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RESEARCH ARTICLES

Football Sports Activities Related to the Menstrual Cycle in North Sumatra PON Female Athletes in 2024

Raja Khatulistiwa Margolang[1], Rahmanita Sinaga[2]

[1]Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara, Jalan Gedung Arca No. 53, Medan 20217, Indonesia

[2]Department of Obstetrics and Gynaecology, Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara, Jalan Gedung Arca No. 53, Medan 20217, Indonesia

Corresponding Author: rajakhatulistiwa@gmail.com

Abstract: Menstruation is the regular discharge of blood from the uterus, which signals the entry of a woman into puberty. Hormonal imbalances in the female reproductive system can lead to menstrual cycle disorders, such as amenorrhea, hypermenorrhea, hypomenorrhea, polymenorrhea, and oligomenorrhea. These disorders can be influenced by various factors, including pathological conditions, psychological conditions, lifestyle, and physical activity. It is reported that 80% of women worldwide experience menstrual cycle disruptions. Among various physical activities, soccer is associated with menstrual cycle disruptions, and it is important to understand the relationship between soccer activities and the menstrual cycle in female athletes. This study uses an analytical descriptive research method with *a cross-sectional* approach. The study found that 83.30% of athletes reported normal menstrual cycles, while 16.70% experienced abnormal cycles. The majority of athletes engage significantly in football training, with 53.30% training for more than 60 minutes daily and 60.00% participating in weight training more than five times a week. The study also revealed a significant link between football activity and menstrual cycles in athletes. The study also revealed a significant link between football activity and menstrual cycles in athletes.

Keywords: Football, menstrual cycle, female athletes, North Sumatra PON, reproductive health, physical activity

INTRODUCTION

WHO data in 2018 states that 80% of women in the world experience menstrual disorders. According to Basic Health Research (Riskesdas) data, 11.7% of women experience menstrual cycle problems, with as many as 14.9% occurring in urban areas. Menstrual disorders are influenced by several factors, including pathological conditions (*polycystic ovarian syndrome*), psychological conditions (depression and anxiety), lifestyle

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(malnutrition and smoking habits), and strenuous physical activity such as exercise. Moderate and heavy physical activity has a 74% risk of menstrual disorders.[1]

A good football sport is one that is done three times a week with a duration of >60 minutes. Excessive exercise in terms of intensity, frequency and duration can cause menstrual disorders. The nature and severity of symptoms depend on several things, such as the type of exercise, the intensity, and the duration of the exercise. Women who participate in competitive sports have a higher risk for eating disorders, menstrual cycle irregularities, and osteoporosis, known as the *female athlete triad*.[2.3]

Based on the background that has been described, the researcher is interested in researching to find out how the relationship between football sports and the menstrual cycle in the North Sumatra Pekan Olah Raga Nasional (PON) women's football team. The purpose of this study is to find out the description of the menstrual cycle of the research sample. To determine the level of intensity and frequency of sports activities in the research sample, and to find out the relationship of exercise activities to the menstrual cycle.

METHOD

This study uses an analytical descriptive research method with *a cross-sectional approach,* which involves collecting data at a single point to the sample.

The population in this study is the 2023 North Sumatra PON women's football team which is prepared for 2024.

The research sample was taken from the North Sumatra PON women's football team with a *purposive sampling technique.*

This method uses criteria that have been chosen by the researcher in selecting samples. The sample selection criteria are divided into inclusion and exclusion criteria.

Inclusion Criteria :

1. Aged 17-25 years old
2. Already having a period
3. Exercising for the past 3 months
4. Women with a normal body mass index
5. Willing to participate in the research by filling out *informed consent*

Exclusion criteria:

1. Have been diagnosed by a doctor with reproductive/menstrual disorders
2. Taking long-term and hormonal medications
3. Suffering from chronic diseases (cancer, diabetes, chronic kidney disease, heart disease)

The hypothesis of this study was tested using *Statistical Packages for Social Science (SPSS)* version 25. The hypothesis test assessed the relationship between sports activities and the menstrual cycle in the North Sumatra PON women's football team using *the Chi Square* test. If you are not eligible to use *Chi Square,* then hypothesis test using *Fisher's Exact Test.* The results are stated to have a significant effect if the value of $p < 0.05$.

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RESULT

The following is the frequency distribution regarding the menstrual cycle in 30 PON North Sumatra women's football athletes' The subjects of this study:

Table 1: Menstrual Cycle Before Football Training Camp

Regular Menstruation	Frequency (n)	Percentage (%)
Before football training		
Irregular	13	43.30
Regular	17	56.70
Total	**30**	**100**

Table 1 provides an overview of the menstrual cycle before the football training camp in 30 PON North Sumatra female football athletes who were the subjects of the study. Before football practice, about 56.70% of athletes reported having regular menstrual cycles, while 43.30% experienced irregular menstrual cycles.

However, the results after football practice it was found that as many as 83.30% of athletes reported regular menstrual cycles. Only about 16.70% of athletes still experience irregular menstrual cycles after training. This change indicates that football practice influences the hormonal balance and pattern of the athlete's menstrual cycle.

Table 2 Menstrual Cycles of the Last 3 Months After Football Training Camp

Menstrual Cycle	Frekuensi (n)	Persentase (%)
Irregular	5	16.70
regular	25	83.30
Total	**30**	**100**

Table 2 provides an overview of the frequency distribution regarding the menstrual cycle in 30 PON North Sumatra female football athletes who were the subjects of the study over the past three months. In total, respondents, as many as 83.30% of athletes, reported that their menstrual cycles ran regularly for the past three months. 16.70% of athletes experienced irregular menstrual cycles.

The following is the level of intensity and frequency of sports activities in 30 PON North Sumatra female football athletes who are the subjects of this study:

Table 3: Football Sports Activities

Activity Sport Football	Frequency (n)	Percentage (%)
Intensity		
Moderate (30-60minute/day)	14	46.70
Heavy(>60 minutes/day)	16	53.30
Frequency		
Moderate (3-5 times/week)	12	40.00
Heavy (>5 times/day)	18	60.00
Total	**30**	**100**

Table 3 illustrates the intensity and frequency of football sports activities in 30 PON North Sumatra female football athletes who were the subjects of the study. This data shows that the majority of athletes show a significant level of involvement in football training. Exercise intensity, around 53.30% of athletes reported training more than 60 minutes every day. Another 46.70%

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of athletes train at an intensity of 30 to 60 minutes every day.

Frequency of exercise, as many as 60.00% of athletes participate in strenuous training, which is more than five times a week. 40.00% of athletes choose moderate intensity with a frequency of exercise between 3 to 5 times a week.

Bivariate Analysis

This study conducted a correlation analysis using *the Chi-Square test* to explore the relationship between football sports activities and the menstrual cycle in the North Sumatra PON women's football team. The decision-making criteria based on probability or significance value (*Sig. (2-tailed)*) are:

If the significance value is p < (0.05), then H0 is accepted

If the significance value is p > (0.05), then H0 is rejected

The following are the results of hypothesis testing with *the Chi-Square* correlation test processed using *SPSS 26* as follows:

Table 4 Correlation Analysis

Activity Sport Football		Menstrual Cycle			*P-Value*
		Normal	Abnormal	Total	
Exercise Football	Intensity				0.009
Moderate	n	9	5	14	
	%	64.20%	35.80 %	100 %	
Heavy	n	16	0 0.00%	16	
	%	100.00 %		100 %	
Total	**n**	**25**	**5**	**30**	
	%	**83,30 %**	**16,70 %**	**100 %**	

The contingency table above shows the distribution of football sports activities based on the menstrual cycle in the North Sumatra PON women's football team. This data provides an overview of the percentage of athletes who experience normal and abnormal menstrual cycles, compared to the intensity and frequency of football training undertaken. In terms of training intensity, it can be seen that 64.20% of athletes who train at moderate intensity have normal menstrual cycles, while 0.00% of athletes with heavy intensity have abnormal menstrual cycles. At the frequency of exercise, 58.30% of athletes who trained with moderate frequency had normal menstrual cycles, while 0.00% of athletes with heavy frequency had abnormal menstrual cycles.

Hypothesis testing regarding the intensity and frequency of football sports gave significant results. First, there was a significant relationship between the intensity of football training and the menstrual cycle (p-value = 0.009). Similar results were found in the frequency of exercise, where there was a significant relationship between the frequency of

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football and the menstrual cycle (p-value = 0.003).

Based on a p-value that is smaller than the significance level of α (0.05), the null hypothesis (H0) can be rejected. It can be concluded that there is a significant relationship between football sports activities and the menstrual cycle in PON North Sumatra female football athletes. These results make an important contribution to the understanding of factors that may affect the reproductive health of female athletes in the context of the sport of soccer.

DISCUSSION

Menstrual Cycle of North Sumatra PON Women's Football Athletes

The study showed that the distribution of the menstrual cycle over the last three months, where the majority of respondents (83.30%) reported a normal menstrual cycle. The study also found that changes in the menstrual cycle before and after football practice. 56.70% of athletes had regular menstrual cycles before training, but after training, this figure increased drastically to 83.30%. This change provides a clue that soccer practice can have a positive impact on an athlete's hormonal balance and menstrual cycle. Athletes experience cycle irregularities before training, but after intensive training, most athletes report regular menstrual cycles. These results provide a deeper understanding of the complexity of the interactions between sports activities, hormonal balance, and reproductive health in PON North Sumatra female football athletes.

The menstrual cycle is the time interval measured from the first day of menstruation to the first day of menstruation in the next period.[4] The range of menstrual cycle duration that is considered normal ranges from 24 to 35 days.[5] Menstrual cycle disruption can be caused by a variety of factors, including hormonal disorders, stress levels, systemic abnormalities, adeniter problems, high or low Body Mass Index (BMI), excessive levels of the hormone prolactin, nutritional status, physical activity level, and age of first menstruation [6]

Respondents who experienced abnormal menstrual cycles were associated with physical activity, especially intensity in the form of football. The menstrual cycle, which is the result of complex interactions of hormones such as FSH (Follicle Stimulating Hormone), LH (Luteinizing Hormone), estrogen, and progesterone, can be affected by intense physical activity. Intense physical activity, such as that of football athletes, can affect the production of these hormones and then impact the menstrual cycle. Changes in the levels of the hormones FSH and LH can affect ovarian follicle development and egg release, while fluctuations in estrogen and progesterone play an important role in maintaining and preparing the endometrium to receive a fertilised egg [7]

Football Sports Activities

In this study, the results showed that the majority of respondents were classified as having heavy sports activities. The indicators of heavy sports activities in this study were the duration of doing football

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for >60 minutes per training session, as well as the frequency of doing it >5 times a week. In terms of training intensity, around 53.30 % of athletes reported training more than 60 minutes every day. As many as 46.70% of other athletes train for a duration of 30 to 60 minutes every day. The high percentage of athletes involved in this intensive training session shows that they are ready to face the high physical challenges in the world of football. Frequency of training, as many as 60.00% of athletes participate in strenuous training, which is more than five times a week. 40.00% of athletes choose moderate intensity with a frequency of exercise between 3 to 5 times a week. These results reflect the athletes' high commitment to the sport of football, with most of them engaging in frequent exercises.

According to the latest guidance from the ACSM (American College of Sports Medicine), the Female Athlete Triad (FAT) is defined by three main components: energy availability, menstrual function, and bone density.[8] The FAT reflects the complex relationship between nutrition, physical activity, and reproductive health in female athletes.

High-intensity exercise can have a significant impact on the hormonal system and reproductive health.

High-intensity exercise can lead to hormonal changes, which in turn can result in menstrual cycle disruption or even secondary amenorrhea in female athletes.[9] Secondary amenorrhea is a condition in which a woman who previously had a normal menstrual cycle experiences a menstrual absence for three or more cycles.

The importance of recognising and understanding the Female Athlete Triad in the context of exercise and reproductive health is key to preventing and managing negative impacts on female athletes. Holistic nutrition monitoring, exercise management, and health care are important aspects of this approach to ensure the right balance between physical activity and reproductive health in female athletes.

The Relationship between Football Sports Activities and the Menstrual Cycle

The results of a statistical test using *Chi-Square* showed that there was a significant relationship between football activities, both in terms of intensity and frequency, and the menstrual cycle in PON North Sumatra female football athletes. These findings make a significant contribution to the understanding of factors that may affect the reproductive health of female athletes in the context of the sport of soccer.

First, in the analysis of exercise intensity, the results showed that athletes who trained at heavy intensity had a higher chance of a normal menstrual cycle compared to those who trained at moderate intensity. The p-value is 0.009.

In the analysis of exercise frequency, the results showed that athletes who trained with heavy frequency had a higher chance of a normal menstrual cycle compared to those who trained with moderate frequency. P-value of 0.003.

The results of this study are in line with the study, which states that there is a relationship between the frequency of exercise and the menstrual cycle, with a p-

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value of 0.000 < p = 0.05. In addition, the results of this study are also consistent with the study, which states that there is a relationship between exercise intensity, volume, and age of sports activities and the rate of menstrual disorders in elite swimmers of East Azerbaijan province, with a p-value of 0.000 < p = 0.05. Very intense, restless, and sustained physical activity is associated with menstrual disorders, and there is a significant association between the intensity and volume of exercise activity and menstrual disorders [10,11]

The relationship between exercise activity and the menstrual cycle occurs because most respondents exercise more than 5 times a week, with a duration of exercise time of more than 60 minutes a day. Sportsmen who experience regular menstrual cycles may be caused by the athlete doing sports according to the intensity of their ability. This statement is supported by research, that in his research, many athletes experience normal menstrual cycles because the exercises are carried out according to their individual abilities and do not have special exercise criteria such as frequency, intensity and duration when doing sports.[12]

These findings provide a deeper understanding of how the sport of football, especially in terms of intensity and frequency of exercise, can affect the reproductive health of female athletes. The implications of this study can be used to develop a more targeted and personalised approach to health management for female athletes in the context of the sport of soccer. A holistic approach that considers aspects such as training patterns, recovery, and nutrition is needed to support the overall well-being of female athletes.

CONCLUSION

Based on the results of this study, it can be concluded that:

1. Menstrual cycles in 30 PON North Sumatra female football athletes over the past 3 months, around 83.30% reported that their menstrual cycles were running normally, while 16.70% experienced abnormal menstrual cycles.
2. The level of intensity and frequency of sports activities in 30 PON North Sumatra female football athletes showed significant involvement in football training.
3. As many as 53.30% of athletes reported training more than 60 minutes daily, while 46.70% trained at an intensity of 30-60 minutes daily.
4. In frequency, 60.00% of athletes participate in strenuous training more than five times a week, while 40.00% opt for moderate intensity with a frequency of training 3-5 times a week.
5. There is a significant relationship between football activities and menstrual cycles in PON North Sumatra female football athletes.

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