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EFFECTS OF MENSTRUAL CYCLE ON SPORTS PERFORMANCE

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The aim of this study was to examine the effects of menstrual cycle on female athletes' performance. Forty-eight teak-wondo athletes, 76 judoka, 81 volleyball, and 36 basketball players (total 241) elite athletes participated in the study. A questionnaire constituted from 21 questions about menstrual cycle applied. A

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one-way analysis of variance and scheffe tests were performed to assess differences between sport branches about physical and physiological characteristics. Chi square was used to evaluate the regularity of menstrual cycle, performance, and drug taking. The mean age of teak-wondo athletes, judokas, volleyball and basketball players were 20.71 ± 0.41, 16.91 ± 0.27, 21.22 ± 0.26, and 21.03 ± 0.63 years, respectively. The menarche ages of the athletes were 13.92, 13.22, 13.75, 13.86 years, respectively. 27.8% participated in regional competitions, 46.1% participated in just the national competitions, and 26.1% participated in the international competitions. Whereas the menstrual disorder was seen in 14.5% of the athletes in normal time, during the intensive exercise this ratio was increased to 20.7%. It was determined that during the competition 11.6% of the athletes used drug, 36.9% had a painful menstruation, 17.4% did not have a painful menstruation, 45.6% sometimes had a painful menstruation, and 63.1% of the athletes said that their pain decreased during the competition. First 14 days after the menstruation began, 71% of the athletes said that they felt themselves well. 71% of the athletes felt worst just before the menstruation period, 62.2% of the athletes said that their performance was same during the menstruation, and 21.2% said that their performance got worse. Both in general and during the training the menstruation period of the athletes was found to be regular ($p < .01$). Most of the athletes said that they have a painful menstruation period, and during the competition their pain decreased. As a result of the questionnaire, during the training and competition the number of athletes that did not use drugs were higher than the athletes that used drug ($p < .01$). The number of athletes that felt good before and during the menstruation were significantly higher ($p < .05$, $p < .01$). Between the menstruation periods the athletes said that they felt better in the first 14 days than the second 14 days ($p < .01$). When the non-menses period and menses period were compared the athletes said that their performance did not change ($p < .01$). It has been concluded that the menarche age was high in the athletes. It has found that the physical performance was not affected by the menstrual period and the pain decreased during the training and competition.

Key words: menstruation, sports performance

INTRODUCTION

The menstrual cycle is a complex physiological phenomenon (Kin et al., 2000). Although no changes happen before or during menstruation in some females, physical and physiological changes do happen in some females (Kin et al., 2000). Although some females feel a decrease in their physical capacity during menstrual cycle, olympic medal-winning performances have taken place during all portions of the menstrual cycle (Fox et al., 1988; Fleck et al., 1990). Oligomenorhea (irregular pattern) or amenorrhea (cessation extending beyond 90 days) could develop in the female athletes involved in high-intensity training

(Hoeger et al., 1990). The exact cause of amenorrhea in female athletes is unknown. The reason of this disorder could be excessive weight loss, changes in body composition, insufficient nutrition, psychological stress, and intensive training (Fox et al., 1988; Kimberly et al., 1998).

Menstruation pains are strong cramps in the lower part of the abdomen at the first and second day of the menses. This situation is called dysmenorrhea (Shangold, 1990). Increased production of the hormone prostaglandin is associated with uterine cramping and is thought to be the cause of dysmenorrhea (Fleck et al., 1990). Exercise has not been shown to either cure or aggravate painful menstruation but it has been shown to relieve menstrual cramps because of improved circulation to the uterus. The decrease in menstrual cramps could also be related to increased levels of endorphins produced during prolonged physical activity that may counteract pain (Hoeger et al., 1990). Some females say that their pain decreased when they exercised regularly (Shangold, 1990).

Athletes attained menarche later than non-athletes. The association of later attainment of menarche and success in sports has been suggested to have two main significances, one dealing with physiological aspects and the other with sociological aspects (Fox et al., 1988). The intense training during the puberty years can cause menstrual disorders. As the longevity of sport age got shorter, the menarche age could be high and the menstrual disorders could increase (Uysal, 1996). From a medical standpoint, there is some disagreement reporting sports participation during menses. Some physicians believe that participation (training and competition) should not be allowed in those sports in which there is a greater incidence of menstrual disorders (Fox et al., 1988).

This study Examined the effect of menstruation cycle on performance.

MATERIALS AND METHODS

Subjects. 241 female subjects consented to participate in this study; all members of first league sports team in Turkey during the 2001–2002 seasons (for teakwondo, $n = 48$; for judo, $n = 76$; for volleyball $n = 81$, and for basketball, $n = 36$). Their age ranged from 15 to 26.

Assessment of Body Mass. Weight was measured using a levelled platform scale (sensitivity 100 g). The subjects were weighted wearing shorts and a tee shirt, and without shoes. Height was measured using a portable stadiometer (sensitivity $\pm$ 0.25 cm). The subjects were measured distributed to both feet and head positioned in the Frankfurt Horizontal plane. The body mass index (BMI) was calculated by the formula BMI = weight (kg)/height^2 (m). A questionnaire

consisting of 21 questions containing some properties and situations about menstrual cycle was applied to the athletes.

Statistical Analyses. Means and standard errors were calculated for each sport branch. ANOVA and Scheffe tests were used to determine possible significant physical and physiological differences among the sports branches. Chi-square was used to evaluate regularity of menstrual cycle, performance, and drug taking. Values are expressed as means ± Standard Error.

RESULTS

Table 1 provides the anthropometric and descriptive data for variables according to each sport branch. The mean ages of teak-wondo athletes, judokas, and volleyball and basketball players were 20.71 ± 0.41, 16.91 ± 0.27, 21.22 ± 0.26, and 21.03 ± 0.63 years, respectively. The menarche ages of the athletes were 13.92, 13.22, 13.75, 13.86 years, respectively. The status of participation in training and competition, and status of place in competition during menstruation (mens.) cycle is given in Table 2. 27.8% of athletes participated in the regional competitions, 46.1% participated in just the national competitions, and 26.1% participated in the international competitions.

The regularity of the menstruation, dysmenorrhea, and the status of using drugs are given in Table 3. Although the menstrual disorders were seen in 14.5% of the athletes in normal time, during the intensive exercise this ratio was increased to 20.7%. It was determined that during the competition 11.6% of the athletes used drugs, 36.9% had a painful menstruation, 17.4% did not have a painful menstruation, and 45.6% sometimes had a painful menstruation. 63.1% of the athletes said that their pain decreased during the competition. Both in general and during the training the menstruation period of the athletes was found to be regular ($p < .01$). Most of the athletes said that they had a painful menstruation period, and during the competition their pain decreased. As a result of the questionnaire, during the training and competition the number of the athletes that did not use drugs were higher than the athletes that used drugs ($p < .01$).

The status of the performance before during and after the menstrual cycle is given in Table 4.

For the first 14 days after the menstruation began, 71% of the athletes said that they felt well. 71% of the athletes felt worse just before the menstruation period, 62.2% of the athletes said that their performance was the same during the menstruation, and 21.2% said that their performance got worse. The number of athletes that felt good before and during the menstruation were significantly

Table 1. The Anthropometric and descriptive data for variables according to each sport branches

Parameters	Branches	*n*	Mean	Std. Er.	Min.	Max.	F ratio	Scheffe
Age (year)	Taek-wondo (1)	48	20.71	0.41	18	28	40.43**	2 < 1,3,4
	Judoka (2)	76	16.91	0.27	13	24		
	Volleyball (3)	81	21.22	0.26	17	31		
	Basketball (4)	36	21.03	0.63	15	32		
Height (cm)	Taek-wondo (1)	48	166.04	0.97	152	183	35.21**	3 > 1,2**
	Judoka (2)	76	165.11	0.70	152	178		4 > 1,2**
	Volleyball (3)	81	173.84	0.68	152	185		
	Basketbol (4)	36	174.81	1.37	157	195		
Weight (kg)	Taek-wondo (1)	48	57.46	1.35	43	76	5.15*	4 > 1*
	Judoka (2)	76	59.70	1.18	40	98		
	Volleyball (3)	81	61.30	0.68	50	75		
	Basketball (4)	36	64.56	1.40	49	88		
BMI (kg/m^2)	Taek-wondo (1)	48	20.81	0.43	16	28	5.79*	2 > 3*
	Judoka (2)	76	21.83	0.35	16	34		
	Volleyball (3)	81	20.25	0.15	17	24		
	Basketball (4)	36	21.03	0.21	19	23		
Menarche age (year)	Taek-wondo (1)	48	13.92	0.19	11	17	4.24*	1 > 2
	Judoka (2)	76	13.22	0.13	11	16		
	Volleyball (3)	81	13.75	0.13	11	17		
	Basketball (4)	36	13.86	0.24	11	17		
Pre-Mens. weight (kg)	Taek-wondo (1)	48	57.46	1.38	44	76	5.89**	1 < 4**
	Judoka (2)	76	60.33	1.18	40	98		
	Volleyball (3)	81	61.75	0.71	50	75		
	Basketball (4)	36	65.32	1.45	49	88		
Post Mens. weight (kg)	Taek-wondo (1)	48	57.02	1.36	43	76	5.77**	4 > 1.2*
	Judoka (2)	76	59.45	1.17	40	98		
	Volleyball (3)	81	61.23	0.69	50	75		
	Basketball (4)	36	64.53	1.41	49	88		

*$p < .05$; **$p < .01$.

Table 2. The status of participation to training and competition, and status of place in competition during menstruation cycle

		Taek-wondo		Judoka		Volleyball		Basketball		Total	
	Answers	n	%	n	%	n	%	n	%	n	%
Number of weekly training	3 days	20	41.67	8	10.53	16	19.75	2	5.56	46	19.1
	4 days	10	20.83	16	21.05	10	12.35	3	8.33	39	16.2
	5 days	6	12.50	8	10.53	17	20.99	11	30.56	42	17.4
	6 days	12	25.00	44	57.89	38	46.91	20	55.56	114	47.3
Duration ofdaily training	1 hour	2	4.17	—	0	1	1.23	—	—	3	1.2
	1.5 hours	14	29.17	10	13.16	20	24.69	5	13.89	49	20.3
	2 hours	31	64.58	53	69.74	42	51.85	27	75.00	153	63.5
	More than 2 hours	1	2.08	13	17.11	18	22.22	4	11.11	36	14.9
Number of mens. per year	0–4 times	0	0.00	1	1.32	1	1.23	0	0.00	2	.8
	5–8 times	1	2.08	4	5.26	1	1.23	0	0.00	6	2.5
	9–11 times	14	29.17	31	40.79	19	23.46	11	30.56	75	31.1
	12–15 times	31	64.58	38	50.00	60	74.07	25	69.44	154	63.9
	More than 15 times	2	4.17	2	2.63	0	0.00	0	0.00	4	1.7
Participation in training during mens.	Always	31	64.58	51	67.11	71	87.65	34	94.44	187	77.6
	Sometimes	15	31.25	24	31.58	10	12.35	2	5.56	51	21.2
	None	2	4.17	1	1.32	—		—		3	1.2
Participation in competition during mens.	Always	46	95.83	74	97.37	78	96.30	34	94.44	232	96.3
	Sometimes	2	4.17	2	2.63	3	3.70	2	5.56	9	3.7
	None	—		—		—		—		—	0
Place in competitions	Regional	4	8.34	14	18.42	33	40.74	16	44.44	67	27.8
	National	26	54.16	29	38.15	44	54.33	12	33.33	111	46.1
	International	18	37.5	33	43.43	4	4.93	8	22.23	63	26.1
Place in competitions during mens.	Taken medal	29	60.42	44	57.89	21	25.92	11	30.55	105	43.6
	No medal	19	39.58	32	42.11	60	74.08	25	69.45	136	56.4

Table 3. The regularity of the menstruation, dysmenorrhea, and the status of using drugs

		Taek-wondo		Judoka		Volleyball		Basketball		Total			
		n	%	n	%	n	%	n	%	n	%	Chi-square	Significance
Status of the mens. in normal time	Regular mens. (1)	27	56.25	28	36.84	52	64.20	17	47.22	124	51.5	49.36	1 > 2,3**
	Irregular mens. (2)	6	12.5	13	17.11	10	12.35	6	16.67	35	14.5		3 > 2**
	Sometimes irreg (3)	15	31.25	35	46.05	19	23.46	13	36.11	82	34.0		
During the high intensive training	Regular mens. (1)	23	47.92	26	34.21	37	45.68	17	47.22	103	42.7	18.58	2 < 1,3**
	Irregular mens. (2)	9	18.75	16	21.05	14	17.28	11	30.56	50	20.7		
	Sometimes irreg (3)	16	33.33	34	44.74	30	37.04	8	22.22	88	36.5		
Dysmenorrhea during mens.	Painful (1)	22	45.84	28	36.85	28	34.56	11	30.55	89	36.9	30.18	2 < 1,3**
	Painless (2)	11	22.91	11	14.47	12	14.82	8	22.22	42	17.4		
	Sometimes painful (3)	15	31.25	37	48.68	41	50.62	17	47.23	110	45.6		
Feeling pain during mens.	Decreasing (1)	26	54.16	45	59.21	57	70.37	24	66.67	152	63.1	120.61	1 > 2,3**
	Not decreasing (2)	19	39.58	24	31.57	22	27.17	11	30.56	76	31.5		2 > 3**
	İncreasing (3)	3	6.26	7	9.22	2	2.46	1	2.77	13	5.4		
Using drugs during training	Yes (1)	4	8.33	4	5.26	9	11.11	6	16.66	23	9.5	212.85	2 > 1,3**
	No (2)	37	77.08	67	88.15	61	75.30	22	61.12	187	77.6		
	Sometimes (3)	7	14.58	5	6.57	11	13.59	8	22.22	31	12.9		
Using drugs during competition	Yes (1)	5	10.42	6	7.89	11	13.59	6	16.66	28	11.6	255.05	2 > 1,3**
	No (2)	38	79.16	66	86.84	65	80.24	28	77.78	197	81.7		
	Sometimes (3)	5	10.42	4	5.26	5	6.17	2	5.56	16	6.6		
Using drugs to delay mens.	Yes (1)	2	4.17	—	—	2	2.47	—	—	4	1.7	401.88	2 > 1,3**
	No (2)	43	89.58	74	97.36	75	92.59	35	97.22	227	94.2		
	Sometimes (3)	3	6.25	2	2.64	4	4.94	1	2.78	10	4.1		

**$p<.01$

Table 4. Feeling about the performance before, during, and after the menstrual cycle

		Taek-wondo		Judo		Volleyball		Basketball		Total			
	Answers	n	%	n	%	n	%	n	%	n	%	Chi-square	Significance
Feeling before mens.	Better (1)	3	6.25	7	9.22	8	9.87	6	16.66	24	10.0	172.69	1 < 3*
	Good (2)	36	75	58	76.31	55	67.91	27	75	176	73.0		2 > 1,3**
	Worse (3)	9	18.75	11	14.47	18	22.22	3	8.34	41	17.0		
Feeling during mens. in competition	Better (1)	5	10.42	7	9.21	17	21.98	11	30.55	40	16.6	91.38	2 > 1,3**
	Good (2)	32	66.66	56	73.68	46	56.79	16	44.45	150	62.2		
	Worse (3)	11	22.92	13	17.11	18	22.23	9	25	51	21.2		
Feeling good among mens.	First 14 days (1)	34	70.83	46	60.53	66	81.48	25	69.44	171	71.0	182.27	1 > 2**
	Second 14 days (2)	14	29.17	30	39.47	15	18.52	11	30.56	70	29.0		
Period of feeling worse	Just before mens. (1)	34	70.83	46	60.53	66	81.48	25	69.44	171	71.0	92.52	3 < 1,2**
	During mens.(2)	14	29.17	30	39.47	15	18.52	11	30.56	70	29.0		
	Just after mens. (3)	34	70.83	46	60.53	66	81.48	25	69.44	171	71.0		

*$p < .05$; **$p < .01$.

higher ($p < .05$, $p < .01$). Between the menstruation periods the athletes said that they felt, better in the first 14 days than the second 14 days ($p < .01$). Evaluation of the performance is given in Table 5. When the non-menses period and menses period were compared the athletes said that their performance did not change ($p < .01$).

DISCUSSION

It has been determined that females who began sports in the early ages (Uysal, 1996) attained menarche later and menstruation disorders of these females increased. The age at which menarche began was significantly higher in the American female athletes than in her non-athletic counterpart. High school and college athletes attained menarche significantly later than non-athletes, and various groups of national and Olympic athletes attained menarche significantly latter than the high school or college athletes. On the other hand, age of menarche for Hungarian athletes has been found to be little affected by athletic competition (Fox et al., 1988). Although average menarche age of Belgium gymnasts is 15.6 ± 2.1 years, the average menarche age of girls in the general population is 13.2 ± 1.2 years (Claessens et al., 1992). Kovalcikova (1989) examined ages of menarche and status of the menstrual cycle in three groups of top level volleyball players and non-athletes. He found that age of menarche was later in athletes than non-athletes. The menstrual cycle in the three groups was associated with relatively slighter complications. Kin et al. (2000) have found the menarche age 13.61 years in 103 athletes and 13.25 years in 99 sedentary girls. The mean menarche age was 12.29 years in non-athletes (Fox et al., 1988). In the present study the mean menarche ages were 13.92 ± 0.19 years in teak-wondo athletes, 13.22 ± 0.13 years in judokas, 13.75 ± 0.13 year in volleyball players, and 13.86 ± 0.24 years in basketball players. Results of the study showed that the athletes attained menarche later than sedentaries and the Kin et al. (2000) study group and earlier than Claessens and et al. (1992) study group. Some physical and physiological characteristics of athletes were found significantly different between sport branches ($p < .05$, $p < .01$). The menarche age of teak-wondo athletes and judokas were found to be significantly different ($p < .05$). The group that attained menarche latest were the teak-wondo athletes; the earliest were the judokas. It was determined that high-intensity training delayed menarche age (Dusek, 2001). Intense exercise had been reported to delay menarche when the sports activity was begun before puberty (Kin et al., 2000, Broso & Subrizi, 1996). The average number of menses per year for joggers was 10.32 (5–30 miles per week) for runners 9.16

Table 5. Evaluation of performance

Performance		Taek-wondo		Judoka		Volleyball		Basketball		Total		Chi-square	Significance
		n	%	n	%	N	%	N	%	n	%		
During mens.	Better (1)	5	10.42	7	9.21	17	21.98	11	30.55	40	16.6	91.38	2 > 1,3**
	Same (2)	32	66.66	56	73.68	46	56.79	16	44.45	150	62.2		
	Worse (3)	11	22.92	13	17.11	18	22.23	9	25	51	21.2		
First day of mens	Better (1)	4	8.33	10	13.16	20	24.69	11	30.56	45	18.7	23.93	1 < 2,3**
	Same (2)	22	45.83	34	44.74	37	45.68	10	27.78	103	42.7		
	Worse (3)	22	45.83	32	42.11	24	29.63	15	41.67	93	38.6		
Second day of mens	Better (1)	20	41.67	27	35.53	37	45.68	17	47.22	101	41.9	58.39	3 < 1,2**
in respect to first	Same (2)	25	52.08	40	52.63	35	43.21	15	41.67	115	47.7		
day	Worse (3)	3	6.25	9	11.84	9	11.11	4	11.11	25	10.4		
3 days after onset	Better (1)	15	31.25	19	25.00	22	27.16	13	36.11	69	28.6	114.16	2 > 1,3**
of bleeding	Same (2)	30	62.50	48	63.16	54	66.67	21	58.33	153	63.5		1 > 3**
	Worse (3)	3	6.25	9	11.84	5	6.17	2	5.56	19	7.9		
13 days after onset	Better (1)	21	43.75	29	38.16	30	37.04	12	33.33	92	38.2	115.98	2 > 1,3**
of bleeding	Same (2)	26	54.17	45	59.21	49	60.49	22	61.11	142	58.9		1 > 3**
	Worse (3)	1	2.08	2	2.63	2	2.47	2	5.56	7	2.9		

**$p < .01$.

(more than 30 miles per week), and for controls 11.85 (Fox et al., 1988). In the present study 63.9% of the athletes menses 12 times, 31.1% of the athletes have 9–11 times in a year.

In some studies a relationship was determined between menstrual disorders with training intensity and training amount. A group of 381 girls, 12 up to 19 years old, engaging in competitive sports (athletics, basketball, dancing, gymnastics, swimming, skiing, tennis, volleyball) was examined. Delay of menarche and longer frequency of menstrual disorders, found among athletes, turned out to be directly proportional to the amount of time devoted to training and to the kind of performed sports (Trivelli et al., 1995). In one study menstrual function was assessed comparatively in different categories of 155 Nigerian athletes, aged 13–19 years, and 135 non-athletes, aged 12–18 years, who answered questionnaires and were interviewed. Menstruation was more regular and normal in the non-athletes (44%) than the athletes (21%) (Triola, 1988). Kin et al. (2000) assessed menstrual function of 103 athletes and 99 non-athletes aged 12–25 years. 54.37% of athletes and 72.73% of non-athletes have a regular menstrual cycle. Türkmen (2000) found that 17% of athletes have an irregular menstrual cycle. In the present study 51.5% of athletes had a regular menstrual cycle, 14.5% an irregular menstrual cycle, and 34% a sometimes irregular menstrual cycle. In this study ratio of regular menstruation was lower than the Kin et al. (2000) study but the results were almost similar.

More menstrual dysfunction was found who in high-intensity training in 96 athletes and participated in team sports. It was found that the menstrual function returned to normal by decreasing the training intensity or stopping the training for a while (Uysal, 1996). Menstrual cyclicity is influenced by prior and concomitant exercise intensity and duration in long-distance runners, gymnasts, ballet dancers, fencers, and rowers. Oligomenorrhea and amenorrhea develop more in athletes than non-athletes but the doctors could not show any reason. These dysfunctions could happen as a result of hormonal and body function changes during high-intensity training (Shangold, 1990; Wierrani, 2000). Excessive loss of body weight and body fat ratio causes the irregular menstrual cycle and amenorrhea. Training and competition stress also cause these dysfunctions. The athletes that participated in the present study said their menstrual cycle was affected a little from high-intensity training. Although 14.5% of the athletes have menstrual disorders in a normal time, this ratio increased to 20.7% during the intensive training. According to the present results it was seen that menstrual disorder increased with high-intensity training.

It was determined that the pain affects the performance so the athletes have to calculate the time of their menstrual cycle and if necessary they

have to delay their menstrual cycle. For this aim analgesics, non-stereoidal antiinflamtore could be used for few days (Uysal, 1996). The athletes who have an irregular menstrual cycle could not calculate the menses time so using the drugs the wrong time could affect the performance negatively. The number of the athletes that use drug during competitions was low (11.6%) in the study. Özdemir and Küçükoğlu (1993) examined the effects of menstruation on speed and endurance, and found the performance did not decrease. But the dysmenor athletes' endurance performance was negatively affected. In the same study they found that 68.6% athletes did not have a pain, 31.4% of athletes had painful menstruation. Kin and et al. (2000) found 70.87% of the athletes had painful menstruation and 29.3% athletes did not have pain. In the study 36.9% of the athletes had painful menstruation, 17.4% didn not have pain and 45.6% of the athletes sometimes had pain. In the present study ratio of the athletes that did not have the pain during menstruation was lower from Özdemir and Küçükoğlu (1993) and Kin et al. (2000) study. The source of this difference could be the number of the answer alternatives. Although the answer alternatives of the questionnaire were three, their alternatives were two. In the present study 63.1% of the athletes indicated their pain decreased during competition. To decrease the pain 9.5% of the athletes use drugs during training and 11.6% used drugs during competition. Just 1.7% of athletes used drugs to delay their menses. Dusek (2001) used questionnaires to determine the dysmenorrhea in 72 active female athletes and 96 sedentary control group not engaged in any sports activity aged between 15 and 21. They found prevalence of dysmenorrhea was twofold lower in athletes than in the control group. Anecdotal accounts and unsystematic reports suggested that women who exercise experience fewer pre-menstrual symptoms and less severe dysmenorrhea than women who are sedentary (Choi et al., 1995; Prior et al., 1992). Women who frequently exercised may be to some extent protected from deterioration of mood before and during menstruation (Choi et al., 1995).

When the effects of menstrual cycle on performance was examined some researchers found negative effects (Wilson et al., 1991) but some researchers did not find negative effects on performance (Quadagno et al., 1991). However, Olympic medal–winning performances have taken place during all portions of the menstrual cycle (Fox et al., 1988; Fleck et al., 1990). 37% of the athletes who participated in the 1964 Olympic Games said that they thought their performances were not negatively affected by their menstrual cycle (Kin et al., 2000). Lebrun et al. (1995) examined the effects of menstrual cycle phase on four selected indices of athletic performance; aerobic capacity, anaerobic capacity, isokinetic strength, and high-intensity endurance. They found the

cycle phase did not impact significantly on the majority of the performance tests and cardiorespiratory variables (Lebrun et al., 1995). Kin et al. (2000) asked athletes the affect of menstrual cycle on performance and 50.49% of the athletes answered that their performance was not affected, 49.51% of the athletes answered their performance was affected. 70% of the athletes had same or better performance, 30% of the athletes performed worse (Reer, 1994). Female athletes reporting poorer performance during menstruation, a large percentage were endurance athletes (e.g., tennis players and rowers). Performances for volleyball and basketball players and swimmers and gymnasts were better than the endurance athletes, but were still below normal. Performances by track-and-field athletes, especially sprinters were not affected nearly so much by menstruation as were the performances by other athletes. Gold-medal performances have been reported in swimming and track and field (Fox et al., 1988). The best performance is performed after the menstrual period and 15th day of the menstrual cycle first (14th day after menses). Many investigators have documented evidence to suggest that the pre-menstrual phase is often associated with decreased performance (Eston, 1984; Fraccaroli, 1980; Nöcker, 1980). In the study 71% of athletes feel themselves good in the first 14 days after the menses began. When it was asked when they feel worse 49% of the athletes answered just before the menses. 62.2% of the athletes said that their performance is the same, 21.2% of the athletes said that their performance is worse during the menstrual cycle. The ratio of athletes said their performance was worse in the first day of menses 38.6%. This ratio decreased 10.4% in the second day of menses in respect to first day. During the menstrual cycle most of the athletes evaluated their performance same with normal time. In the present study, after 3 days and 13 days after the onset of bleeding the ratio of the athletes evaluated their performance "worse," was low. In one study, metabolic and cardiovascular responses were determined at rest and during exercise on 8 trained female athletes and 9 untrained females during the following 3 phases of the menstrual cycle: 7 days after ovulation (pre-menstrual phase), 3 days after the onset of bleeding (menstrual phase) and 13 days after the onset of bleeding (postmenstrual phase). None of the responses, either at rest or during exercise was significantly affected by the different phases of the cycle (Fox et al., 1988). Özdemir and Küçükoğlu (1993) found that speed and endurance were not affected by the menstrual period if athletes have no pain. Türkmen (2000) have found that menstrual cycle period did not negatively affect the sportive performance (vertical jump, 20 m sprint, reaction time, and hand grip strength) of 30 athletes and 30 sedentaries.

It was concluded that the menarche age was high in the athletes. It has found that the physical performance was not affected by the menstrual period and the pain decreased during the training and competition.

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