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Full Length Research Paper

Investigation of the effect of menstruation period on sportive performance of women's volleyball players

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ABSTRACT

The aim of this study was to investigate the effect of some sportive performance on the mensturation of female amateur volleyball players. 15 healthy female athletes with average age 20.0 ± 1.39 years, height average 165.93 ± 5.13 cm, body weight average 57.07 ± 4.42 kg and BMI (body mass index) 20.69 ± 4.78 kg/m^2, voluntarily partipated in this study. Athletes had training age of 6 years, they participated in regular training, they had regular menstrual cycle for 6 months, and they were not using any regulatory drug. In obtaining the data, flexibility, muscular strength and endurance, anaerobic power and speed tests after of the the premenstrual menses and in 2nd day of menstrual menses to athletes were taken. The avarage test, the standart deviation test and the t test of the dependent groups, were statistically analysed. The results of the first and second of athletes to sit-ups, push-ups, flexibility, speed and anaerobic power values, respectively, were 31.00 ± 12.28, 29.33 ± 9.88, 27.20 ± 5.41 cm, 4.08 ± 0.69 sn and 73.77 ± 3.20 kgm/sn; at 29 ± 12.13, 23.93 ± 9.24, 27.87 ± 4.97 cm, 4.14 ± 0.59 sn and 69.84 ± 3.25 kgm/sn. In conclusion, female volleyball players' menstrual cycle did not affect their flexibility, muscular strength and endurance, anaerobic power and speed performances ($p > 0.05$).

Keywords: Menstruation, voleyball, female, sport performance.

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INTRODUCTION

Volleyball is an interval the type of sport which in the short-term follows each other in loading and relaxation variations. Interval studies contain very short-term maximum exertion made, contractions, and then again with a very short rest period studies. High technical skill, anaerobic and aerobic endurance, speed, agility, promptness and flexibility has players who are adaptable for esthetic, fast and hard games, active and lithe with flexible bodies as well as having strong hand and foot wrists. Those esthetic, fast and strong players who can do a quick several actions in narrow field have organisms adaptable for anaerobic exercises based on aerobic power (Ön, 2012; Fröhner, 1999).

Research on the topic has focused on sportive performance in four cycles of menstruation period and revealed that women players perform worse during their menstruation periods. However, there have been several studies concluding that players get the best performance at the beginning of their menstruation periods. Some others also suggest that menstruation and sportive activities affect one another and some extraordinary sportive achievements have been witnessed in each phase of menstruation periods of women (Ertas and Ersoz, 2002; Karacan et al., 2013; Karakas, 1987; On, 2012; On et al., 2014). Some searchers (Kalyon, 2000; Lebrun, 1993; On, 2012; On et al., 2014; Sevim, 2002; Tsampoukos et al., 2010) have attempted to illuminate the effect of menstruation on performance but no conclusive evidence related to if there was a negative or positive effect was found. But, menstruation in women players may lead to performance loss and several physiological difficulties in trainings or competitions. Female athletes often try to abstain from trainings or competitions psychologically during menstruation periods. On the other hand, a line of research focusing on performance of women during menstruation periods

concluded that there is no change in power output values in terms of sprint tests in menstruation period. In another study, it has been found that muscle endurance is at the highest level in the middle of the follicular phase, whereas it is at the lowest level in the half of the luteal phase. Additionally, it has been found that performance is better at early luteal phase. Finally, other studies have concluded that the best performance values have been measured after ovulation and menstruation phases, while the worst performance values were obtained during premenstruation period (Fomin et al., 1989; Kalyon, 2000; Lebrun, 1993; Lind and Petrofsky, 1976; On, 2012; On et al., 2014, Ozdemir and Kucukoglu, 1993; Sevim, 2002; Tsampoukos et al., 2010).

Purpose of this research was to investigate the effect of menstruation periods of women's volleyball players on some sportive performance levels.

MATERIALS AND METHODS

Study group

A total of 15 healthy, active and volunteer women player who had a regular menstruation period and did not use any regulatory medical supplement (oral contraseptive) were recruited for this study. The participants were players in women's volleyball team of Department of Physical Education and Sport Teacher, Amasya University. The average physical properties of the participants were as follows: Volleyball players have average of 20.20 ± 1.39 years old, average of 165.93 ± 5.13 cm height, average of 57.07 ± 4.42 kg body weight and average of 20.69 ± 4.78 kg/m^2 BMI.

Data collection

The body weights of the participants were measured via electronic bascule (Arzum AR 553). The physical traits of participants, including height, body weight, age and menstruation cycles were noted. Additionally, push-up, sit-up, flexibility, 30 m speed and vertical jump tests were employed in order to determine sportive performance values. All measurements were taken with participants' tights and T-shirts. Tests were conducted on the 2nd (menstrual) and 23rd (follicular-luteal-ovulation) days of menstrual cycle.

Height and body weight

Body weight measurements of players were conducted through weighing machines with 0.01 kg sensitivity, while height measurements were done via tools with 0.01 m sensitivity. In order to determine the body fat level, Body Mass Index (BMI) was used and values for volleyball players were calculated via this formula: BMI = Body weight (kg)/height $(m)^2$.

Flexibility

The flexibility measurements of volleyball players were calculated via sit and reach tests and sit and reach test box was employed. Before the measurement, participants were informed on how it would be conducted. Tests were repeated two times and the highest measurement was noted in the information form.

Push-up

Push-up test was employed so as to determine the power and sustainability of power at 30 s intervals and the highest push-up scores in 30 s were noted.

Sit-up

Sit-up test was employed so as to determine the power and sustainability of power at 30 s intervals and the highest sit-up scores in 30 s were noted.

Vertical jumps

To test anaerobic power, the vertical jump test was conducted. It was conducted through vertical jump meter that is a measure of how high an individual or athlete can elevate off the ground from a standstill. Volleyball players were informed before the test and two measurements were conducted and the highest measurement was noted. The calculation of vertical jump values were calculated via Lewis formula (Tamer, 2000): $P = \sqrt{4.9} \times$ Body Weight (kg) $\times \sqrt{}$ Jumping Level (m) = kg-m/sec.

Speed

In order to determine the speed, 30 m speed test was conducted. The test was conducted via sprint start tips from the start line in 30 m and the measurement was done via Casio Brand time keeper. Each player's running was measured two times via two time keepers simultaneously (the average measurement of two time keepers was considered as one) and the best one was noted in the information form.

Statistical analysis

To analyse data, means of age, height, body weight and BMI values of the players, standard deviation, minimum and maximum values were calculated. The t test at the

dependent groups was employed to determine if there is a difference amount menstrual phases. The standard level of significance used to justify a claim of a statistically significant effect is p = 0.05.

RESULTS

All findings related to women's volleyball players are presented in Tables 1 and 2 in detail and discussed.

The average means of the participants are as follows: age 20.20 ± 1.39 year; height 165.93 ± 5.13 m, body weight 57.07 ± 4.42 kg and BMI (Body Mass Index) 20.69 ± 4.78 kg/m^2 (Table 1).

As shown in Table 2, the flexibility, push-up, sit-up, vertical jump, speed, anaerobic power values during menstruation periods of the players are as follows respectively: 27.20 ± 5.41 cm, 29.33 ± 9.88 number, 31.00 ± 12.28 number, 33.73 ± 3.58 cm, 4.08 ± 0.69 sec and 73.77 ± 3.20 kgm/sec on 23rd day (regular day); 27.87 ± 4.97 cm, 23.93 ± 9.24 number, 29 ± 12.13 number, 30.13 ± 4.21 cm, 4.14 ± 0.59 sec and 69.84 ± 3.25 kgm/sec on 2nd day. Findings clearly indicate that female volleyball players' menstrual cycle, their flexibility, muscular strength and endurance, anaerobic power and speed performances did not affect showed (p > 0.05).

Table 1. Demographic ınformation on women's volleyball players.

Variables	n	X ± Sd	Minimum	Maximum
Age (year)	15	20.20 ± 1.39	18.00	24.00
Body weight (kg)	15	57.07 ± 4.42	45.00	62.00
Height (cm)	15	165.93 ± 5.13	156	173
BMI (kg/m^2)	15	20.69 ± 4.78	16.87	22.20

Table 2. Performance analysis of women's volleyball players during menstrual cycles.

Performance variable	n	Personal variables		P
		Regular day	2nd day	
		X ± Sd	X ± Sd	
Flexibility (cm)	15	27.20 ± 5.41	27.87 ± 4.97	1.11
Push-up (number)	15	29.33 ± 9.88	23.93 ± 9.24	0.07
Sit-up (number)	15	31.00 ± 12.28	29 ± 12.13	0.71
Vertical jump (cm)	15	33.73 ± 3.58	30.13 ± 4.21	0.35
Speed (sec)	15	4.08 ± 0.69	4.14 ± 0.59	0.30
Anaerobic power (kgm/sec)	15	73.77 ± 3.20	69.84 ± 3.25	0.38

*P < 0.05, **P < 0.01.

DISCUSSION

This study has sought to illuminate the effect of menstruation periods of women's futsal players on several sportive performance levels. Previous studies have revealed that women players sometimes experience difficulties in taking part in sportive activities during menstruation cycles. On the other hand, some other studies have provided compelling evidence suggesting that menstruation cycles pose different effects on women and some women do not experience any effect in menstruation phases even though many others have some physical and psychological health problems, including pain, weakness, nervousness and coordination problems. Therefore, it has a wellknown fact that women become very sensitive and stressful during menstruation periods (Özdemir and Kucukoglu, 1993). In this regard, it can be concluded that findings of the studies dwelling on performance varieties of women players during menstruation periods may vary.

In a study conducted by On (2012), for example, the effect of menstruation period on anaerobic power and active jumping performance of female volleybal players was examined and no significant evidence was obtained. Dibrezzo et al. (1988) performed a study on dynamic power and performance variables during the three cycles of menstrual period and found no significant difference between power variables during the three cycles of menstruation period. In a similar study conducted by Özdemir and Kucukoglu (1993), the authors investigated the effect of menstruation on speed and endurance, it was concluded that menstrual phase did not affect speed and endurance scores of the women players, but it adversely affected those with a painful menstruation

period in terms of endurance. In another one conducted by Giacomoni et al. (2000), 10 players who used any regulatory medical supplement (oral contraceptive) and 7 healthy players who did not use any medicine were recruited and no statistical difference was found between and in-group comparisons of squat jumpings. Hazir et al. (2011) dwelled on menstrual cycles' effect on repetitive sprint performance and the speed of removing of lactic acid from the blood during active recovery and conducted 5×6 sec power loss test which are against to the resistance corresponding 10% of body weight in mechanic ergometer cycling after anthropometric measurements during follicular and luteal phases of 11 women players with regular menstruation cycles but found no significant differences among the values including 5×6 sec repetitive sprint maximum power measured during follicular and luteal phases, total power and power loss values. They concluded that no negative effect of menstrual cycle on repetitive sprint performance and then the speed of removing of lactic acid from the blood during active recovery were found. In another study conducted by Cakmakci et al. (2005), Wingate Test was conducted on women students of physical education teaching at the 2nd and 14th day of their menstrual periods and no significant difference was obtained between anaerobic performance measured menstrual and follicular phases. Guvenman (2007) examined the effect of menstrual cycles on physical parameters and reaction time, compared jumping scores of 8 elite and 12 sedentary women players and found no statistical difference in the analysis. In a study conducted by Ön et al. (2014), for example, the effect of menstruation period on anaerobic power and active jumping performance of female volleybal players was examined and no significant evidence was obtained. Canpas Çakir (2006), on the other hand, conducted a study in which cardio-respiratory response on exercise in follicular and luteal cycles of menstrual cycles of normal and overweight women who don't exercise and found that luteal phase in overweight and follicular phase in normal women affect the exercise performance. In a study by Tsampoukos et al. (2010), the effect of menstrual cycle on sprint performance was examined and found no difference in sprint test scores of the participants. In this present study, we obtained no significant data ($P > 0.05$) on the effect of menstruation periods of women's volleyball players on flexibility, muscular strenght and endurance, speed and anaerobic power performances (Table 2). Our findings align with the studies mentioned above. That is to say, it can be concluded that menstruation period don't have positive or negative effect on sportive performance in women players.

However, Wearing et al. (1972) conducted a study on the effect of menstruation period on physical fitness tests, examined four phases of menstrual cycle and concluded that the worst performance was noted in menstrual phases. Masterson (1999) found significant differences between two groups, those in follicular phase and luteal phase who exercise at least 3 days in a week, by applying anaerobic power test. Karacan et al. (2013) investigated menstrual situations of 133 elite women players in different branches of sports and found that menstruation period affects the sportive performance psychologically and that sportive activity affects menstrual phases. In another study by Karacan and Gunay (2003), it was attempted to investigate the effect of menstruation and pre-menstrual syndrome on performance in short term and high level exercise parameters, such as attention, concentration, speed and promptness and found that general coordination, anaerobic power, vertical jump and 30 m sprint values were found to be significant after menstruation period when compared to premenstrual and menstrual phases ($p < 0.05$). Additionally, it was found that significant differences were found in visual reaction times ($p < 0.05$) and the best score was obtained three days after the menstruation ($p < 0.05$). Ertas and Ersoz (2002), on the other hand, concluded that women players gave the best performance during their beginning of the menstruation period. In contradiction with this, Lebrun and Rumball (2001) indicated that the best performances were obtained after ovulation and menstruation periods, while the worst ones are the result of premenstrual periods. On the other hand, Karakas (1987) noted that extraordinary achievements and world records of women players were obtained during each cycle of the menstruation period. In our study, we don't corroborate with the existing literature in that, we found no significant difference between sportive performance and menstruation periods of women players (Table 2).

In a nutshell, it can be concluded that menstruation cycle of women's volleyball players do not affect the flexibility, muscular strenght and endurance, speed and anaerobic power performances.

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