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EXAMINATION OF MENSTRUATION INFORMATION OF THE ELITE AND SUB-ELITE FEMALE ATHLETES IN DIFFERENT BRANCHES IN TERMS OF DIFFERENT VARIANCES

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ABSTRACT

The intensity of training and diets in female athletes with intensive training may affect the menstruation. The purpose of this study is to examine the menstruation information of women athletes in different branches in terms of different variables. Research engaged in sports in different parts of Turkey; handball (n=16), football (n=10), wrestling (n=20) and taekwondo (n=26) total (n=72) female athletes participated. 41 of these athletes were elite athletes and 31 were sub-elite athletes. In this research, data were collected through individual interview using qualitative research methodology. The survey consisting of questions including menstruation, nutrition and some demographic information was created by the researcher by making use of similar studies in the related literature. According to the research findings, there were statistically significant differences found between the elite and the sub-elite female athletes in terms of the frequency of training and the intensity of the training (p <0.001). There was also a significant difference between the elite and sub-elite female athletes in the menstruation period (p <0.001). Correlation analysis revealed that there was a weak positive correlation between the sports branches and the dysmenorrhea variables in the menstruation period (r =, 470, p <0.01). When the performed correlation analyses considered in sub-elite women athletes, there was a statistically significant negative correlation between the sport and menstruation period during training (r = 447, p <0.01), and a significant negative correlation between training and training severity in menstruation (r = -, 685, p <0.01). As a result, it can be said that elite female athletes have more intensive and intense training than the sub-elite female athletes. Besides, the age of menarche has been observed in elite athletes. When we look at the eating habits of the athletes about nutrition, it was seen that the athletes had lower breakfast and the fast-food habits than the sub-elite athletes.

Keywords: Female athlete, menstruation, nutrition, training, health.

INTRODUCTION

Increasing women's participation in sports, training at elite level with intensive and exhausting workouts can sometimes lead to different and unintended consequences. The intense training of women due to their physical and physiological differences can lead to irregularities and some problems in menstrual cycle.

Menstrual cycle contains a periodic process lasting approximately 28 days. The gonadotropic hormones released from the anterior pituitary gland provide the growth of new follicles in the ovaries during this 28 day period. Thus, one of the follicles develops on the fourteenth day of ovulation. Corpusluteum deterioration occurs after four days and the menstrual cycle ends with a large decrease in the female gender hormones released from the ovary and a new cycle begins (Koz et al., 2003). Dysmenorrhea is a pain in menstruation that will prevent normal activity in women and require drug use (Deb and Fenning, 2008). Shorter definition of dysmenorrhea means painful menstruation (Ayan et al., 2013). The concept of menarche is the name given to the first menstrual vision in girls (Sahin Ozdemir and Ersoz, 2013). It was first defined by the American Sports Physicians Association in 1992 and this definition was updated in 2007 (Javed et al., 2013). In the first definition, eating disorder was defined as amenorrhea and osteoporosis. Yet, in 2007, this definition has been updated as a reduced energy presence, menstrual cycle disorder and low bone mineral density (Lebrun and Rumbell, 2002; Zergeroglu, 2017). Recent studies have shown that the patient has optimal energy compliance, optimal bone health, and euthoria; It is stated that with or without eating disorder, it may be in a spectrum ranging from low energy deficiency to osteoporosis and hypothalamic functional amenorrhea (Thein-Nissenbaum, 2013).

The increase in the participation of women athletes in physical activity and sport has started to create different problems in health problems. In recent years, the situation of women athletes known as a trilogy of women, athletes with reduced energy, menstrual cycle disorder and low bone mineral density is seen together. Oestrogen deficiency leads to irregular menstrual cycle and decreased bone mineral density. A multidisciplinary approach is necessary for treatment. The awareness of athletes, coaches and parents is very important in protection (Sahin Ozdemir and Ersoz, 2013). The female athlete trilogy is a health problem that is recognized in the last quarter of a century and the severity of its effects is better understood every day. If the table cannot be detected early, irreversible health problems may occur (Tenforde et al., 2016).

With the increase in women's participation in sports, the incidence of female athlete trilogy increased. Women athletes trilogy, detailed history and physical examination can be recognized and necessary measures can be taken in the studies of women's athletes trilogy in the different clinical reflections of athletes and health care workers aim to increase awareness of the research has been done (Zergeroglu, 2017; Ercan, 2017). For the determination of failure, calorie monitoring can be done with a 3-day diet. A variety of screening questionnaires can be used to identify eating disorders and a clinical interview can be requested from a psychiatrist if possible (Barrack et al., 2013, Joy et al., 2016).

In the light of the above information, the purpose of this study is to examine the menstruation information of female athletes that are at elite and sub-elite levels in terms of their diet and training information. Sub-elite athlete means non-elite athlete but it is competitive athlete. In female athletes, menstruation and adequate nutrition are very important for women's health. Therefore, the main purpose of this research is to acquire information about the female athletes with their training information as well as their diets and its contents and their menstruation status.

METHOD

Research engaged in sports in different parts of Turkey; handball (n=16), football (n=10), wrestling (n=20) and taekwondo (n=26) total 72 female athletes participated. 41 of these athletes were elite athletes and 31 were sub-elite athletes. In this research, qualitative research method was used. Data were collected through the survey developed by the researcher. In the survey, questions including demographic information, menstruation information and nutritional information were arranged in a way similar to the questionnaires developed by the researchers in similar studies (Kelecek and Kin İşler, 2008; Karacan et al., 2013; Koca et al., 2014).

Survey questions consisted of; age, height, weight, sport age, sports branch, frequency of training, training intensity, age of menarche, menstruation cycle, dysmenorrhea, menstruation cycle time, how many days of menstruation period, does she train in menstrual days, how many meals they eat, fast-food, red meat, fish , milk and dairy products and water consumption.

For the analysis of the data obtained from this study, descriptive statistics, Independent T test (Table 1) and Spearman Correlation (Table 2, Table 3) were applied by using SPSS 22.0 package program for Windows.

FINDINGS

Table 1. Comparison of Variances That Belong to Elite and Sub-Elite Athletes

Variables	Level	n	x±sd	t	p
Age	Elite	41	20,41±2,97	,320	,750
	Sub-elite	31	20,19±2,81		
Weight	Elite	41	57,51±10,02	-,891	,376
	Sub-elite	31	59,58±9,39		
Length	Elite	41	166,54±6,45	,456	,650
	Sub-elite	31	165,87±5,67		
BMI	Elite	41	20,77±3,44	-,982	,329
	Sub-elite	31	21,53±3,00		
Branch	Elite	41	2,54±1,07	,445	,658
	Sub-elite	31	2,42±1,15		
Sport age	Elite	41	10,63±3,93	1,427	,158
	Sub-elite	31	9,29±3,99		
Training frequency	Elite	41	5,80±0,71	6,738	***,000*****
	Sub-elite	31	4,23±1,26		
Training intensity	Elite	41	15,98±4,41	7,305	***,000*****

	Sub-elite	31	9,10±3,26		
Breakfast habit	Elite	41	1,37±0,77	-,934	,353
	Sub-elite	31	1,55±0,89		
Fastfood consumption	Elite	41	2,39±0,86	1,642	,105
	Sub-elite	31	2,03±0,98		
Red meat consumption	Elite	41	2,68±1,04	1,089	,280
	Sub-elite	31	2,42±0,99		
Fishconsumption	Elite	41	1,68±0,52	-,204	,839
	Sub-elite	31	1,71±0,59		
Water consumption	Elite	41	8,17±4,45	-,360	,720
	Sub-elite	31	8,55±4,35		
Menarcheage	Elite	41	13,90±1,30	1,382	,171
	Sub-elite	31	13,48±1,23		
Menstruation regularity	Elite	41	1,20±0,40	-,629	,531
	Sub-elite	31	1,26±0,44		
Dysmenorrhea	Elite	41	1,54±0,50	-,318	,752
	Sub-elite	31	1,58±0,67		
Menstruation train	Elite	41	1,07±0,35	-4,299	***,000******
	Sub-elite	31	1,65±0,75		
Menstrualcycle	Elite	41	28,49±4,54	1,399	,166
	Sub-elite	31	26,97±4,59		
Menstrual day	Elite	41	5,39±1,61	-,698	,488
	Sub-elite	31	5,65±1,43		

$^{***}p<0,001$

Table 1 shows the comparison of different variables of elite and sub-elite athletes. Age, weight, height, BMI (body massindex), sports branch, sport age (age of beginning to sports), breakfast habit, fast-food consumption, red meat consumption, fish consumption, water consumption, menarche age, menstruation , dysmenorrhea (menstrual pain), mens. sports (whether she does sports in the period of menstruation), menstrual cycle (how often does a menstrual cycle happen), menstrual day (How long the menstrual period lasted) variables are given. There were statistically significant differences between the elite and sub-elite female athletes in terms of training frequency and training intensity (p <0.001). There was also a significant difference between the elite and elite female athletes in the menstruation period (p <0.001).

Tablo 2. The Relationship Between Different Variables of Elite Female Athletes

Elite (n=41)		Age	Weight	Lenght	BMI	Branch	Sportage	Train freq.	Train intens.	Breakfst	Fastfood	Redmeat	Fishcons.	Water cons.	Mens. age	Mens. regul.	Dysmenorrhe	Menstrain	Mens. cycle
Weight	r	**.384***																	
Lenght	r	.171	**.347***																
BMI	r	**.319***	**.892*****	-.107															
Branch	r	**-.432****	-.233	**-.554*****	.029														
Sportage	r	**.490****	.118	.078	.078	-.272													
Train. Freq.	r	**-.326***	-.216	.061	-.258	-.023	-.062												
Train.intens.	r	-.093	.125	-.051	.151	.209	-.057	**.586*****											
Breakfast	r	.097	.300	.101	.268	-.032	.203	-.231	-.249										
Fastfood	r	-.065	.017	.020	.008	.038	.006	.289	**.351***	-.032									

Redmeat	r	-.241	-.116	-.273	.027	**.381***	-.085	**.320***	**.546*****	-.291	**.338***								
Fishcons.	r	-.026	.075	**.327***	-.064	-.090	**.418****	.165	.149	.047	.115	-.006							
Watercons.	r	-.066	-.237	-.228	-.140	.069	-.171	-.099	-.246	**-.371***	-.194	-.232	-.289						
Mens. age	r	.192	-.140	.009	-.155	.074	.071	.006	.078	-.164	.102	.255	-.010	.029					
Mens. regul.	r	-.175	.192	.181	.100	-.133	.015	.223	.257	-.075	.280	.092	.184	-.117	-.011				
Dysmenorr.	r	-.069	.177	**-.359***	**.368***	**.470****	-.113	.020	.253	-.068	.196	.190	-.192	.036	.196	-.283			
Mens. train	r	-.030	-.155	.116	-.213	.026	.020	-.042	-.245	.085	-.098	-.213	.132	.203	-.262	-.106	-.231		
Mens. cycle	r	-.282	.244	-.062	.295	**.324***	-.149	.276	.190	-.117	.224	.188	.151	.142	.072	.234	.308	.009	
Mens. day	r	-.029	-.168	-.059	-.145	-.167	-.024	.024	-.048	.226	-.238	-.104	.032	-.180	-.160	-.276	-.172	.217	-.146

*p<0.05 ** p<0.01 *** p<0.001

r: Interpretation of Pearson (r) correlation coefficient; 0.00-0.25 very weak, 0.26-0.49 weak, 0.50-0.69 middle, 0.70-0.89 high, 0.90-1.00 very high.

The relationship between different variables of elite female athletes is given in Table 2 (correlation-Pearson). So the analysis indicates:

A weak positive significant correlation (r=.384, p<0.05) between weight and age variables,

A weak positive significant correlation (r=.347, p<0.05) between lenght and weight variables,

A middle negative significant correlation (r=-.554, p<0.001) between lenght and branch variables,

A weak positive significant correlation (r=.327, p<0.05) between lenght and fishcons (fish consumption) variables,

A weak negative significant correlation (r=-.359, p<0.05) between lenght and dysmenorrhea variables,

A weak positive significant correlation (r=.319, p<0.05) between BMI and age variables,

A high positive significant correlation (r=.892, p<0.001) between BMI and weight variables,

A weak positive significant correlation (r=.368, p<0,05) between BMI and dysmenorrhea variables,

A weak negative significant correlation (r=-.432, p<0.01) between branch and age variables,

A middle negative significant correlation (r=-.554, p<0.001) between branch and lenght variables,

A weak positive significant correlation (r=.381, p<0.05) between branch and red meat cons. (red meat consumption) variables,

A weak positive significant correlation (r=.470, p<0.01) between branch and dysmenorrhe avariables,

A weak positive significant correlation (r=.324, p<0.05) between sport branch and mens. cycle (mensturation cycle) variables,

A weak positive significant correlation (r=.418, p<0.01) between sport age and fish cons. (fish consumption) variables,

A weak positive significant correlation (r=.490, p<0.01) between sport age and age variables,

A weak negative significant correlation (r=-.326, p<0.05) between training frequency and age variables,

A middle positive significant correlation (r=.586, p<0.001) between training intensity and training frequency variables,

A weak positive significant correlation (r=.320, p<0.05) between training frequency and red meat consumption variables, A weak positive significant correlation (r=.351, p<0.05) between training frequency and fast food cons. (fast food consumption) variables,

A middle positive significant correlation (r=.546, p<0.001) between training intensity and red meat consumption variables,

A weak negative significant correlation (r=-.371, p<0.05) between breakfast habit and water cons. (water consumption) variables,

A weak positive significant correlation (r=.338, p<0.05) between fast food consumption and red meat consumption variables.

Tablo 3. The relationship between different variables of sub-elite female athletes

Sub-elite (n=31)		Age	Weight	Lenght	BMI	Branch	Sport age	Train freq	Train intens	Breakfst	Fastfood	Redmeat	Fishcons.	Water cons.	Mens. age	Mens. regul.	Dysmenorrhe	Mens. train	Mens. cycle
Weight	r	-.009																	
Lenght	r	-.122	.338																
BMI	r	.111	**.882*****	-.082															
Branch	r	.088	**-.573*****	-.319	**-.438***														
Sportage	r	.191	-.178	.067	-.240	**.554****													
Train. Freq.	r	-.183	**.415***	.145	**.376***	**-.530****	-.206												
Train. inten.	r	-.133	.282	.197	.189	**-.492****	-.130	**.824*****											
Breakfast	r	-.231	-.051	.021	-.032	-.298	**-.526****	.154	.188										
Fastfood	r	.034	-.002	-.340	.250	-.160	-.334	.183	.134	.285									
Redmeat	r	-.018	.127	-.002	.055	-.247	.061	.002	-.147	-.232	-.049								
Fishcons.	r	.055	.001	-.262	.157	-.159	-.275	.182	.102	-.004	.190	-.241							
Watercons.	r	-.096	**.481****	.218	**.478****	**-.468****	**-.395***	.324	.156	.066	.128	.269	-.079						
Mens. age	r	-.143	**-.404***	.104	**-.454***	.181	-.144	-.266	-.004	.175	.152	-.334	-.213	-.163					
Mens. regul.	r	-.175	**-.404***	-.132	**-.372***	.173	.069	-.167	-.133	.305	.209	.049	.041	-.196	-.053				
Dysmenorr.	r	-.256	**-.462****	-.006	**-.485****	.279	.134	-.121	-.087	-.049	-.231	.123	-.065	.001	.213	.151			
Menstrain	r	.285	**-.393***	-.268	-.279	**.447***	-.020	**-.685****	**-.622*****	-.148	-.074	.027	-.165	-.335	.298	.083	.223		
Mens. cycle	r	.161	.129	-.009	.216	.154	.284	-.108	-.254	-.281	-.243	-.012	-.090	.091	-.291	-.322	-.231	.073	
Mens. day	r	-.024	-.210	-.088	-.179	.053	-.011	.046	.094	.159	.008	-.009	-.166	-.182	.120	-.008	-.021	.096	-.078

*p<0.05 ** p<0.01 *** p<0.001

The relationship between different variables of sub-elite female athletes is given in Table 3 (correlation-Pearson). So the analysis indicates that:

A high positive significant correlation (r=,882, p<0.001) between weight and BMI variables,

A middle negative significant correlation (r=-,573, p<0.001) between weight and branch variables,

A weak positive significant correlation (r=,415, p<0.05) between weight and training frequency variables,

A weak positive significant correlation (r=,481, p<0.01) between weight and water consumption variables,

A weak negative significant correlation (r=-,404, p<0.05) between weight and mens. age (menarche age) variables,

A weak negative significant correlation (r=-,404, p<0.05) between weight and mens. regul. (mensturation regularity) variables, A weak negative significant correlation (r=-,462, p<0.01) between weight and dysmenorrhea variables,

A weak negative significant correlation (r=-,393, p<0.01) between weight and mens. train (mensturation training) variables,

A weak negative significant correlation (r=-,438, p<0.05) between BMI (body mass index) and branch variables,

A weak positive significant correlation (r=,376, p<0.05) between BMI and training frequency variables,

A weak positive significant correlation (r=,478, p<0.05) between BMI and water cons. (water consumption) variables,

A weak negative significant correlation (r=-,454, p<0.05) between BMI and menarche age variables,

A weak negative significant correlation (r=-,372, p<0.05) between BMI and mensturation regularity variables,

A weak negative significant correlation (r=-,485, p<0.01) between BMI and dysmenorrhe avariables,

A middle positive significant correlation (r=,554, p<0.01) between branch and sport age variables,

A middle negative significant correlation (r=-,530, p<0.01) between branch and training frequency variables,

A weak negative significant correlation (r=-,492, p<0.01) between branch and training intensity variables,

A weak negative significant correlation (r=-,468, p<0.01) between branch and water consumption variables,

A weak positive significant correlation (r=,447, p<0.01) between branch and mensturation training variables,

A middle negative significant correlation (r=-,526, p<0.01) between sport age and breakfast habit variables,

A weak negative significant correlation (r=-,395, p<0.01) between sport age and water consumption variables,

A high positive significant correlation (r=,824, p<0.001) between training frequency and training intensity variables,

A middle negative significant correlation (r=-,685, p<0.01) between training frequency and mensturation training variables,

A middle negative significant correlation (r=-,622, p<0.001) between training intensity and mensturation training variables.

DISCUSSION AND RESULT

When the findings of this study are examined, it is seen that there is a statistically significant difference found between the elite and sub-elite female athletes in terms of training day and time (p <0.001). On the training day, the athletes train several days a week and the training time expresses how many hours a week the athletes train. Thus, in accordance with these findings, elite athletes are more intense and have more training in terms of duration than sub-elite athletes. It is already an expected situation and it is because of elite athletes has an higher level of performance. In addition, in terms of the findings containing nutritional information, non-elite female athletes were more likely to have breakfast habits, water consumption and fish consumption. It was also observed that elite athletes had more fast-food consumption. According to these results, it can be said that elite female athletes have a more irregular diet and unhealthier than the sub-elite female athletes.

When the findings in Table 2 and the correlation findings of the elite female athletes for different variables are examined; there was a positive and highly meaningful correlation found between BMI and weight variables (r =

892, p <0.001). This high correlation state is expected to be related to the relationship between these two variables. There was a positive correlation between the training intensity and training intensity of elite female athletes (r = 586, p <0.001). In these two cases, elite athletes are expected to have intensive and severe training programs. There is a positive correlation between training intensity and red meat consumption and it can be said that red meat consumption increases as the training intensity of the athletes increase.

Similar researches in our study examined; In a research of Kelecek and Kin İşler (2008), when the irregularities in volleyball players and university students were examined, it was stated that there was a statistically significant difference between the two groups and when the percentages in irregularities seen in menstruation were examined, it was said that 27.9% of volleyball players and 48.6% of university students experienced irregularities in their menstruation. The fact that the athletes in this study had less irregularity during the menstruation periods supports the findings of our study.

According to the results of Karacan et al. (2013), no significant relationship was found between the branches and menstrual irregularities. A significant relationship was found between the branches and the changes in the menstrual period of sportive activity. In our study, this study supports this result of our study because there is no significant difference between the branches in terms of menstrual irregularities.

In the research of Koca et al. (2014) performed with 307 athletes in Turkey, all together of all three factors trilogy of 3.9%, lower energy intake 32%, menstrual disorders was determined in the rate of 31%. In addition, 7.2% of the athletes were primer amenorrhea, 16% had late menarche age, 16.9% had secondary menopause and 17.9% had short luteal phase were seen. In our study, it was observed that elite female athletes had experienced more menarche age than non-elite athletes.

In a study done by Beals (2002) on female athletes dealing with aerobic and anaerobic branches in the United States, no significant relationship was found between the groups in terms of menstrual disorder and it was found that the participants with eating disorders were more than menstrual disorders compared to the other athletes. In addition, 31% of athletes suffered from pain during menstruation. The results of this study also support the findings of our study.

In the research of Güney et al. (2017), it was determined that some menstrual disorders were seen less frequently and premenstrual syndrome symptoms were milder in the students with high levels of physical activity. Moreover, it was determined that the average menarche age of the students did not differ between the students with high physical activity level (13.33) and low level of physical activity (13.23).

Again, in the research of Güney et al. (2017) it has been found that students with high levels of physical activity experience less dysmenorrhea. Many studies comparing athletes and sedentary women have results that support our finding (Kelecek and Kin İsler, 2008; Salehzadeh, 2015; Azima, 2015).

In terms of physical exercise and menstrual cycle, in the studies of compariosn about females that do sports and doe do sports the age of menarche has been indicated to be delayed (Klentrou and Plyley, 2003). In our study, it was seen that elite female athletes had more intense and intense training than the sub-elite female athletes, and that the age of menarche in elite female athletes was later.

Nichols et al. (2007) researched associations of menstrual status, type of mechanical loading, and bone mineral density in female high school athletes participating in high/odd impact or repetitive/non-impact sport. In the result of the study researches said that female adolescent athletes should be evaluated periodically and advised of the possible negative effects of oligo/amenorrhea on bone health.

In the literature and some researches, it is determined that physical exercise has a positive effect on the reduction of dysmenorrhea (Bayram, 2007; Salehzadeh, 2015). In our study, it was seen that elite female athletes had dysmenorrhea and their participation in training during the menstrual period was low.

In this research, it was seen that elite female athletes had more intensive and intense training than sub-elite female athletes. When the nutrition habits of the athletes were examined, it was found that elite athletes were worse than their sub-elite athletes. However, the elite athletes are much more regular and healthy in terms of their intensive and severe training and they are crucial in terms of their performance and health. In accordance with these results, it is seen that the dysmenorrhea is much more in elite women athletes, while they are in menstruation there are some nutritional irregularities occur and their participation to training is at a low level. The training of female athletes during the menstrual period is so important in terms of both the moderation of dysmenorrhea and the adaptation of the organism to training during this period. Moreover, female athletes' healthy eating habits again play a vital role in terms of being healthy and a better performance.

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