and exercises in such a way that many of the female athletes are diagnosed to have preliminary amenorrhea disorders, secondary amenorrhea disorders and oligomenorrhea. Of course, such disorders prevalence is different based on the athletes' conditions and the sport competitions level [29]. Of course, the fact that the voluminous sport exercises or an abrupt initiation of heavy exercises lead to menstruation disorders in university students [30] cannot be a reason for stopping such regular exercises by the students and their coaches; rather there should be offered solutions and programs by the medical team of the university and the professors. According to the physiological and psychological variations during the menstruation cycle one of the suggested solutions for the officials can be this solution that because in luteal stage the progesterone levels increase and estrogen level is in an intermediate level, thus, in this stage the body is more prepared to tolerate intensive and long exercises. So, designing and implementing exercises

with high intensity and volume in luteal stage and on the other hand implementing exercises with lower intensity and volume in other menstruation cycle stages can prevent from hormone variations and this can contribute the athlete to reduce the exercise pressure and therefore to prevent from abnormal bleedings.

From the other results obtained by the present study we can refer to the matter that dysmenorrhea expression amount in non-athlete cohort was higher than the athlete group but this difference was not statistically significant which conforms to the results obtained by Chantler et al. [31]. Also, in a study performed by Noorbakhshs et al for determining the sport effect on preliminary dysmenorrhea, the experimental group played sports for 8 weeks, thrice a week for 90 minutes and based on the results obtained, various types of medicinal treatments, the number of the medicines, hemorrhage extent, the bleeding frequency intensity, the menstruation cycle pain duration and generally dysmenorrheal symptoms reduced considerably [32]. In another study, it was observed that menstruation pains are of a lesser intensity and frequency in athletic individuals who conducted sport activities in comparison to the sedentary individuals [33]. In numerous studies the tranquilization effect, abdominal, pelvis and thigh stretching effects and the effect of a period of isometric exercises on preliminary dysmenorrhea was studied [34, 35] and most of these studies were suggestive of sport activity useful effect on such symptoms. One of the symptoms accompanied by menstruation is dysmenorrhea which is pain accompanied with menstruation. Dysmenorrhea is usually of a cramping nature which concentrates in the lower section of abdomen. Approximately 50% of all of the women experience dysmenorrhea [4]. In a study conducted in Iran preliminary dysmenorrhea prevalence was reported 71%. 15% of the students stayed out of university 1 to 7 days of the curriculum year as a result of dysmenorrhea [36]. It is usually made use of drugs for treating dysmenorrhea. According to the drugs side effects and surgery operations nowadays a particular attention has been paid to non-medicinal treatments [37]. Taking warm bath, especially during the early days of menstruation cycle and playing sports and doing physical exercises are but some of the recognized and effective methods for treating dysmenorrhea [38].

Physical exercise and activity cause an increase in brain efficiency, feeling of happiness and physical and body health and through creating a positive attitude towards life, it can secure the individual's psychological health. Playing sport is more likely to cure the premenstrual syndrome. Also, playing sports is the best method of reducing the pressure and creating equilibration in female brain chemical secretions [39]. Stoddard et al [22] also in their study indicated the sport positive effect with intermediate intensity on the PMS clinical symptoms such as muscle pain and water retention. Maybe, one reason for the existence of difference in the studies' results can be attributed to the type and intensity of sport. One other reason behind such variations in various studies can be attributed to the samples' age groups and also the individuals' life style, since in different age groups the expression of such a syndrome differs [40].

In the present study, the champion and elite and expert athletes were not studied separate from the other individuals. The sport intensity and type, economic, cultural factors and education level are effective on dysmenorrhea and PMS [41] and therefore there is a need for them to be taken into a closer consideration.

## CONCLUSION

The results obtained in the present study indicated that the regular and continuous sport exercises can be of a great effect on PMS prevention, but, according to the present study plan constraints and ignoring some of the disadvantageous factors such as neglecting the sport type and sport duration in every time it is suggested that there is a need for other studies in a wider scope in order for more optimized results to show up.

### Competing Interests

The authors declare that they have no competing interests.

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