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Original article

EFFECT OF PREMENSTRUAL SYNDROME ON BALANCE PERFORMANCE IN EARLY ADOLESCENT SWIMMER GIRLS

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Abstract

Aim. The purpose of this study was to investigate premenstrual syndrome influences on balance performance in early adolescent swimmer girls.

Methods. A total of 13 subject were examined. The mean (*SD*) age was 13.31±0.751 years, height was 165.54±4.235 cm, and weight was 52.69±4.111 kg for the 13 female children. In this study, The Flamingo balance test was used for female children. The tests were applied monthly normal and premenstrual period, and the aim of the test was explained to the children before the test was conducted. The test was started with a 10-minute warm-up session. While the test was conducted, the same weather conditions were taken into consideration.

Results. There were differences in balance performance of children between menstrual and premenstrual period each month (P<0.05).

Conclusions. the balance scores in the premenstrual period are lower than those in the menstrual period. It is considered that the balance is deteriorated during menstruation.

Keywords: balance, children, premenstrual, swimmer

Introduction

The number of women and young girls exercising regularly has increased enormously over the past 30 years. Physicians have more female patients who exercise regularly than ever before and they must be prepared to advise about the risks and the benefits of exercise and manage the problems that emerge along the way (Warren and Shantha, 2000). The female athlete derives many benefits from exercise but is also at special risk because of the negative effects of exercise on the reproductive and skeletal systems. Several forms of menstrual irregularities have been described in the female athlete: secondary amenorrhea, oligomenorrhoea, short luteal phases and anovulation. The prevalence of menstrual irregularities varies greatly in various studies due to methodological differences, differences between the populations studied in terms of age, athletic discipline, level of activity and performance and training prior to menarche (Warren and Shantha, 2000). 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).

The premenstrual syndrome (PMS) is a major clinical entity afflicting a large segment of the female population and is characterized by emotional and physical symptoms that consistently occur during the luteal phase of the menstrual cycle (Dickerson et al., 2003). Many authors have described premenstrual symptoms as physical, emotional, and behavioral changes. These changes must be different from a female's baseline state, occurring in the 7–10-day period before menses and ending with the onset of menses. During the menstrual cycle, as the levels of estrogen and progesterone in the body undergo dynamic regulation, the effects of these hormones on the central nervous system will also change (Wolley, 1999).

Balance is considered to be an important aspect of performance of all individuals whilst undertaking various daily activities, which is achieved by a complex process involving the function of musculoskeletal and neurological systems (Jacobson et al. 1992). Balance; many sensory, motor and biomechanical components is a complex process involving coordinated activities (Nashner, 1997). Balance is different as a result of postural changes in the body muscular contraction to maintain a certain position in a certain place (Cavlak, 1997). Balance the condition of the musculoskeletal system, the age, visual and

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vestibular stimulation and this depending on the coordination between the components (Pereira 1990). Various daily activities can be affected during premenstrual phase. This may be partly explained by impaired postural balance as long-term estrogen supplementation has been demonstrated to result in better balance in postmenopausal women (Hammar et al., 1996; Naessen et al., 1997).

Therefore, the aim of this study was to investigate premenstrual syndrome influences on balance performance in early adolescent swimmer girls.

Method

Experimental Approach to the Problem

This investigation involved sectional design to balance performance of female children with respect to their normal and premenstrual period. A total of 13 female children were obtained. The Flamingo balance test was used for female children.

Subjects

A total of 13 female children were examined. The mean (*SD*) age was 13.31±0.751 years, height was 165.54±4.235 cm, and weight was 52.69±4.111 kg for the 13 female children. Before conducting the experiment, all children were informed of the risks of the study and gave informed consent. The study was approved by an ethics board and met the conditions of the Helsinki Declaration.

Procedures

In this study, The Flamingo balance test was used for female children. The tests were applied monthly normal and premenstrual period, and the aim of the test was explained to the children before the test was conducted. The test was started with a 10-minute warm-up session. While the test was conducted, the same weather conditions were taken into consideration.

Flamingo Balance Test

In the assessment of balance ability of children, the Flamingo balance test was used which was evaluated as an ability to balance on one leg on a flat firm surface with eyes open (60 s). The other leg was bent backwards. The stopwatch was started as soon as the child achieved balance. If the child lost balance, she was unable for this test (Robergs and Roberts, 1997). Balance ability scores was recorded by administrator as error score during 60 s. Balance ability was better when error score was lowest.

Statistical Analysis

SPSS IBM 22.0 statistical program was used for evaluation and calculation of the data. We summarized the data and evaluated the means and standard deviations. To explain differences between normal and premenstrual period, paired sample T test was used. Also, to explain differences between measurements, repeated measurements analysis of variance was used according to the results of the test of normality, and a Bonferroni test from post hoc multiple comparisons tests was used according to the results of the homogeneity of variance. The significance level was taken as 0.05.

Results

Table 1. Summary of all recorded variables as means ±SD

Variables	N	Mean	Std. Deviation
Age (years)	13	13.31	0.751
Height (cm)	13	165.54	4.235
Weight (kg)	13	52.69	4.111

The mean (*SD*) 30-m age was 13.31±0.751 years, height was 165.54±4.235 cm, and weight was 52.69±4.111 kg for the 13 female children.

Table 2. Comparative of flamingo balance test in menstrual and premenstrual period

		N	Mean	S.D	T	P
First Month	Menstrual Period	13	4.23	2.555	3.157	0.008*
	Premenstrual period	13	2.92	2.629		
Second Month	Menstrual Period	13	4.00	1.826	4.571	0.001*
	Premenstrual period	13	2.69	1.974		
Third Month	Menstrual Period	13	3.69	2.213	7.675	0.000*
	Premenstrual period	13	2.31	1.932		
Fourth Month	Menstrual Period	13	4.38	2.219	6.231	0.000*
	Premenstrual period	13	2.54	2.222		

*P<0.05

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As shown in Table 2, there were differences in balance performance of children between menstrual (4.23±2.555) and premenstrual period (2.92±2.629) for first month. There were differences in balance performance of children between menstrual (4.00±1.826) and premenstrual period (2.69±1.974) for second month. There were differences in balance performance of children between menstrual (3.69±2.213) and premenstrual period (2.31±1.932) for third month. There were differences in balance performance of children between menstrual (4.38±2.219) and premenstrual period (2.54±2.222) for fourth month.

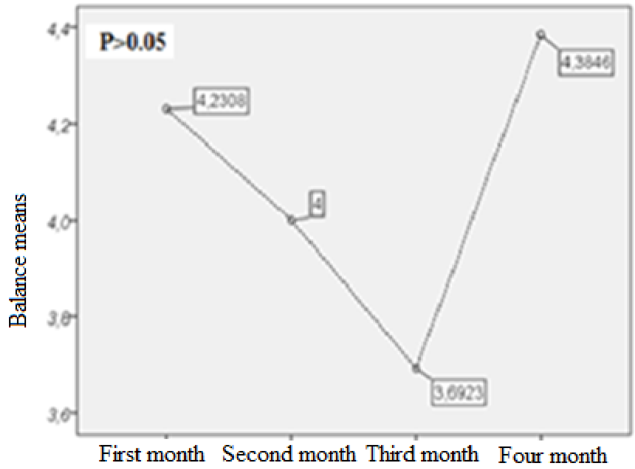

Figure 1 . Comparison of repeated measurements as four months in menstrual period

As shown in figure 1, we found balance performance (4.23±2.555) of swimmer female in menstrual period for first month, balance performance (4.00±1.826) of swimmer female in menstrual period for second month, balance performance (3.69±2.213) of swimmer female in menstrual period for third month, balance performance (4.38±2.219) of swimmer female in menstrual period for fourth month. There were no differences in balance performance of swimmer female between repeated measurements four months in menstrual period (P>0.05).

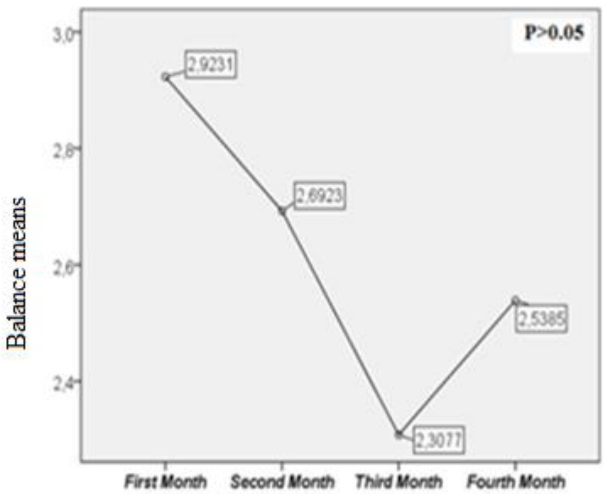

Figure 2. Comparison of repeated measurements as four months in premenstrual period

As shown in figure 2, we found balance performance (2.92±2.629) of swimmer female in premenstrual period for first month, balance performance (2.69±1.974) of swimmer female in premenstrual period for second month, balance performance (2.31±1.932) of swimmer female in premenstrual period for third month, balance performance (2.54±2.222) of swimmer female in premenstrual period for fourth month. There were no differences in balance performance of swimmer female between repeated measurements four months in premenstrual period (P>0.05).

Discussion

The main finding of this study was that early adolescent swimmer girls with PMS (cyclic) had a significantly lower postural way compared with early adolescent swimmer girls menstrual cyclic. Since there are numerous cycle dependent physical changes, including premenstrual fluid retention, breast tenderness and menstrual cramps, there may be correlations between cycle phase and athletic performance (Warren and Shantha, 2000). Many studies have reported that the physical performance of the athletes varied during the menstrual cycle, but these studies have been hampered by a variety of methodological problems, such as failure to document ovulation using hormone levels or basal body temperature (Lebrun, 1993).

Previous a study, whether postural sway and knee-joint kinesthesia vary during the menstrual cycle, and whether premenstrual syndrome (PMS) influences postural balance and kinesthesia were investigated. Subjects had a significantly greater postural sway ($p = 0.002$) and a greater threshold for detection of passive motion in the knee joints ($p = 0.05$) than women without PMS. A tendency ($p = 0.06$) towards greater postural sway in the mid-luteal phase was detected among women with PMS (Friden et al., 2003). A study, trans capillary fluid balance was studied in ten women with well-defined the premenstrual syndrome. From the follicular to the luteal phase the interstitial colloid osmotic pressure on the leg was significantly reduced, whereas the interstitial colloid osmotic pressure on the thorax remained constant. The capillary filtration coefficient 30 % from the follicular to the luteal phase. No change was observed in body weight (Tollan et al., 1993). In the study was investigated the effects of the menstrual cycle on visual-vestibular interaction by measuring optokinetic function and postural stability at different phases of the cycle. While menstrual cycle phase had no significant effect on anterior-posterior sway, it did significantly affect lateral sway (P<0.001), with sway on day 5 significantly greater than on days 12 and 21 (P<0.05 and 0.01, respectively), and sway on day 25 significantly greater than that on day 21 (P<0.05) (Darlington et al. 2001). A significant difference was detected in dynamic postural stability within three phases of the menstrual cycle (P < 0.05). No differences were observed for static stability results. However, there were differences for the dynamic stability results in that they were better in follicular and luteal phases compared with menses (Kaya and Çelenay, 2016). There were no significant differences in the two-legged stance between the phases of the menstrual cycle or between groups (cyclic and non-cyclic). In one-legged stance with eyes open, there was a significant increase in postural displacement in the mid-luteal phase in the cyclic group, but no differences were detected between phases in the non-cyclic group (Friden et al. 2005).

Samadi et al. (2013) reported that aerobic exercise training to patients suffering from PMS can reduce symptoms, resulting in better job and social performance. In a study showed that 12 weeks of exercise (aerobic and non-aerobic) is effective in reducing PMS, but aerobic activity can reduce depression more (Scully et al. 1998). Previous a study investigated the menstrual status of swimmers, in whom exercise is no weight bearing and thinness is, thus, not essential. The study indicate that female competitive swimmers are vulnerable to delayed puberty and menstrual irregularities, but the associated hormonal profile is very different from the hypothalamic amenorrhea described in dancers and runners (Constantini and Warren, 1995). In a study examined the effects of menstrual cycle on female athletes' performance. It has reported that the physical performance was not affected by the menstrual period and the pain decreased during the training and competition (Kishali et al., 2006). Previous an investigation studied the relationship between symptoms of menstrual distress and macronutrient intake, eating behavior, and exercise in healthy women. Carbohydrate consumption, eating behavior, and regular exercise are reliably associated with menstrual distress and deserving of experimental evaluation as treatment interventions for menstrual distress (Johnson et al., 1995). Estrogen treatment increased balance performance measured by dynamic post-urography, indicating that the beneficial effects from estrogens on postmenopausal fracture risk may include central nervous system effects on balance (Hammar et al., 1996). A study investigated the influence of cycle phase on strength performance and on swimming performance in short-and middle-distance events. It has reported that cycle phase does not affect athletic performance as measured by strength and swimming speed (Quadagno et al., 1991).

In conclusion, in this study which was followed balance in menstrual and premenstrual for 4 months, there were no significant differences in the balance between the phases of the menstrual cycle and premenstrual (non-cyclic). Balance scores were better in pre-menstrual phase during four months for every month.

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