



EFFECT OF CYCLE ON THE PERFORMANCE OF FEMALE ATHLETES

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Abstract

The problem under investigation was to determine the effect of exercise during menstruation on female athletes. Main objectives of this study were to assess the effect of exercise on menstrual cycle. To evaluate that whether the exercise are harmful during menstruation or not, To assess what changes occurs before, during, and after menstruation, and to know the effects of menstruation upon personal performance. A questionnaire was developed and distributed among the sports girls. The received responses of girls were tabulated and analyzed. Main findings were that exercises are not harmful during menstruation, personal performances are increased during bleeding days.

Key Words: - Athletic performance, Menstrual cycle, Effects,

Introduction

The recently increased popularity and quality of competition of women sports has drawn attention to the physiological responses of women to exercise. Of special interest is the relationship between athletics training and female menstrual cycle and reproductive function.

In the past, it has been generally believed (with out scientific evidence) that participation in strenuous exercises and sports during menstruation could be physiological harmful. Only recently has it been established somewhat clearer that vigorous athletic



training and competition do not adversely affect the menarche, menstruation, or subsequent obstetric and gynecological history. The woman by virtue of her special role in the process of reproduction exhibits not only changes in degree in the distribution or character of the general body tissues but also peculiarities of form and function which are relevant to the context of sports and physical recreation (Williams, 1976)

The study of fluctuations in athletic performance attributable to the menstrual cycle has been an area of considerable interest and controversy for well over half a century. Studies have included simple observations of performance in athletic events, and have documented specific physical, psychological and physiological changes as they relate to varying hormonal levels of the menstrual cycle. Advantages and disadvantages to human performance have been attributed to various phases of the cycle. Many investigators have documented evidence to suggest that the premenstrual phase is often associated with decreased performance. Others have noted that there are specific physiological changes, inherent in athletic performance, occurring in the follicular and luteal phases of the menstrual cycle. However, it is evident that there is conflict within the literature. (Eston, 1984)

Although understanding of the unique physiology of the female athlete has increased, there are still many questions to be answered. Endogenous and exogenous female sex steroids have been shown to influence various cardiovascular, respiratory, and metabolic parameters, but these changes probably have minimal impact on the ability



of most recreational athletes to participate in and enjoy their sport. Statistically significant data may or may not have clinical or performance relevance. Similarly, a statistically insignificant change may mean the difference between first and second place to an elite athlete. For an athlete concerned about maximizing performance, individual variability in menstrual cycle changes to various performance parameters must be considered. For women with menstrual dysfunction, Oral Contraceptives may provide a predictable hormonal milieu for training and competition. Frankovich (2000)

The periodic cycle of ovulation and menstruation produces not only local changes in the glands but also general psychological disturbances, which may be quite profound. The development of the embryo following conception alters not merely the women's general physiological behavior but also drastically modifies, although only temporarily, body structure particularly that of the abdomen.

Nowadays females are taking part in sporting activities at large scale, and they are performing well. Menstrual cycle is unavoidable in female athletes; it has some physiological and psychological affects. Therefore, the need was to investigate the problem, but it was a difficult task to investigate because of the nature of topic, but it was happily done at last due to volunteer athletes. They gave their responses and it was become possible for researcher to draw conclusions in the light of those responses.

Objectives of the Study

1. To assess the effect of exercise on menstrual cycle of sports girls



2. To investigate that whether or not the exercise are harmful during menstruation.
3. To assess what changes (Physiological, Psychological) occurs before, during, and after menstruation of women athletes.
4. To know that what effects does menstruation has upon muscular strength and athletic performance.

Background of the Study

The effect of menstruation on the individual subject varies enormously in some individuals, the cycle progress throughout entirely without any apparent disturbance. While in others the changes are quite profound and may indeed be sufficient to give rise to regular periods of significance incapacity, in the majority of cases, the cycle gives rise to little apparent disability, though the physiological changes, which take place, may significantly affect human physical performance.

For example, the weight gain associated with water retention during the premenstrual period will clearly be disadvantageous, also the feeling of dragging in abdomen as well as the fullness and discomfort felt in the breasts. Psychological changes are also demonstrable during the cycle. Showing considerable fluctuation in the level of intellectual and psychological performance capacity (Redgrove, 1971) Physical activity has frequently been show to improve the women's capacity to cope with the physiological changes in menstruation and, indeed it has been shown in some that physical training is a valuable means in the treatment of dysmenorrhoea. (Erdelyi, 1962) The effects of menstrual periodicity on physical performance



have also been studied. (Pierson, 1963) Although there is some individual variation, the majority of women under observation, over a significant number of cycles pinpointed the time phases of each cycle during which they are at their best and at their worst.

The average age for the first menstruation has been found to be between 13 and 14 years with a range from 11 to 16 years. The exact timing of the menarche is influenced by genetic, racial, socioeconomic, and climatic factors. Pubertal development begins with a gradual-increase in breast size and the spouting of pubic hair, which proceed slowly for some two years before the first menstrual loss, and these changes continue for further two years after the menarche. At the same time, secondary skeletal changes are taking place with broadening of the female pelvis and an increase in the carrying angle of the arms and forearms.

When athletic training begins before puberty, menarche may be delayed, several investigators report significantly later menarche in athletes compared to age-matched controls. While it is likely that athletic training can delay pubertal development, girls who mature late may be more likely to excel in sports, both for physiological and social reasons (Malina, 1983).

The role of low body weight, low body fat, and weight loss in production of exercise related menstrual disturbance is still controversial. While body weight and body fat tend to be lower in amenorrhea athletes, some athletes continue to menstruate normally with very low levels of body fat. It is likely that factors related to body size contribute importantly to the menstrual dysfunction in some athletes, but are less important in others.



Many other factors appear to be associated with exercise related menstrual disturbances. One is age; amenorrhea is more common in athletes who are under 30 years of age than in older women. Other studies, however, indicates similar ages for athletes with amenorrhea and normal menstruation. Psychological or emotional stress is a possible cause for exercise related menstrual disturbances. Stress, amenorrhea and infertility are often found in non-athletic women. It might be that athletes, particularly college and varsity athletes are exposed to more stress than those associated with lesser form of competition. Runners rated higher with the stress than the normally cycling runners (Schwartz et al, 1928). Depression, anxiety, obsessive/compulsive tendencies, hypochondriacs and other degrees of life stress assessed by four psychological tests showed all runners were within the normal range, and athletes interviewed said that psychological stress contributed to their menstrual disturbances, but stress was cited less often than exercise as a cause for the menstrual changes. Thus, psychological stress may be important in production of menstrual disturbances in some athletes, but the important in others. Thus, athletes may be prone to shortened factual phases, a condition associated with infertility.

Ferguson et al (1991) has documented six examples of individuals with tests that competed successfully in International Women's events.

1. The earliest recorded case was the winner of the women's 100-m sprint in 1932 Olympic Games in Los



Angeles. Forty-eight years later, she was killed in a shooting incident and at autopsy was found to have testes. It is not recorded whether she was virilized and it is probable that she had the androgen insensitivity syndrome.

2. The winner of the women's 800-m race and world record holder in 1934 was found to be a male pseudohermaphrodite who had a sex-change operation it is clear that there was considerable virilization of the external genitalia, and thus the diagnosis could not have been androgen insensitivity.
3. The German Athletic Federation barred a high jumper who came fourth in the Berlin Olympics in 1936 from competition after the 1938 European Championship in Vienna, when she was found to have both male and female organs. It is reported that the Nazi youth movement had forced the athlete to pose as a woman for three (3) years. He returned to male gender thereafter.
4. Two members of the women's relay team that came second in the European Championships in 1946 subsequently had sex-change operations and lived afterwards as men. One of them became a father of several children.
5. In 1946, another runner broke world track events record in races for women at 400 and 800-m distances, which were never ratified. He was later recognized by his father as the son he had lost in the war. This may have been an example of a male simply masquerading as female.



6. The winner of the women's world downhill ski title in 1966 was identified as being male as a result of medical examination in 1967. This revealed undescended testis and, after surgical correction, the skier married and became a father.

Procedure of the Study

This study was aimed at summarizing the effect of exercise during menstruation on female athletes. For the study 18 volunteer sports girls were selected. These girls have participated in different sports at National and at Intervarsity competitions, in which five girls were of Track and Field events, four were of Volleyball and Badminton respectively and five were of Table Tennis.

For the collection of relevant information the researcher have prepared a closed form questionnaire containing 24 questions with the help of expert in the field and available literature, the questionnaire was divided in to three sections.

The first section included Physiological responses to exercise through out the normal menstrual cycle. The second section discusses the effect of regular strenuous exercise on premenstrual and menstrual symptoms. The third section deals with a topic that has attracted considerable research interest in the last few decades, which is personal performance during the menstrual cycle. The questionnaire was distributed and collected personally. The percentage of each question was calculated and presented in the form of table.



PRESENTATION AND ANALYSIS OF DATA

Questions	Responses							
Regular menstruation	Yes		88.88%		No	22.22%		
Any sign of tension	Before menstruation			During Menstruation				
	27.77%			33.33%				
Any sign of fever	0%			0%				
During menstruation	Backache	Vomiting		Headache		Nausea		
	66.66%	5.55%		11.11%		11.11%		
Duration of menstruation	4 Days	5 Days		6 Days		7 Days		
	22.22%	44.44%		22.22%		11.11%		
Change in blood volume due to light & hard exercise	Light Exercise 1 & 2 days			Hard Exercise 1 & 2 days				
	Yes. 44.44%		No. 55.55%		Yes. 72.22%		No. 27.77%	
	During 3 & 4			During 3 & 4				
	Yes. 16.66%		No. 83.37%		Yes. 27.77%		No. 72.22%	
	During 5 & 6			During 5 & 6				
	Yes. 00%		No. 100%		Yes. 5.56%		No. 94.44%	
Pain before, during, and after menstruation	Before cycle		During cycle			After cycle		
	Yes %	No %	Yes %	No %		Yes %	No %	
	44.44	55.55	61.11	38.88		5.55	94.44	
Pain increases with	Light exercise			Hard Exercise				
	Yes %	No %		Yes %		No %		
	33.33	66.66		38.88		66.11		
Performance increased	First 2 days			3 & 4 days		5 & 6 day		
	Yes %	No %		Yes %	No %	Yes %	No %	
	11.11	88.88		55.55	44.44	72.22	27.77	
Performance decreased	83.33	16.66		33.33	66.66	16.66	83.33	

Conclusion and Discussion

Sportswomen tend to be young, healthy, who must be able to maintain a steady, consistent performance of high quality in which even slight variations spell defeat. Their best performance are frequently achieved in those years during which sexual development is occurring, for once full development is complete the peak may be passed. Undoubtedly, the menstrual hormones play an important part in any sportswomen's career, but it is not possible to generalize about their influence. It is just as incorrect to say that all sportswomen are affected by



menstruation, as it is to say that none is affected. For each woman the influence of menstruation is a personal and very individual effect, and the old adage "know thyself" is vital to success. The only way in which this essential knowledge can be obtained is by meticulous recording on personal menstrual chart of every variation in performance together with the dates of menstruation. It is then possible to discover whether performance is related to a particular phase of the menstrual cycle, and which hormone levels are most advantageous. Many sportswomen are Meso-morphs, and therefore not so markedly influenced by menstrual hormones.

The incidence of menstrual disturbances among athletes appears to relate the type, intensity, and duration of the exercise performed. This probably accounts for much of the variability among athletic populations at the prevalent rate for amenorrhea. Several investigators note that menstrual disturbances are most common in athletes who are champions or who have the heaviest physical workloads. Distance runners appear to have more menstrual irregularities than those competing in other sports, although many sports have not been studied adequately.

Strenuous exercise can cause menstrual dysfunction, but many other factors may also be associated with athletic amenorrhea and thus increase a woman's weakness to this condition. Low body weight and low body fat are most commonly associated with exercise-related menstrual disturbances, but other factors, such as emotional stress and dietary changes, may also be more stresses, as strenuous exercise, may disrupt cycle menstrual activity.



Lebum CM, et al (1995) study suggested that no significant differences were observed between follicular and midluteal tests in weight, percent body fat, sum of skin-folds, hemoglobin concentration, hematocrit, maximum heart rate, maximum minute ventilation, maximum respiratory exchange ratio, anaerobic performance, endurance time to fatigue (at 90% of VO₂max), or iso-kinetic strength of knee flexion and extension. Lebum CM, (1994) has also stated in his research that apart from subtle changes in some variables, most women have not shown any significant effect. Women have set world record and have won medals during any phase of the menstrual cycle; he further suggests that most women's athletic performance is not affected by the phase of the menstrual cycle. In another study in surveying on the menstrual cycle and performance, Lebrun CM (93) reported that 37 to 63% of athletes did not show any cycle 'phase' loss, while 13 to 29% illustrate an improvement during menstruation. He further added that the best performances were generally in the immediate postmenstrual days, with the worse performances during the premenstrual interval and the first few days of menstrual flow. However, investigators did not document any significant changes in measures of athletic performance as a function of timing of testing during the menstrual cycle. Swimmers have shown a premenstrual worsening of performance times, with improvement during the menstrual phase and on the eighth day of the cycle. An increase in perceived exertion was noted premenstrual and during the early menstrual stage with very intense exercise. The best times for cross



country runners were recorded in the postovulatory and postmenstrual phases, He further added and recommended that training loads may be selected according to cycle phase to achieve maximum benefit.

Nicklas B.J, et al (1989) study's results suggest that exercise performance and muscle glycogen content are enhanced during the Luteal Period of the menstrual cycle. It means that athletic performance may be affected by the phases of the menstrual cycle.

The effect of the menstrual cycle on the performance of women in sporting activities is a very confused subject. A study by Davies et al (1991) regarding the performances in simple muscle tests--the handgrip and standing long jump, were studied at three phases of the menstrual cycle--menstrual (day 1-4), follicular (day 12-14) and luteal (day 19-21). Within subject paired "t" testing showed that in the handgrip test, performance was significantly superior during the menstrual phase than those during both the follicular and luteal phases. In the standing long jump test, performance was again superior during the menstrual phase, although not significantly with respect to the luteal phase.

A study by Cockerill et al (1994) regarding the evaluation of the effects of menstrual cycle on mood and the performance of a perceptual-motor task. The findings suggest that menstrual-cycle and mood-related effects on performance are not observed reliably.

Thomas (2000) suggested that strenuous athletic training might affect the normal menstrual cycle. Such disruptions include delayed menarche in ballet dancers



and gymnasts, shortened luteal phase and secondary amenorrhea associated with high training loads and competitive stress. Fluctuations in the steroid hormones have been associated with changes in muscle strength.

Giacomoni et al (2000) study imply no significant differences were observed among the three stages of the menstrual cycle in maximal jumping power, or maximal height of jump in menstrual discomfort. In menstrual symptoms, only maximal jumping power decreased by 8% in menstruation compared with that in midfollicular phase ($P < 0.05$). Although there were, no significant differences in maximal anaerobic performance during different menstrual cycle phases, results of the study suggest that the presence or absence of premenstrual or menstrual syndrome symptoms may have an effect, possibly through an action on the stretch-shortening cycle of tendons and ligaments.

The importance of exercise intensity in the development of menstrual dysfunction is emphasized by the appearance and disappearance of menstrual symptoms with increase and decrease in exercise. Many of the female athletes in the study in hand reported changes in their menstruation that were associated with specific change in their training. The changes included Interruption of menstrual function associated with increased exercises, and normalization of menstrual function associated with reduced exercises.

The relation between performance and the menstrual cycle presents a more complicated picture. Majority of girls participating in Track and Field and other events showed no decreased in efficiency, the



performances of them even being increased on days of bleeding. A few girls showed a decreased in performance either during menstruation or immediately before the onset of the flow.

Most often, the menstrual discomfort during premenstrual and menstrual symptoms is diminished or unchanged by athletic training, but sometimes it is worsened. Thus, the effects of regular strenuous exercises on premenstrual and menstrual symptoms vary among individuals, but the most common observation is improvement or no change. A mechanism for exercise-induced alterations in menstrual symptoms has not been investigated.

There is no evidence to prove that participating in sports during menstruation is harmful. Some menstruating girls faint (Pale) during severe exertion of course, but severe exertion also causes fainting in some boys (men).

The study, has also found that some girls indicates that their strength suddenly decreased a few days before menstruation and continues at a lower level throughout the cycle. On the other hand, 72% athletes have not been influenced by the phase of their menstrual cycle, their performances even increased during the last four days of their menstrual cycle. Seventy-two (72%) girls reported that they have severe bleeding due to hard exercises during first two days of menstruation. Similarly, 61 % athletes have shown pain during the cycle. This probably reflects a large variability among individuals and the small magnitude of changes attributable to cycle fluctuations in hormone levels.



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