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Investigating the effect of premenstrual syndrome in high school students doing regular sports

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Abstract

Present study was aimed to investigate the effect of regular exercise on premenstrual syndrome (PMS) in high school students. A total of 252 high school students who involved in regularly (n = 117) and sedentary students (n = 135) participated in the study. The personal information form was used to determine the age group and sports status of the participants and the Premenstrual Syndrome Scale (PMSS) developed by Gençdoğan (2006) consisting of 44 questions was used to determine the premenstrual syndrome levels. Mann Whitney U and Kruskal Wallis H tests were used in SPSS 22.0 program for statistical analysis of data obtained. At the end of the study, the level of PMS was found to be significantly higher in the sedentary students compared to the students who participated regularly in sports ($p < 0.05$). When handled according to age group variable, it was found out the students who regularly in sports did not show any statistically significant difference in depressive affection, anxiety, fatigue, nervousness, depressive thoughts, pain, bloating, appetite changes and PMS total syndrome levels ($p > 0.05$). In the sedentary students, depressive affection and anxiety subscales were found to be statistically significant in favor of students in the age group of 17 years ($p < 0.05$). As a result, it is possible to say that the participation in sports in high school students has a positive contribution to PMS, while the age factor holds a significant effect on the symptoms on PMS.

Keywords: High school students; sports; menstruation; menstrual cycle; premenstrual syndrome.

Introduction

On the development of women's over function and as a result of these developments, the beginning of reproductive ability is called "menstruation". This period is specific to female and the reproductive function does not take place in this period (Çakmakçı et al., 2005). While the hormonal structures of males usually follow a steady course, constant changes occur in the hormonal structures of females (Karp and Smith, 2012). Menstrual cycles are at the beginning of the process in which hormonal changes take place. While menstrual cycles show hormonal differences according to gender, the effects of sportive performance are mostly debated (Ön, 2012).

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In women, there are some problems in menstrual period leading to premenstrual syndrome (PMS) and PMS prevalence of is 5-8% (Yonkers et al., 2008: 1200). PMS is a problem characterized with the emotional and physical symptoms usually observed in the luteal phase of the menstrual cycle in women of young and middle age group (Dickerson et al., 2003: 1743). PMS begins in the luteal phase and ends with the onset of PMS menstruation. Although PMS, which affects women's quality of life negatively whose aetiology is not known precisely, it is estimated that it affects millions of women worldwide (Öztürk and Tanriverdi, 2010). For this reason, in order to increase the quality of life of women, it is emphasized that research on PMS should be given importance (Kebapçılar et al., 2012).

It is known that exercise has an important function in the maintenance of health and prevention of diseases. For this reason, participation in exercise seems to have an important place of human life whichever age (Çakmakçı et al., 2005). The research findings addressing the effects of participation of exercise on health also support the idea that exercise is very effective in the maintenance and development of health from different perspectives. When the studies done on this subject are examined, it was observed that the exercise has beneficial results in terms of psychological (Sahin, 2015; Keskin, 2014) and physical aspects (Janssen et al., 2005; Brown et al., 2003).

In recent years, many changes have occurred in the social structures of societies, in which societies have begun to exhibit positive attitudes towards the sports. In this background, women's attitudes towards sports have also improved in the positive way (Roupas and Georgopoulos, 2011, Hekim, 2016). In parallel with the increasing levels of women's attitudes towards sports activities, the number of studies related to the effects of sports on morphological and physiological structure of women has increased (Karacan and Çolakoğlu, 2003). The changes in the hormonal structures of women during the menstruation process contributed to direct the studies towards examining the changes in the sportive performances of women. As a result of the literature review, it was observed that the study practised in this area generally focused on the effects of the menstruation process on the sportive performance, as well as the menstrual disorders observed in female athletes. On the other hand, it has been observed that the researches on the effects of regular exercise on the premenstrual syndrome are limited. In this study, it was aimed to investigate the effect of regular exercise on premenstrual syndrome in high school students.

Material and Method

Research Model

In this research, survey research method from observation-based (empirical) research models which are frequently used in sports sciences was used. Observational researches are composed of the researches conducted by using surveys and scales in order to answer the questions desired, to develop hypotheses to test whether the questions to be answered are correct or not. In observational studies, statistical analysis of data obtained is included to test the hypotheses. Survey type studies categorized in observational studies are known as descriptive research methods used to determine the characteristics (age, marital status, sex, etc.) of research subjects of large sample groups (Can, 2014: 8).

Research Group

A total of 252 high school students voluntarily participated in the survey, including 117 high school students doing sports regularly and 135 sedentary students. In this content, Etimesgut Anatolian High School students who has habit of sedentary lifestyle were chosen randomly and participants involved regularly in sports were chosen randomly from Ankara TVF (Turkish Volleyball Federation) Sports High School.

Data Collection

For the determination of the data about the age and sports status of high school students participating in the research, a personal information form consisting of two questions was utilized. Developed by Gençdoğan (2006) Premenstrual Syndrome Scale (PMS), composed of 44 questions

was used to determine premenstrual syndrome levels of the participants. "No" option is evaluated as 1 point, "very few" option is 2 points, "occasionally" option is 3 points, "often" option is 4 points, "permanent" option is 5 points. Depressive affection (1., 2., 3., 4., 5., 6. and 7. items), anxiety (8., 9., 10., 11., 13., 15. and 16. items), fatigue (12., 14., 17., 18., 25. and 37. items), nervousness (19., 20., 21., 22. and 23. items), depressive thoughts (24., 26., 27., 28., 29., 30. and 44. items), pain (31., 32. and 33. item), appetite changes (38., 39., and 40. items), bloating (41., 42., and 43. items) composed of 9 subscales and PMS total scores of the subscales obtained from all the subscales. The lowest score that can be taken from the scale is 44, the highest score is 220. The higher the score, the greater the prevalence of premenstrual syndrome symptoms (Erbil et al., 2011: 431).

Statistical Analysis

SPSS 22.0 program was used in the analysis of the obtained data. It was examined whether the participants had a normal distribution before the scores obtained from the subscales of the participants were analyzed. According to the one-sample Kolmogorov-Smirnov test results, it was determined that the data did not show a normal distribution. For this reason, non-parametric analysis methods were used when the data were analyzed according to sports status and age groups. The Mann Whitney U test was used for the comparison of the scale scores according to the sports status, whereas the Kruskal Wallis H test was used for the comparison of scale scores to the age groups. Mann Whitney U test was used as a post hoc test to determine the difference between the age groups when significant differences were found. Cronbach's Alpha values for the scale subscales ranged from 742 to 946.

Findings

Table 1. Frequency and Percentage Distributions of Participants' Sports Status and Age Groups

Variables	Sub-variables	f	%
Sports Status	Sportss Group	117	46,4
	Sedentary Group	135	53,6
Age Groups	14 age	29	11,5
	15 age	63	25,0
	16 age	126	50,0
	17 age	34	13,5

46,4% of the participants have the habit of participating in sports regularly, 53,6% are sedentary participants. 11,5% of the survey participants are in the age group of 14, 25% are in the age group of 15, 50% are in the age group of 16 and 13,5% in the age group of 17.

Table 2. Descriptive Statistics of Participants' PMS Scale Scores

Sub-scales	n	The Lowest	The Highest	X	Sd
Depressive affection	252	7	35	22,45	5,458
Anxiety	252	7	33	20,98	5,611
Fatigue	252	6	30	20,25	4,851
Nervousness	252	5	25	16,68	4,236
Depressive Thoughts	252	7	34	22,50	6,282
Pain	252	3	15	10,18	3,349
Appetite Changes	252	3	15	10,81	2,940
Bloating	252	3	15	10,20	3,175
PMS Total	252	47	200	144,73	29,500

When the table 2 was examined, it was observed that the participants had over moderate scores of depression, fatigue, nervousness, depressive thoughts, pain, appetite changes, bloating and PMS total scores; anxiety scores were moderate.

Table 3. Descriptive Statistics on Comparing Participants' PMS Scale Scores According to Regular Sports Status

Sub-scales	Sports Status	n	X	Sd
Depressive affection	Sports Group	117	20,52	6,497
	Sedentary Group	135	24,12	3,635
Anxiety	Sports Group	117	17,30	5,289
	Sedentary Group	135	24,17	3,561
Fatigue	Sports Group	117	17,35	5,478
	Sedentary Group	135	22,77	2,091
Nervousness	Sports Group	117	15,24	5,437
	Sedentary Group	135	17,93	2,152
Depressive Thoughts	Sports Group	117	17,77	5,582
	Sedentary Group	135	26,60	3,235
Pain	Sports Group	117	8,07	3,240
	Sedentary Group	135	12,01	2,160
Appetite Changes	Sports Group	117	9,09	3,025
	Sedentary Group	135	12,31	1,847
Bloating	Sports Group	117	8,04	2,928
	Sedentary Group	135	12,07	1,971
PMS Total	Sports Group	117	123,39	29,107
	Sedentary Group	135	163,23	12,426

When the table 3 was examined, the level of syndrome in all subscales of sedentary participants and the total of PMS was higher than that of participants involved in sports.

Table 4. Mann Whitney U Test Results for Participants' Comparison of PMS Scale Scores According to Regular Sports Status

Sub-scales	Sports Status	Range ave.	Range Total.	U	P
Depressive affection	Sports Group	99,55	11647,0	4744,0	,000
	Sedentary Group	149,86	20231,0		
Anxiety	Sports Group	78,03	9130,0	2227,0	,000
	Sedentary Group	168,50	22748,0		
Fatigue	Sports Group	83,46	9764,5	2861,5	,000
	Sedentary Group	163,80	22113,5		
Nervousness	Sports Group	100,23	11726,5	4823,5	,000
	Sedentary Group	149,27	20151,5		
Depressive Thoughts	Sports Group	71,82	8402,5	1499,5	,000
	Sedentary Group	173,89	23475,5		
Pain	Sports Group	81,30	9512,0	2609,0	,000
	Sedentary Group	165,67	22366,0		
Appetite Changes	Sports Group	83,66	9788,0	2885,0	,000
	Sedentary Group	163,63	22090,0		
Bloating	Sports Group	77,12	9023,0	2120,0	,000
	Sedentary Group	169,30	22855,0		
PMS Total	Sports Group	74,44	8709,0	1806,0	,000
	Sedentary Group	171,62	23169,0		

When the table 4 was examined, there was a statistically significant difference between the levels of syndromes in all subscales of participants involved in sports regularly and sedentary participants and total of PMS ($p < 0.05$).

Table 5. Descriptive statistics on the comparison of PMS scale scores according to age groups of participants involved in sports regularly

Sub-scales	Age Groups	P	X	Sd
Depressive affection	14 age	28	21,21	6,161
	15 age	24	19,46	7,425
	16 age	40	20,65	6,997
	17 age	25	20,56	5,221
Anxiety	14 age	28	19,18	5,375
	15 age	24	16,58	5,679
	16 age	40	17,35	5,475
	17 age	25	15,80	4,010
Fatigue	14 age	28	17,93	5,228
	15 age	24	16,83	5,799
	16 age	40	18,08	5,976
	17 age	25	16,04	4,550
Nervousness	14 age	28	15,82	5,963
	15 age	24	13,92	5,948
	16 age	40	16,18	4,888
	17 age	25	14,36	5,073
Depressive Thoughts	14 age	28	19,11	5,633
	15 age	24	17,08	6,227
	16 age	40	18,20	5,506
	17 age	25	16,24	4,816
Pain	14 age	28	8,43	3,214
	15 age	24	7,92	3,189
	16 age	40	8,15	3,247
	17 age	25	7,68	3,449
Appetite Changes	14 age	28	9,54	2,617
	15 age	24	10,25	3,096
	16 age	40	8,58	3,396
	17 age	25	8,28	2,424
Bloating	14 age	28	7,82	2,611
	15 age	24	7,75	3,529
	16 age	40	7,55	2,745
	17 age	25	9,36	2,691
PMS Total	14 age	28	128,54	29,288
	15 age	24	120,13	33,958
	16 age	40	124,55	28,724
	17 age	25	118,92	24,886

When the table 5 was examined, participants in the 14-year-old age group were observed with the highest levels of depressive affection, anxiety, depressive thoughts, pain, and PMS total syndrome. The participants with the highest fatigue and nervousness syndrome were participants in the 16-year-old age, the participants with the highest syndrome in the appetite change syndrome in the 15-year-old group, and the participants in the 17-year-old age with the highest syndrome in the bloating syndrome.

Table 6. Mann Whitney U Test Results Regarding Comparison of PMS Scale Scores According to Age Groups of Regular Sports Participants

Sub-scales	Age Groups	Range Ave.	x ²	P
Depressive affection	14 age	61,59	1,122	,772
	15 age	52,85		
	16 age	61,16		
	17 age	58,54		
Anxiety	14 age	69,00	4,830	,185
	15 age	55,48		
	16 age	60,20		
	17 age	49,26		
Fatigue	14 age	60,30	1,462	,691
	15 age	55,60		
	16 age	63,25		
	17 age	54,00		
Nervousness	14 age	61,14	3,437	,329
	15 age	51,00		
	16 age	65,41		
	17 age	54,02		
Depressive Thoughts	14 age	64,30	2,958	,398
	15 age	55,88		
	16 age	62,55		
	17 age	50,38		
Pain	14 age	62,14	1,128	,770
	15 age	58,06		
	16 age	60,96		
	17 age	53,24		
Appetite Changes	14 age	63,95	9,183	,027
	15 age	74,35		
	16 age	52,40		
	17 age	49,28		
Bloating	14 age	56,23	6,035	,110
	15 age	55,25		
	16 age	54,06		
	17 age	73,60		
PMS Total	14 age	60,79	,516	,915
	15 age	57,17		
	16 age	60,93		
	17 age	55,68		

When the table 6 was examined, it was observed that the participants involved in sports did not differ statistically in the subscales of depressive affection, anxiety, fatigue, nervousness, depressive thoughts, pain, bloating and PMS total syndrome levels with respect to age groups ($p > 0,05$), however the appaetite changes showed statistically significant difference ($p < 0.05$). According to the results of post host test to determine which groups of significant difference in appetite change syndrome, the difference stems from the fact that the syndrome level of the participants in the 15 years age group is higher than the syndrome level of 16 years and 17 years age group participants.

Table 7. Descriptive Statistics on the Comparison of PMS Scale Scores According to Age Groups of Sedentary Participants

Sub-scales	Age Groups	P	X	Sd
Depressive Affection	15 age	40	24,25	4,337
	16 age	86	23,73	3,255
	17 age	9	27,22	2,108
Anxiety	15 age	40	24,05	4,557
	16 age	86	23,95	2,982
	17 age	9	26,78	2,906
Fatigue	15 age	40	22,48	2,160
	16 age	86	22,85	2,072
	17 age	9	23,33	2,000
Nervousness	15 age	40	17,93	1,927
	16 age	86	17,78	2,111
	17 age	9	19,44	3,046
Depressive Thoughts	15 age	40	26,45	3,250
	16 age	86	26,52	3,328
	17 age	9	28,00	1,936
Pain	15 age	40	12,18	2,510
	16 age	86	11,91	2,056
	17 age	9	12,22	1,481
Appetite Changes	15 age	40	12,60	1,780
	16 age	86	12,20	1,859
	17 age	9	12,11	2,088
Bloating	15 age	40	12,55	2,183
	16 age	86	11,81	1,876
	17 age	9	12,33	1,581
PMS Total	15 age	40	163,55	14,735
	16 age	86	162,12	11,262
	17 age	9	172,44	8,428

When the table 7 was examined, while sedentary participants in the age group of 17 years the highest level of syndrome in depressive affection, anxiety, fatigue, nervousness, depressive thoughts, pain and PMS total syndrome, participants in the age group of 15 years have the highest syndrome level in appetite changes and bloating syndromes.

Table 8. Mann Whitney U Test Results In Comparison of PMS Scale Scores According to Age Groups of Sedentary Participants

Sub-scales	Age Groups	Range Ave.	x ²	P
Depressive Affection	15 age	69,90	9,501	,009
	16 age	63,24		
	17 age	105,00		
Anxiety	15 age	70,74	7,023	,030
	16 age	63,50		
	17 age	98,83		
Fatigue	15 age	62,59	1,343	,511
	16 age	69,67		
	17 age	76,11		
Nervousness	15 age	67,69	2,286	,319
	16 age	66,19		
	17 age	86,67		
Depressive Thoughts	15 age	66,21	2,247	,325
	16 age	66,87		
	17 age	86,72		
Pain	15 age	72,40	,791	,673
	16 age	65,88		
	17 age	68,72		

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Appetite Changes	15 age	73,59	1,209	,546
	16 age	65,74		
	17 age	64,72		
Bloating	15 age	78,78	4,900	,086
	16 age	62,57		
	17 age	72,00		
PMS Total	15 age	70,05	7,914	,019
	16 age	63,52		
	17 age	101,67		

When the table 8 was examined, it was observed that fatigue, nervousness, depressive thoughts, pain, appetite changes, bloating and PMS total syndrome, levels of sedentary participants did not differ statistically according to age groups ($p > 0,05$), however depressive affection, anxiety and PMS total syndrome levels ($P < 0,05$) showed significant difference according to age groups. According to the post hoc test results performed to determine the difference between groups with significantly different subscales, the difference in the anxiety and PMS total syndrome was due to the fact that the syndrome level of the participants in the 17 years age group was higher than the syndrome level of the 16 years age group and the difference in the depressive affection syndrome, the level of the syndrome stems from the fact that participants of 17 years was higher than the syndrome level of both 15 and 16 years group.

Discussion and Conclusion

When compared to sedentary high school students, it was found that the students involved in sports regularly had lower scores on the PMS subscale, and similarly the total PMS score was lower in favor of students with regular sports participation. These findings reveal that the frequency of PMS was higher in sedentary high school students than students with regular sports participation.

According to Serena et al. (2001), regular exercise inhibits the reduction of endorphin release in the luteal phase of the menstrual cycle, as well as contributing to the reduction of affection symptoms. In this respect, regular exercise is considered as an element contributing to the reduction of PMS symptoms (Quoted by: Öztürk and Tanrıverdi, 2010: 59). For this reason, it is recommended to exercise regularly for women who show signs of PMS (Kebapçılar et al., 2012: 113, Süer, 2008: 77).

In the study conducted by Bayram (2007: 107) it was aimed to investigate the frequency of PMS in athlete women and sedentary women. A total of 189 women, 93 athletes and 96 sedentary participants were included in the study between the age range of 17-36. At the end of the study, sedentary women were found to have more severe affection disturbances due to PMS compared to athletes women. A similar study conducted by Lustyk et al. (2004: 35) aimed to examine the relationship between the frequency of exercise and the symptoms of PMS in women aged 18-33 years. It was found that the frequency of exercising in women with age range of 18-33 was a significant determinant on PMS. According to the findings, the frequency of PMS-related stress was higher in women who exercised frequently compared to women who exercise occasionally. In another study conducted by Sokullu and Aksu (2015: 54), it was aimed to investigate the lifestyle behaviors of women who applied to the hospital with PMS complaints and at the end of the research, it was determined that women having PMS have very low levels of participation in exercising. When the research findings in the literature are evaluated, it is observed that the results obtained in this study were in parallel with the literature.

In this study, PMS levels of high school students involved in sports regularly were examined according to the age group variable, it was interpreted that the students in the 15 years age group had a higher mean score in the subscale of appetite changes compared to the students in the 16 and 17 age groups. In the students with regular sports participation, the findings of other PMS subscales and total PMS score did not show any significant difference according to the age

group variable. According to these findings, it can be said that the age variable is not a significant determinant on PMS in the students with regular sports participation. At the basis of this outcome, it can be considered that regular exercise reduces PMS symptoms. Research findings in the literature also support the view that PMS symptoms decreases as the frequency of exercising increases in women (Demir et al., 2006: 262).

When the PMS levels of sedentary high school students in the study were examined according to the age group variable, it was concluded that the depressive affection and anxiety subscales and the total PMS score average were higher in favor of the students in the 17 years age group. According to these findings, it can be said that affection disturbances related to PMS are more frequent in sedentary high school students in the older age group when compared to the students in younger age group. On the basis of this outcome, it can be considered that the high school students' hormonal changes in their bodies during the menstruation period vary according to age groups. It is emphasized that sex hormones lies on the basis of the emotional and behavioral symptoms observed in the PMS process in the study by Yonkers et al. (2008: 1203).

In sedentary high school students in age group of 17, besides PMS total score, it can be considered that the background of high scores in depressive affection and anxiety subscales PMS prepares the basis for affection disorders. A similar study on athletes and sedentary women, Bayram (2007: 104) also found that PMS changes are more severe due to the frequency of symptoms of depression.

In conclusion, while exercise has positive effects on general health, it is also known that it has some positive effects on hormonal structure. At the beginning of the process of changes in the hormonal structures of women which is the period of menstruation, and the hormonal changes that take place during this period sometimes pave the way for the symptoms of PMS in women. Exercising has a protective role in the minimization of the symptoms of PMS. In this study, it was found that the PMS level was higher in sedentary students when compared to the high school students involved in sports regularly. The result obtained in the research was found to be in parallel with the literature. Findings obtained in the research and the related literature suggests that participation in exercise would be beneficial to reduce the incidence of PMS in women.

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