

ISSN: 2392-5442 ESSN : 2602-540X		<i>Sport system journal</i>
V/13 N/01 Year/2026		<i>International scientific journal published by: Ziane Achour –Djelfa- Algeria</i>
P 155 - 173		<i>Received: 2026-01-24 Accepted: 2026-02-24</i>

Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

Yagoubi Adma ^{1*}

¹University of Souk ahras (Algeria), a.yagoubi@univ-soukahras.dz

Abstract

The objective of this study was to evaluate the effect of different phases of the menstrual cycle on physical performance in national-level athletes. Fifteen senior and junior athletes, aged 16 to 19 years, with an average height of 165.5 cm and an average weight of 59.33 kg, were included. To this end, we used physical tests. The results of physical performance during the menstrual cycle revealed that speed quality is negatively affected during the luteal phase compared to the follicular phase ($F=0.04$; $P<0.05$). A progressive regression was observed when comparing the arithmetic means of the three phases: the follicular, ovulatory, and luteal phases (2.14 ± 0.33 ; 2.13 ± 0.14), which also indicates a decrease in speed quality.

Keywords: menstrual cycle- physical performance- athletics.

**Corresponding author* a.yagoubi@univ-soukahras.dz

1. INTRODUCTION

Since ancient Greece and Rome, athletic competition was largely a male domain, while women were often seen more as objects of beauty than as serious athletes (Leburn, 1993). Over the past few decades, however, women's participation in both competitive and recreational sports has grown dramatically. Today, female athletes engage in demanding training programs and compete at intensities similar to their male counterparts.

Despite this progress, we still know relatively little about how female-specific steroid hormones affect athletic performance (Peyret-Lafforgue, 1981).

The menstrual cycle is likely the second most important biological rhythm after the circadian cycle. It results from complex interactions between the hypothalamus, pituitary, and ovaries, causing changes not only in the reproductive system but across many other tissues in the body. Depending on ovarian function, the cycle can be divided into two phases (follicular and luteal) or three phases (follicular, ovulatory, and luteal) (Constantini, Dubnov, & Lebrun, 2005).

For female athletes, from puberty through pregnancy and postpartum, hormonal fluctuations-especially of steroid hormones-can influence performance, particularly at the elite level (Ekenros, et al., 2022). These hormonal changes are unique to each woman and may affect different aspects of physical performance, which is the focus of this study (KISHALI, İMAMOĞLU, KATKAT, ATAN, & AKYOL, 2006).

Research on sports biochemistry is limited at our university, and there are few studies exploring the effects of the menstrual cycle on athletic performance. This gap inspired our study, which aims to monitor the physical performance of female athletes throughout the menstrual cycle.

Our study seeks to address some longstanding questions: why is performance often higher during the post-menstrual phase? Why does it tend to decrease during the first days of menstruation and the premenstrual phase? These fluctuations may be influenced by training load, premenstrual or menstrual symptoms (such as fluid retention, weight changes, mood swings, dysmenorrhea, increased injury risk, or temporary performance decline), and the underlying hormonal changes.

To better understand these variations, we will examine physiological parameters-including hormonal profiles, mineral levels, and VO₂ max—and review the literature for insights. Ultimately, our goal is to provide practical recommendations to help athletes and coaches minimize cyclical performance drops.



Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

This study will investigate the impact of menstrual cycle phases on physical performance by assessing physical qualities across the three main phases: follicular, ovulatory, and luteal.

This leads us to the following general research question:

How do different menstrual cycle phases affect physical performance?

This overarching question gives rise to the following sub-questions:

Does the menstrual cycle affect speed quality?

Does the menstrual cycle affect strength quality?

Does the menstrual cycle affect endurance quality?

Research Hypotheses

Menstruation negatively affects speed quality.

Menstruation negatively affects strength quality.

Menstruation negatively affects endurance quality.

Objectives of the study:

This study aims to:

To evaluate the influence of the menstrual cycle on the physical qualities of 15 senior and junior female athletes participating in the athletics leagues of Constantine and Algiers.

to assess whether the different phases of the menstrual cycle negatively affect the physical quality of speed

to assess whether the different phases of the menstrual cycle negatively affect the physical quality of strength

to assess whether the different phases of the menstrual cycle negatively affect physical endurance quality

Significance of the Study:

The study's importance stems from the growing global popularity of women's sports, making it crucial to understand the physiology of exercise in these athletes. Female athletes train and compete under the potential influence of hormonal fluctuations during their menstrual cycle. However, high-level athletic success hinges on the smallest details, and the menstrual cycle is an additional variable that could negatively impact performance. Ultimately, this work sheds light on the prevalence and impact of the menstrual cycle during training. Indeed, physiological factors specific to women, such as hormonal fluctuations during the

different phases of the menstrual cycle, can be an important factor to consider in order to maximize performance and protect the health of female athletes.

2. Defining Concepts and terms:

2.1 Menstrual cycle:

The menstrual cycle is a series of monthly hormonal and physiological changes that prepare a woman's body for a potential pregnancy, beginning on the first day of menstruation and ending the day before the next period, with an average duration of 28 days, involving the maturation of an egg (ovulation) and thickening of the endometrium (uterine lining) which, if fertilization does not occur, will be shed during the next period (Cole, Ladner, & Byrn, 2009).

-Operational Definition:

The menstrual cycle is a mechanism that prepares the female body to receive a pregnancy every few months, from puberty to menopause. It begins on the first day of menstruation, ends on the first day of the next period, and continues if fertilization does not occur.

2.2 Physical performance:

Physical performance is an individual's ability to optimize their physiological and motor skills (strength, endurance, speed, flexibility, coordination) to accomplish a task efficiently, whether in a sporting context (achieving a result) or in everyday life (energy for activities), representing an optimal level of performance linked to health and training (BILLAT, 2024).

-Operational Definition:

This refers to the level of physical qualities that allows one to perform physical activity under the best possible conditions; that is, it is a person's ability to react well to the demands and physical stress associated with a series of physical activities.

Previous studies

Study by D. Mboup Diéye. Influence of the menstrual cycle on performance (2011) this study assesses the influence of the menstrual cycle on the physical qualities of a number of female students at INSEPS. Fifteen female students at INSEPS aged between 20 and 29 were tested twice (pre- and post-physical tests). The tests used in this experiment aimed to assess reaction speed, vertical jump, and abdominal and back endurance on the third day of bleeding and three days after bleeding had stopped. The results showed that there was no significant difference in any of the variables on the third day of bleeding or on the third day after bleeding had stopped. The researcher concluded that the menstrual

Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

cycle has no influence on power, endurance, and speed exercises, which means that menstruation has no influence on the physical performance of female athletes.

Study by A. Tsampoukous. Effect of the menstrual cycle phase on sprint performance(2010) The aim of this research is to examine the effects of menstruation and metabolic responses during a sprint. Eight women participated in this study and were tested three times during the follicular phase, the pre-ovulation phase, and the luteal phase. The test consisted of repeated 30-second sprints on a treadmill with a two-minute recovery period between repetitions, as well as physiological tests (blood lactate, blood pH, and plasma ammonia after sprinting). The results of the physical and physiological tests indicate that peak power, average power, and physiological parameters remained unchanged during the three phases of the menstrual cycle. The researcher suggests that hormonal fluctuations due to the menstrual cycle do not interfere with maximum sprint intensity or even metabolic responses, which remain stable throughout the cycle.

Study by K. Oumou Desse. Physical performance of female soccer players in Commune I of the Bamako district during menstruation and non-menstruation (2015) This study aimed to determine the dynamics of physical performance according to menstrual and non-menstrual periods in female soccer players. Thirty female athletes aged between 13 and 23, selected at random, took part in this experiment. To compare performance during menstruation and non-menstruation, several parameters were evaluated (anthropometric parameters, physical tests, and functional parameters). The results of physical fitness, anthropometric measurements, and cardiac function parameters showed that there was no change between the menstrual and non-menstrual periods. The researcher concluded that physical performance is not influenced by the menstrual cycle in female soccer players in the municipality of Bamako.

3. Research Methodology

3.1 Research Approach:

We opted for an experimental approach with a matched group in order to achieve the desired objective.

3.2 Research population:

The research population consists of 40 senior and junior female athletes of national level from the provinces of Constantine and Algiers.

3.3 Sample of the study:

Our study focused on a group of fifteen female athletes who were unmarried, did not take oral contraceptives, had regular menstrual cycles, were national-level specialists in sprinting and jumping, aged 16 to 19, with an average height of 165.5 cm and an average weight of 59.33 kg.

3.4 Data Collection Tools:

Physical testing method:

Test distribution: in order to ensure favorable conditions for the tests to run smoothly, they were distributed in such a way as to reduce the influence of fatigue on the athletes' performance.

We spread the tests over two days, allowing for recovery time.

Day 1: 40-meter sprint test- Standing long jump test

Day 2: Cooper test (12 minutes)

1st Test: 40 m sprint

Definition: speed test organized over a set distance (40 m) that competitors run after a 10 m run-up.

Purpose of this test: the 40 m sprint assesses speed of action and coordination involving anaerobic alactic power.

Description and evaluation: the subject takes a 10-15 m run-up; the start is free, the stopwatch is started as soon as the subject crosses the 40 m line and is stopped as soon as the subject crosses the finish line.

2nd Test: standing long jump

Definition: (jump) natural movement whereby a person leaves the ground with a sudden burst of energy.

Purpose of the test: the standing long jump is used to assess the explosive strength of the lower limbs in a predominantly horizontal direction, enabling the measurement of anaerobic-alactic power.

Description and procedure: the subject stands behind the starting line in a semi-squatting position, feet slightly apart at shoulder width, swinging their arms back and bending their knees. They jump as far as possible, straightening their knees and swinging their arms simultaneously.

The distance achieved corresponds to the interval between the starting line and the mark closest to this line.

The athlete performs two attempts, and the best result is recorded on the evaluation sheet. As in the long jump, the landing is on both feet.

3rd test: Cooper test (12 min)

Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

Definition: This test consists of covering the greatest possible distance (alternating between running and walking is permitted) in 12 minutes.

Objective: The 12-minute run is used to assess aerobic endurance and VO₂ max.

Description and evaluation: The test subject is informed that they will have to cover the greatest possible distance in 12 minutes.

3.5 Psychometric Properties of the instrument

3.5.1 Reliability: Reliability using the Pearson correlation method:

Table 1:Correlation coefficients between measurements(reliability) for the no-approach jump test

Stability level	Correlation coefficient R	Comparison
Medium stability	0,51	Follicular phase × ovulation
Medium stability	0,54	Follicular × Luteal Phase
Very high stability	0,96	Ovulation × Luteal Phase

Source: Based on SPSS Version 24 outputs.

Conclusion: The test has a very high degree of reliability, especially between the ovulation and luteal phases, which indicates the stability of the measurement.

Table 2: Stability coefficients for 40m speed test

Stability level	Correlation coefficient R	Comparison
Very high stability	0,99	Follicular phase × ovulation
High stability	0,89	Follicular × Luteal Phase
Very high stability	0,92	Ovulation × Luteal Phase

Source: Based on SPSS Version 24 outputs.

Conclusion: The 40m test exhibits very high stability, making it suitable for experimental studies.

Table 3: Reliability coefficients for the Cooper test

Stability level	Correlation coefficient R	Comparison
Very high stability	0,87	Follicular phase × ovulation
Very high stability	0,94	Follicular × Luteal Phase
High stability	0,79	Ovulation × Luteal Phase

Source: Based on SPSS Version 24 outputs.

Conclusion: The Cooper test has very high reliability and is suitable for experimental studies.

3.5.2 Validity

A. Apparent Validity

The tests were presented to training and physiology experts.

B. Content Validity

The tests are related to physical abilities (strength, speed, endurance) verified.

Conclusion: The jump test, the 40m sprint test, and the Cooper test all possess both face validity and content validity, as they measure the physical abilities for which they were designed, and have been widely used in scientific research.

3.5.3 Objectivity

The measurement tool relied on digital measurements (meters per second), and the result was high. The researcher's intervention was non-existent, and there was no difference between the evaluators.

Conclusion: The tests have a high degree of objectivity because their results do not depend on personal judgment, but rather on accurate numerical measurements.

3.6 Field Application procedures

- **Time frame:** The study was conducted from early Novembre 2025 to the end of December 2025.

Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

- **Geographic scope:** The research was conducted on sports clubs in the province of Constantine and Algiers.

3.7 Statistical methods used in the study:

The researchers used the SPSS software package (Version 24 Statistical Package for the Social Sciences) and applied the following statistical techniques:

- Arithmetic mean
- Standard deviation
- Variance
- Analysis of variance
- Student's t -test

4. Results

4.1 Presentation and discussion of study findings

Physical performance appears to be influenced to varying degrees by the menstrual cycle. Certain conditions, individually or combined, can act as obstacles to performance, creating a feedback loop where sport affects performance and vice versa. Factors contributing to ovarian cycle dysfunction include stress, training volume and intensity, inadequate nutrition, and hormonal changes are (Wilmore, Costill, & Kenney, 2024). Several studies indicate that excessive training and hormonal fluctuations can lead to secondary amenorrhea, altering hormone secretion in female athletes. To ensure regularity, the menstrual cycles of all participants were monitored for two months prior and one month after testing (Ekenros, et al., 2022).

4.1.1 Answering the First Research Question

Does the menstrual cycle affect speed quality?

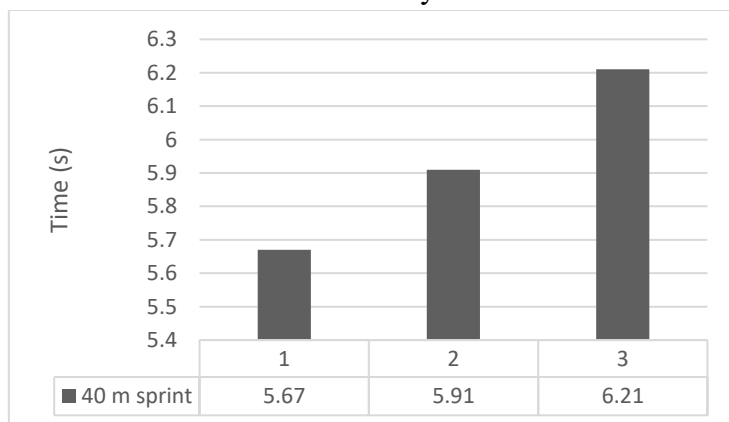
Table4: Results of the 40m sprint during 3 phases of the menstrual cycle.

Phases	Follicular	Ovulatory	Luteal
subjects	meters	meters	meters
1	6,05	6,25	6,42
2	5,65	5,9	6,04
3	5,83	6	6,12
4	6,35	6,75	6,9

5	5,2	5,35	5,7
6	5,97	6,13	6,38
7	6,03	6,4	6,53
8	5,85	6,01	6,3
9	6,99	7,35	7,4
10	5,45	5,92	6,08
11	5,13	5,47	6,35
12	5,05	5,13	5,42
13	5,02	5,19	5,99
14	5,35	5,55	5,7
15	5,15	5,25	5,75
Mean	5,67	5,91	6,21
Standard Deviation	0,56	0,62	0,50
Variancy	0,31	0,39	0,25

Source: Based on SPSS Version 24 outputs.

Fig1: Results of the 40-meter sprint during the three phases of the menstrual cycle



Source: Based on SPSS Version 24 outputs.

The 40-meter sprint revealed mean times of 5.67 ± 0.56 s in the follicular phase, 5.91 ± 0.62 s in the ovulatory phase, and 6.21 ± 0.50 s in the luteal phase table4. ANOVA indicated a significant negative effect on sprint performance

Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

during the luteal phase compared to the follicular phase ($F = 0.04$; $P < 0.05$) (Figure 1).

4.1.2 Answering the second Research Question

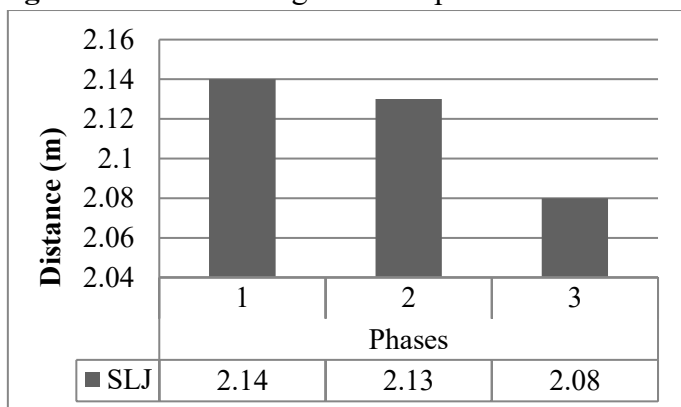
Does the menstrual cycle affect strength quality?

Table5: Results of the standing jump during the three phases of the menstrual cycle

phases	follicular	ovulatory	luteal
subjects	meters	meters	meters
1	2,25	2,15	2,15
2	2,23	2,1	2,1
3	2,12	2,09	2,05
4	2,2	2,15	2,1
5	2,37	2,31	2,25
6	2,27	2,2	2,2
7	1,98	1,8	1,68
8	2,28	2,18	2,15
9	2,5	1,95	1,9
10	2,3	2,2	2,18
11	2,25	2,2	2,05
12	2,32	2,28	2,2
13	2,22	2	2
14	2,15	2,03	1,95
15	2,35	2,3	2,26
Mean	2,14	2,13	2,08
Standard Deviation	0,33	0,14	0,15
Variancy	0,11	0,02	0,02

Source: Based on SPSS Version 24 outputs.

Fig2: SLJ results during the three phases of the menstrual cycle



Source: Based on SPSS Version 24 outputs.

The mean results of the standing long jump across the follicular, ovulatory, and luteal phases were 2.14 ± 0.33 m, 2.13 ± 0.14 m, and 2.08 ± 0.15 m, respectively table5. Analysis of variance indicated a significant decrease in performance between the follicular and ovulatory phases ($F = 0.01$; $P < 0.01$) and an even greater decline between the follicular and luteal phases ($F = 0$; $P < 0.001$) (Figure 2, Table 4). These results suggest that explosive lower-limb performance gradually declines as the cycle progresses.

4.1.3 Answering the third Research Question

Does the menstrual cycle affect endurance quality?

Table 6: Cooper test results during the threephases of the menstrual cycle.

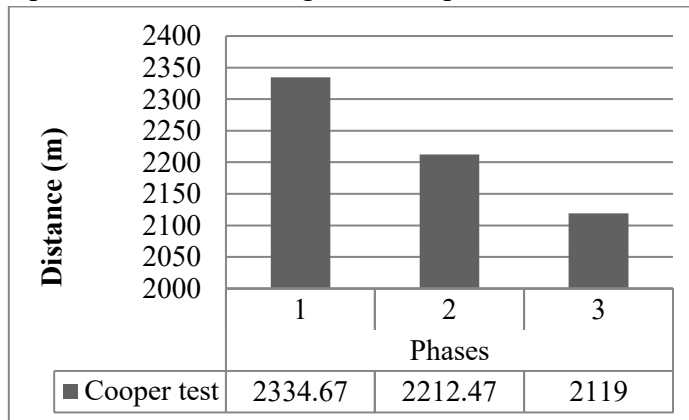
phases	follicular	ovulatory	luteal
subjects	meters	meters	meters
1	2310	2250	2230
2	2245	2230	2150
3	2120	2090	2040
4	2275	2235	2220
5	3190	3050	2920
6	1860	1700	1670
7	1990	1830	1800
8	2450	2300	2120

Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

9	1820	1600	1575
10	1750	1685	1650
11	2320	1970	1700
12	2960	2800	2620
13	2495	2390	2300
14	2005	1952	1925
15	3230	3105	2870
Mean	2334,67	2212,47	2119,33
Standard Deviation	469,14	469,69	426,91
Variancy	220090,95	220610,55	182253,10

Source: Based on SPSS Version 24 outputs.

Fig 3: Cooper Test results during the three phases of the menstrual cycle



Source: Based on SPSS Version 24 outputs.

The Cooper test showed mean distances of 2334.67 ± 469.14 m in the follicular phase, 2212.47 ± 469.69 m during ovulation, and 2119.33 ± 426.91 m in the luteal phase table 6, Figure3. Although there was a gradual decline in endurance performance from the follicular to luteal phase, the differences were not statistically significant according to the Fischer test.

Table7: One factor analysis of variance of performance according to the three phases of the cycle.

phases	1 à 2	2 à 3	1 à 3
40 m sprint	0,28 (ns)	0,16 (ns)	0,04*
Standing long jump	0,01 **	0,38 (ns)	0***
cooper Test	0,48 (ns)	0,57 (ns)	0,44 (ns)

*P<0.05; **P<0.01; ***P<0.001; (ns): not significant

Paired t-Test Analysis

Table 8

	Phase folliculaire	Phase d'ovulation
$\bar{X}$	2334,67	2212,47
σ	469,14	469,69
Tt	5,44	

Source: Based on SPSS Version 24 outputs.

Table9

	Phase d'ovulation	Phase Lutéale
$\bar{X}$	2212,47	2119,33
σ	469,69	426,91
Tt	4,23	

Source: Based on SPSS Version 24 outputs.

Table10

	Phase folliculaire	Phase Lutéale
$\bar{X}$	2334,67	2119,33
σ	469,14	426,91
Tt	5,45	

Source: Based on SPSS Version 24 outputs.

Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

The paired Student's t-test confirmed significant differences between the follicular and ovulatory phases ($t = 5.44$; $P < 0.001$), ovulatory and luteal phases ($t = 4.23$; $P < 0.001$), and follicular and luteal phases ($t = 5.45$; $P < 0.001$), supporting the ANOVA findings for strength and speed parameters.

Discussion:

The results suggest that the follicular phase is the most favorable for strength-speed performance, particularly activities relying on anaerobic alactic energy systems. Peak muscle strength during the follicular phase correlates with rising estrogen levels, which have anabolic effects promoting muscle protein synthesis (Kissow, Jacobsen, & Jessen, 2025), and enhancing adaptations to training load (Zhang, et al., 2024). Estrogen also optimizes serotonergic transmission via tryptophan hydroxylase stimulation, reducing stress and fatigue perception and improving strength output (Martin-Du-Pan, 2010) (Ansdell, Brownstein, Škarabot, & Hicks, 2019). Additionally, estrogen supports metabolic regulation by enhancing glucose uptake and glycogen sparing, making the follicular phase favorable for explosive and hypertrophic work (Isacco & Boisseau, 2017), (Wikström-Frisén, Boraxbekk, & Henriksson-Larsén, 2017).

The Cooper test results, assessing endurance, align with previous studies (Leburn, 1993) despite the absence of direct hormone measurements. Performance gradually declined from the follicular to luteal phase, likely reflecting changes in substrate utilization. Elevated estrogen enhances free fatty acid bioavailability and intramuscular lipid oxidation, improving fatigue resistance during aerobic activities (Dokumacı & Hazır, 2019). Conversely, the luteal phase may reduce endurance performance due to higher progesterone levels, which increase thermoregulatory and cardiovascular stress and accelerate neuromuscular fatigue (GOLDSMITH & GLAISTER, 2020).

The variability in previous literature is evident, with studies on female swimmers showing contradictory findings: some report improved performance during menstruation, others post-menstrual improvement, and some show slight premenstrual gains, though differences were often not statistically significant (Wilmore, Costill, & Kenney, 2024).

Overall, our findings reinforce the importance of considering menstrual cycle phases in training and performance planning. Explosive strength and speed work may benefit from scheduling during the follicular phase, while endurance

performance may be more resilient but slightly lower during the luteal phase. Hormonal fluctuations, particularly estrogen and progesterone, provide a physiological basis for these variations.

5. CONCLUSION

We can conclude that the different phases of the menstrual cycle have a significant impact on physical performance, with varying degrees of negative effects.

- The **follicular phase** appears to be the most favorable for achieving optimal results in speed, strength, and overall endurance, corresponding to a peak in estrogen levels.
- **Performance during the ovulatory phase** was lower compared to the follicular phase, which may be related to peaks in LH and FSH secretion.
- The **luteal phase** had a more pronounced negative effect on physical performance compared to the follicular phase, likely due to elevated progesterone levels.

However, it is important to note that the effects observed cannot be generalized for several reasons:

- The small sample size in this study.
- An incomplete protocol, including the lack of measurements of fat mass across phases, hormonal assays, and dietary habits.
- Premenstrual symptoms, such as fatigue or abdominal pain, which are difficult to quantify.

6. Recommendations

Given the variability in results and the contradictions in the literature, recommendations should be interpreted with caution. Nevertheless, based on our findings, we suggest that coaches and sports professionals consider the following:

1. **Monitor body composition:** Regularly measure body fat and track weight to prevent amenorrhea, as fat tissue contributes to estrogen production through the conversion of androgens (testosterone).



Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

2. **Adjust training load according to cycle phase:** Emphasize higher-intensity or volume training during the follicular phase and consider reducing load during the luteal phase.
3. **Ensure a balanced diet:** Maintain adequate daily intake of calories, protein, fats, vitamins, and minerals to minimize declines in performance throughout the menstrual cycle, particularly during the luteal phase.

7. Bibliography:

- 1- Ansdell, P., Brownstein, C. G., Škarabot, J., & Hicks, K. M. (2019). Menstrual cycle-associated modulations in neuromuscular function and fatigability of the knee extensors in eumenorrheic women. *Journal of Applied Physiology*, 126(6), 1701-1712.
- 2- BILLAT, V. (2024). *Physiologie de l'entraînement et de la performance sportive* (6 ed.). Sciences et pratiques du sport De Boeck Supérieur.
- 3- Cadario, R., Butori, R., & Parguel, B. (2017). *Méthode expérimentale : analyses de modération et médiation*. (r. m. Savoirs, Ed.)
- 4- Cole, L. A., Ladner, D. G., & Byrn, F. W. (2009). The normal variabilities of the menstrual cycle. *Fertility and Sterility*, 91(2), 522-527.
- 5- Constantini, N. W., Dubnov, G., & Lebrun, C. M. (2005, april). The Menstrual Cycle and Sport Performance. *Clinics Sports Medicine*, 24(2), 51-82.
- 6- Dokumacı, B., & Hazır, T. (2019). Effects of the Menstrual Cycle on Running Economy: Oxygen Cost Versus Caloric Cost. *Research quarterly for exercise and sport*, 90(3), 318-326.
- 7- Ekenros, L., rosen, P. v., Solli, G. S., Sandbakk, Ø., Holmberg, H.-C., Hirschberg, A. L., & Fridén, C. (2022, August). Perceived impact of the menstrual cycle and hormonal contraceptives on physical exercise

and performance in 1,086 athletes from 57 sports. *Frontiers in physiology*(13).

- 8- GOLDSMITH, E., & GLAISTER, M. (2020, april). The effect of the menstrual cycle on running economy. *The Journal of Sports Medicine and Physical Fitness*, 60(4), 610-617.
- 9- Isacco, L., & Boisseau, N. (2017). *Hormones sexuelles et métabolisme des substrats pendant l'exercice d'endurance* (premiere ed.). Springer.
- 10- KISHALI, N. F., İMAMOĞLU, O., KATKAT, D., ATAN, T., & AKYOL, P. (2006). EFFECTS OF MENSTRUAL CYCLE ON SPORTS PERFORMANCE. *International Journal of Neuroscience*, 116(12), 1549-1563.
- 11- Kissow, J., Jacobsen, K. J., & Jessen, S. (2025). Global Proteomics Reveals Distinct Muscle Adaptations to Menstrual Cycle Phase-Based Sprint Interval Training in Endurance-Trained Females. *American Society for Biochemistry and Molecular Biology*, 24(10).
- 12- Leburn, C. M. (1993). Effect of the different phases of the menstrual cycle oral contraceptives on athletic performance. *sport medicine*, 16(6), 400-430.
- 13- Martin-Du-Pan, R. C. (2010). Syndrome prémenstruel, envie de sucre et sérotonine. *Revue Médicale Suisse*, 258.
- 14- Peyret-Lafforgue, J. (1981). Les effets de l'activité physique sur la fonction ovarienne. *Médecine du Sport*, 55(1), 5-9.
- 15- Tsampoukos, A. (2010, march). Effect of menstrual cycle phase on sprinting performance. *European journal of applied physiology*, 109, 659-667.
- 16- Wikström-Frisén, L., Boraxbekk, C. J., & Henriksson-Larsén, K. (2017). Effects on power, strength and lean body mass of menstrual/oral



Impact of Menstrual Cycle Phases on Physical Performance in Female Athletes

contraceptive cycle based resistance training. *Journal of Sports Medicine and Physical Fitness*, 57(1-2), 43-52.

- 17- Wilmore, J. H., Costill, D. L., & Kenney, L. W. (2024). *Physiologie du sport et de l'exercice physique* (8 ed.). De Boeck Supérieur.
- 18- Zhang, C., Feng, X., Zhang, X., Chen, Y., Kong, J., & Lou, Y. (2024, novembre). Research progress on the correlation between estrogen and estrogen receptor on postmenopausal sarcopenia. 15.