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"International Seminar on Sport Science 2012"
6th October 2012, Semarang, Indonesia
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**"Educating
Sport
Professionals:
Conserving
Local
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and
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Cooperation:



**SPORT SCIENCES FACULTY
SEMARANG STATE UNIVERSITY**



**ASSISTANCE FOR SPORT SCIENCES AND
TECHNOLOGY IMPLEMENTATION, THE
MINISTRY OF YOUTH AFFAIRS AND SPORTS**



Preface

Assalamu'alaikum warrahmatullahi wabarakatuh

May we first made our highest praise and thank to Allah swt, for His bless we able to gathered here on the prestigious occasion the International Seminar on Sport Science with the main theme of "Educating Sport Professionals: Conserving Local Wisdom and Progressing Future", to share our knowledge and ideas with so much warmness and friendship from world wide sports community.

This seminar which hold by the Faculty of Sports Science Semarang State University in partnership with the Deputy Assistant of Applied Science and Technological Sports, Indonesian Ministry of Youth and Sport, serves as a platform which allows scholars, professionals, researchers and sport technocrats to share and discuss the latest knowledge and findings with the purpose of transforming a revitalization and rethinking in sport, physical education, health and recreation as well. The results from this seminar are able to revitalize and uphold the spirit of local wisdom in every occation of sport. In line with the commitment to enhance the communication bridge builted through the cooperation between sport scientists, academics, practitioners and technocrats from sports community.

I would like to deliver our highest respect and appreciation to Minister of Youth and Sport of Republic of Indonesia and to the Rector of Semarang State University for their help and support so that this seminar can be held, and it is my great pleasant to express my deep gratitude to our honourable guests Prof. Dr. Djoko Pekik Irianto, M.Kes, AIFO, Prof. Dr Supriadi Rustad, Prof. Dr. Sudijono Sastroadmodjo, M.Si, Prof.Chang Keun Kim, Ph.D, Prof. Chia-Hua Kuo, Ph.D FACSM, Prof. Supranee Kwanboonchan, Ph.D, and Prof. Zhao Bo, Ph.D. I really expect that this seminar will be beneficial for all of us and have direct to the development of the sports.

Allow me to express my thank to the participants and audiences from Indonesia and other foreign countries who are enthusiastic to attending this precious seminar. I do hope that all audiences will gain important values and collaborate it into our own fields and make crucials changes in the future. Beside that, I also convey thank to all of organizing committes who has gave their oustanding commitment for presenting this International seminar.

Wassalamu'alaikum warrahmatullahi wabarakatuh

Sincerely yours
Harry Pramono, M.Si



COMPARISON BETWEEN PHYSIOLOGICAL AND PSYCHOLOGICAL FACTORS DURING MENSTRUATION, PROLIFERATION, AND SECRETORY CYCLES AT FEMALE ATHLETES

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Abstract

The purpose of this study is to compare between physiological and psychological during menstruation, proliferation, and secretory cycles at female athletes. This research is quantitative with descriptive comparative method. Subjects of this study were 60 female athletes for various sports at Faculty of Sport Sciences State University of Surabaya. Data was taken by using test physiological for anaerobic power using sprint 50m, for aerobic capacity using 20m shuttle run; test psychological for anxiety using trait anxiety test, for concentration using grid concentration exercise test. All data were taken once at every cycle (menstruation, proliferation, and secretory). Data was analyzed by using Anava with significant level 0,05.

The results of this study were found that anaerobic power tended to decrease from 6.2867 ± 0.24757 seconds at menstruation cycle became 6.3075 ± 0.24410 seconds at proliferation cycle and 6.3637 ± 0.22239 seconds at secretory cycle. The aerobic capacity increased from 43.7250 ± 2.84686 ml/kg/min at menstruation cycle became 44.2350 ± 2.73798 ml/kg/min at proliferation cycle, and 44.4633 ± 2.64575 ml/kg/min at secretory cycle. The anxiety decreased from score 71.4500 ± 6.74330 during menstruation cycle became 69.2833 ± 9.66225 during proliferation cycle, but it increased again to 70.9833 ± 8.17498 during secretory cycle. Concentration score increased during proliferation cycle 9.0500 ± 3.11053 , before that the score was 18.4833 ± 3.13802 during menstruation cycle, and it decreased again during secretory cycle 18.9333 ± 4.05415 .

The conclusion of this study: there was no significant differences between physiological (anaerobic power $p=0.190$ and aerobic capacity $p=0.323$) and psychological (anxiety $p=0.323$ and concentration $p=0.640$) during three cycles of menstruation at female athletes.

Key words: physiological, psychological, menstruation, proliferation, secretory, female athletes

Introduction

Many female athletes who believe that menstruation leave a negative impact on performance, and many women who believe that the appearance of motor and cognitive impaired during the menstrual period. Gunn (1990) reported that one-third to half of all women believe that his performance was prevented by menstruation, although some decrease in performance was not visible. From previous studies (Sommer, 1983) reported that some of the consequences associated with menstruation in women decrease the appearance of non-athletes.

Since the 1984 Olympics, a new female athletes are allowed to participate in the race with a race number is more than 1500 meters. Whereas in previous Olympic female athletes declared unable to physical pressure. Society gradually changed the perception and behaviour about the influence of the menstrual cycle or limited to the ability of the physical appearance of women. The participation of women in the sports arena in Indonesia has its place and can be accepted by most people. Some Indonesian female athletes have performed in the world event. The first medal (silver) Olympic Games (in Seoul) for Indonesia presented by archery female athlete known as Trio Srikandi Indonesia. Then followed by female badminton athlete (Susi Susanti) who had won the first gold medal at the Olympic Games in Barcelona.



In the last two decades, a lot of research on the influence of the menstrual cycle on the appearance of female athletes. At the beginning of research on the menstrual cycle and sport performance are anecdotal or retrospective survey results potentially misinformed on female athletes and coaches in particular about the truth of the influence of the menstrual cycle phase on exercise performance. Menstrual influence on the performance of sports is one of the interesting research areas, especially since there was an increase in the participants' physical activity done regularly among women (Highet, 1989). This increase is evidenced by many female athletes who appear at a high level. Although much of the literature about menstruation and its effect on performance, but only a few information on the possible relationship between phases of the menstrual cycle with the performance of athletes.

Some of the literature informed that some female athletes recorded their best performance and won the competition during menstruation (Ryan, 1975, Toth, 1976). But some female athletes reported to journalists that they have been affected negatively by menstruation, for example, one-third of the participants of the 1960 Olympic Games participant failed because impaired by periods that have affected her performance (Zaharieva, 1965). From the fact mentioned above, researcher interested in conducting research at the student of Faculty of Sport Science State University of Surabaya which aimed to compare the physiological and psychological capabilities menstrual, proliferation, and secretion stages.

Physiological Performance

Anaerobic Power

Appearance athletes who rely on Adenosine triphosphate-phosphocreatine and glycolytic, including athletes movements involving elements of speed and explosive power is needed, especially on either sprinter athlete swimming, athletics, cycling, and other sports. The ability of anaerobic power is very important in coaching athletes to achieve optimal performance. Although there are many other factors that support the achievement of performance factors including technical, tactical and mental. There are several tests to determine the ability of anaerobic power among other tests running speed of 50 meters. Velocity or speed is one element of anaerobic power capabilities that are important in sports activities in order to achieve maximum performance. This is especially necessary in a sport that requires demands fast motion and moving to different direction quickly. Speed is the ability to perform fast motion.

Definition of speed according to Suharno (1992) is the ability of the athlete to perform similar movements in a row in the shortest possible time. Furthermore, Sajoto (1988) also says that speed is the ability to perform continuous movement in the same shape in the shortest possible time. It can be concluded that the speed is the ability to perform similar movements in a row in the shortest possible time or the ability to cover a distance in the shortest possible time. Suharno (1992) divided speed into three kinds, namely the speed reaction, speed sprint, and speed movement. The rate of reaction is the time between the stimulus and the response first motion. Athlete's speed sprint is the ability to cover a distance in the shortest possible time. Speed movement is the ability of the athlete to move as quickly as possible in a single motion that marked the time between the beginning of the motion to the final motion. This study focused on speed sprint that can be measured using a 50m running sprint test (Nurhasan, 1986). There are several determinants of speed sprint, namely: dependent muscle strength work, upper leg length, frequency of movement, and ran a perfect technique (Suharno, 1992).

Aerobic Power

Maximal aerobic capacity, known as VO₂max is the best indicator of the maximum aerobic power. VO₂max is the capacity of the body to breathe, transport, distribute, share and use oxygen (O₂) as much as possible (Sastropanoelar, 1997). Furthermore, Fox and Mathews (1981) states that: "..... The maximum aerobic power (VO₂max) is a significant predictor in the performance of prolonged activities". From the definition, it is clear that VO₂max has a very important role on the ability to work in a long time. Eendurance is one of the important components of aerobic capacity power in a sport that certainly could not be separated from other components such as power, speed and flexibility. According to Suharno (1992) endurance athlete is the ability to resist fatigue organ that arise when running sports activities for a long time. Furthermore Bompa (1994) classifies the resistance into two groups, namely general endurance and specific endurance.



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Meanwhile, in terms of time spent in endurance activities are divided into three functions: 1) durability with a long time (over 8 minutes), 2) durability with moderate (2-6 min), 3) durability with a short time (42 seconds - 2 minutes). However, Sajoto (1988) distinguishes durability into two groups, namely local muscular endurance and cardio respiratory endurance. In this research focused on general endurance is the ability of a person to use the cardiovascular system, respiratory and circulatory effectively and efficiently in carrying out continuous work. Contraction of general endurance involves a large number of muscles with high intensity in a long time. Measuring a person's general endurance ability using the 20m Shuttle Run test. Some experts claim that the 20m Shuttle Run Test is a test of VO₂max that is valid and reliable (Leger and Lambert, 1982, Ramsbottom, 1991). Sastropanoelar (1997) also noted that the 20m Shuttle Run Test is equivalent to the estimated of VO₂max using 15 minutes running test and Bruce treadmill test.

As an illustration of the relationship between endurance during the menstrual cycle, Jurkowsky (1981) states that there are significant changes in work capacity during the menstrual cycle. Jurkowsky also found that the worst performances occur during the menstrual period and the best performance during the middle period.

Psychological Ability

Anxiety

Anxiety can arise due to tension and anxiety in a person. Anxiety is a mental strain that is usually accompanied by body disorders that cause the individual to feel helpless and suffering from fatigue, as should always be in a state of alert to the danger that is not obvious (Satiadarma and Myrna, 1996:39). Distinguishing athletes under stress or not is difficult, sometimes athletes seemed calm but actually strained or otherwise. Athletes will experience the tense usually physiological changes before the game or during the race. For example, the muscles become tense, muscle tremors, become more frequent eye blinking, breathing becomes more rapid and shallow, no nausea, stomach pains, and dizziness. Fear or tension may also appear psychologically or reflected in the behaviour of athletes and athletes' talk. For example, athletes easy to feel annoyed or uncomfortable, more emotional, more discussed the shortcomings or weaknesses, and easier to complain. According to Harsono (1996:62) anxiety may arise in the moments before the race starts where the anxiety at this time is usually up, as long as the race lasts where anxiety levels usually decline, but there is also a rise, especially in sports that require a long time, and near the end of the race where anxiety levels will typically rise again, especially if the race score balanced. Someone who is experiencing anxiety tend constantly worried about the plight that will befall her or anyone else who knew well. Feelings of anxiety can occur in athletes when facing certain circumstances, for example in the face of competition that takes a long time and it turns out athletes losing constantly. Feeling of anxiety can be categorised into two general categories:

- 1) State anxiety (anxiety that occurs in a particular state) is an emotional state that occurs suddenly (at the time) which is characterized by anxiety, fear, tension is usually followed by a deep feeling of anxiety accompanied by tension and physiological arousal.
- 2) Trait anxiety (anxiety that an individual's personal traits). Anxiety is a more settled personal nature (such as carriage) (Setyobroto, 1989:94). Feelings of anxiety state can occur when athletes will perform movements that require concentration. For example, at the time of the pole vault athletes will do leaps and sudden strong winds so that athletes are afraid of the wind over the bar when it comes back. Athletes who have typically exhibit the trait anxiety easily anxious face various problems, particularly issues relating to personal security or emotional security, the individual is showing symptoms of anxiety, which contains fear. Anxiety is a symptom of a feeling state specifically how the individual circumstances facing certain situations that interfere with personal security. State anxiety has an objective reference or objective reference. Trait anxiety is more permanent and will appear at various events or situations in which the individual concerned was troubled personal security. Trait anxiety has a subjective referral (Seyobroto, 1989:94).



Concentration

Concentration is a situation where athletes demonstrate awareness fixed on something (a particular subject) that is not easily shaken (Setyobroto, 1989:109). If the athlete can perform well then the concentration is expected to show the best possible performance as expected. Cox (1985) stated that the concentration of an athlete's ability to focus on relevant information during the competition. Dolloway (1990) also states that the concentration required achieving optimal performance, not just on sport shooting, archery, golf, or tennis but in nearly all sports including sports teams. In sports activities, especially to achieve the optimal performance required the functioning of certain psychological aspects, for example, to achieve high performance in athletic sports, the athlete should be able to focus properly, confident, calm, can concentrate despite the wind and noise disturbance. For runners, walkers, throwers, and jumpers, athletes must have the confidence, courage, concentration, willpower and a good motor coordination in order to achieve optimal performance. It will all be compromised if the athletes suffered an emotional disturbance. In athletic sports, all runners, walkers, throwers and jumpers require high concentrations when they want to start and when they are racing. Athletes are required to focus on the running track, the goal, and the rule that must be exceeded or footstool at the right time bearing on the long jump and jump transmissible. According to Mutohir (1992, 11) states that the power of concentration / attention is one aspect that needs mental athlete or team either at practice, before the race and during the race. Athletes who perform fully focusing at practice, before the race and during the race will result in a better performance, in addition to the ability to focus resources on an object, the ability to concentrate for long endurance race takes place is also very important.

According to Matlin (1992) attention was divided into two, namely concern spread (divided attention) and concentrated attention / focus (selective attention). Concentration is the concentrated attention at the expense of another stimulus when faced with two or more stimulus. Eysenck (1996) suggested that the concentration is identical to the attention of the ability to select one of the existing stimuli for further processing. While restrictions on the concentration of the person's ability to focus on certain cues in accordance with his duties, and maintaining the focus of attention.

Menstrual Cycle

In healthy adult women and not pregnant, every month regularly get menstruation or menses. The period is from the first day of menstruation until the first day of the next menstrual cycle. Normal menstrual cycle is 28 days from 3 weeks to 5 weeks (Obsteri, 1983:78). For approximately one month, the menstrual cycle can be divided into four periods (stadia) is a stadium or desquamation menstruation, menstrual or post-stage regeneration stage, stage intermenstruum or proliferative stage, and the stage or stages praemenstruum secretion. In later stages of menstruation, the endometrial of the uterine wall cast accompanied by bleeding, only a thin layer called the stratum basal stay, this stage lasts 4 days. While on stage post menstrual, injuries occur because the endometrial is released, gradually closed the mucous membranes that occur from new epithelial cells of endometrial glands. This stage has begun to stage time periods and lasted about 4 days. In the proliferative stage, grow into thick endometrial and glands grow faster than the other networks until the winding. This stage lasts from the 5th day to the 14th day from the first day of menstruation. In stage secretion, endometrial glands still thick but the shape of a long and winding road and remove the sap. In the endometrial was buried glycogen and lime that will be required as food for the eggs. Stadium secretion takes place from the 14th day to the 28th day. If pregnancy does not occur the endometrial removed by repeated bleeding and menstrual cycle (Obsteri, 1985).

The menstrual cycle affects the metabolism of the body because most functions and organs play a role in the process cycle. Therefore, during this process, a woman's body will change. According to Hale (in Straus, 1984) at the time of the menstrual blood of a woman's body will lose an average of 35 to 60 millilitres, and haemoglobin will drop about 2 grams. This condition will affect the oxygen carrying capacity. Meanwhile, according to Wells (1985) some of the functional part of the body changes during the menstrual cycle is as follows:

- 1) Temperature. Temperature will drop before ovulation and increased sharply during ovulation. Degree temperatures will persist until the formation of the ovum.
- 2) Blood pressure. At mid-cycle, the blood pressure in the arteries is low.



- 3) Breathing. Lung ventilation increased in secretion phase (before menstruation).
- 4) Weight. Weight loss will increase the pre-menstrual phase.
- 5) Red blood cells. The number of red blood cells will gradually decline in the pre-menstrual phase.
- 6) The white blood cells. White blood cell counts decreased during menstruation and post-menstrual phase.
- 7) Carbohydrate metabolism. Glucose levels decreased during the current period.
- 8) Lactic acid. Lactic acid will increase as the release of the ovum.

Methods

This study used a descriptive comparative method, comparing the ability of physiological and psychological stages of menstruation, proliferation, and secretion. The subject of this study is 50 students of the Faculty of Sport Science State University of Surabaya, who are active in the Student Activity Unit in sports. The data obtained from the tests of physiological and psychological capabilities. Physiological ability tests using test anaerobic power (50m sprint) and aerobic power test (20m shuttle run). While the psychological ability test using test anxiety (trait anxiety) and test concentrations (concentration grid exercise). Each subject performed once on the stage of menstruation, proliferation stage, and the stage of secretion. Data was analysed using Analysis of Variance (Anova) with a significance level of 0.05.

Results and Discussion

The results of this study found that the ability of physiological for anaerobic power capacity (50m sprint) tend to decrease from 6.2867 ± 0.24757 seconds during the menstruation to 6.3075 ± 0.24410 seconds during proliferation and 6.3637 ± 0.22239 during secretion. Overall, the mean 50m sprint time was 6.3193 ± 0.23918 seconds. In the ANOVA test results for 50 m sprint time, it indicated that there was no significant difference in time ($p=0.190$) during menstruation, proliferation, and secretion.

Furthermore, there was an increase in maximal aerobic capacity from 43.7250 ± 2.84686 ml/kg/min during menstruation to 44.2350 ± 2.73798 ml/kg/min during proliferation, and 44.4633 ± 2.64575 ml/kg/min during secretion. Overall, the mean VO₂ max in the three cycles was 44.1411 ± 2.74688 ml/kg/min. ANOVA test results for VO₂ max showed that there was no significant difference ($p=0.323$) for maximal aerobic capacity (VO₂ max) during menstruation, proliferation, and secretion.

While psychological ability found that the mean value of anxiety was fluctuation. It was decreased from 71.4500 ± 6.74330 during menstruation to 69.2833 ± 9.66225 during proliferation. And it increased to 70.9833 ± 8.17498 during secretion. ANOVA test results on anxiety showed that there was no significant difference ($p = 0.640$) during menstruation, proliferation, and secretion.

The mean value for the concentration was 18.4833 ± 3.13802 during menstruation, it decreased to 9.0500 ± 3.11053 during proliferation, then it increased to 18.9333 ± 4.05415 during secretion. ANOVA test results for the concentration showed that there was no significant difference of the menstruation, proliferation, and secretion.

Conclusion

It can be concluded that there was no difference in physiological capacity (anaerobic power (50m sprint) $p=0.190$, aerobic power (VO₂ max) $p=0.323$) in three of the menstrual cycles. In addition, there was no difference in the ability of the psychological (anxiety $p=0.323$ and the concentration $p=0.640$) in the three menstrual cycles.

This research suggested that another kind of research needs to be done and developed to provide more information about the effect of menstrual cycles. However, in further studies ought to consider the weaknesses of the previous study. Control of the respondents (food intake, physical activity, environmental conditions) is very important for the research conducted in future studies in order to better results.



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