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editorial-office@sciformat.ca

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THE EFFICACY OF TRAINING PERIODIZATION STRATEGIES ADAPTED TO MENSTRUAL CYCLE PHASES: A SYSTEMATIC REVIEW OF EVIDENCE

Julia Kacer *(Corresponding Author, Email: julakacer@gmail.com)*
Wroclaw Medical University: Wroclaw, Lower Silesia, Poland
ORCID ID: 0009-0005-1709-3236

Jakub Niepokój
Wroclaw Medical University: Wroclaw, Lower Silesia, Poland
ORCID ID: 0009-0003-5273-4532

Maurycy Jabłoński
Poznan University of Medical Sciences, Poznan, Poland
ORCID ID: 0009-0006-6793-6534

Laura Kobaka
Poznan University of Medical Sciences, Poznan, Poland
ORCID ID: 0009-0007-1010-3467

Jakub Chołast
Lower Silesian Oncology Center, pl. Ludwika Hirszfelda 12, 53-413 Wroclaw, Poland
ORCID ID: 0009-0006-7180-2029

Wiktoria Łuniewska
Wroclaw Medical University: Wroclaw, Lower Silesia, Poland
ORCID ID: 0009-0009-5398-422X

Jakub Kacer
Lower Silesian Oncology Center, pl. Ludwika Hirszfelda 12, 53-413 Wroclaw, Poland
ORCID ID: 0009-0005-8573-0815

Klaudia Jurga
Poznan University of Medical Sciences, Poznan, Poland
ORCID ID: 0009-0004-3676-8166

Marta Modrzyk
Institute of Medical Sciences: Opole, Poland
ORCID ID: 0009-0003-9590-5602

ABSTRACT

Background: The female menstrual cycle features dynamic hormonal fluctuations affecting metabolic parameters, the neuromuscular system, and the biomechanics of the musculoskeletal system. With the advancement of women's sports, the popularization of rigorous training periodization models based on cycle phases (cycle syncing) can be observed on social media. Unfortunately, many of these recommendations rely on anecdotal reports, and the research landscape is further complicated by the widespread use of oral hormonal contraceptives among female athletes.

Objective: This study aims to critically evaluate the validity of training periodization according to the menstrual cycle phase in women by comparing evidence-based medicine (EBM) guidelines with the narrative promoted across mass social media.

Methods: A systematic review of scientific literature across PubMed and Web of Science databases was performed for the period up to 2026. Studies assessing the impact of hormonal fluctuations on strength parameters, performance metrics (VO2max), joint laxity (anterior cruciate ligament - ACL injury risk), and psychophysical indicators in naturally training women and oral contraceptive users were analyzed. Concurrently, a qualitative analysis of top trends and claims on TikTok, Instagram, and YouTube was carried out.

Results: Analysis of scientific literature indicated the stability of performance metrics (VO2max) and strength indicators across the physiological cycle for most women, undermining the validity of drastic and rigid training load changes promoted online. However, hormonal fluctuations correlate with variability in ligament laxity (increased susceptibility to ACL injuries during the ovulatory phase) and subjective fatigue in the late luteal phase. It was also shown that hormonal contraception abolishes natural sex hormone fluctuations, rendering universal internet templates non-functional.

Conclusions: Current EBM guidelines do not support rigid training periodization based strictly on the menstrual calendar, contradicting the dominant mass media trend. Uncritical implementation of schematic training restrictions and dietary constraints can negatively affect athletic progress, bone mineral density, and the relationship with food. The most justified, safe, and scientifically supported alternative to internet templates is individual effort autoregulation, based on ongoing monitoring of psychophysical readiness.

KEYWORDS

Menstrual Cycle, Cycle Syncing, Training Periodization, Social Media, Evidence-Based Medicine (EBM), Autoregulation

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1. Introduction

1.1. Physiology of the Menstrual Cycle in Women

Compared to men, whose sex hormone levels remain stable, women who menstruate regularly experience significant fluctuations in these levels throughout the menstrual cycle [1]. This cycle typically lasts 28–32 days and consists of the following phases: the follicular phase (characterized by low levels of estrogen and progesterone), the ovulatory phase (preceded by a sharp increase in estrogen levels), and the luteal phase (dominated by high levels of estrogen and progesterone) [2].

1.2. The Effect of Ovarian Hormones on Metabolism

These hormones also have a noticeable effect on carbohydrate and lipid metabolism; therefore, it is recommended to monitor and meet carbohydrate requirements during all phases of the cycle [3]. By modulating selected metabolic pathways and processes, such as protein turnover, estrogens may influence muscle adaptations to resistance training; however, further research is needed in this area [4]. Most scientific evidence confirms that there are no changes during the menstrual cycle with regard to key determinants of maximum oxygen uptake (VO_2max), which include: the lactate response to exercise, body weight, plasma volume, hemoglobin concentration, heart rate (HR), and pulmonary ventilation [5]. Furthermore, these hormones play a role in appetite regulation; their simultaneous high concentrations during the mid-luteal phase directly contribute to an increased tendency toward emotional eating [6]. Estrogen itself, in turn, strongly suppresses appetite by modulating hypothalamic neurons, which is physiologically responsible for the decrease in food intake during the preovulatory period [7,8].

1.3. The Effect of Ovarian Hormones on Musculoskeletal Tissues and Injury Risk

One of the most significant sex differences in the musculoskeletal system is the 2- to 8-fold higher incidence of anterior cruciate ligament (ACL) tears in women. Rising estrogen levels during the preovulatory and ovulatory phases lead to a cyclical decrease in tissue stiffness and increased laxity of the knee joint, which directly translates to a drastic increase in the risk of injury during this period [9,10]. Additionally, chronic estrogen deficiency disrupts the synthesis of muscle-building proteins and impairs the function of satellite cells, thereby weakening the regenerative and hypertrophic potential of muscle tissue [11].

1.4. The Effect of Ovarian Hormones on Psychophysical Parameters

Scientific literature reports an increase in fatigue (both neuromuscular and subjective) toward the end of the luteal phase, accompanied by more favorable emotional states during earlier phases of the cycle [12]. Estrogen fluctuations have a strong impact on the mental health of female athletes; estrogen deficiency contributes to anxiety and depression, and irregular menstruation shows a clear correlation with psychological distress and the severity of ADHD symptoms [13].

1.5. The Impact of Oral Contraception

Another important variable in the analysis of female athletes is the widespread use of hormonal contraception, which alters their natural endocrine profile [14]. On the one hand, this pharmacotherapy disrupts the natural course of the ovulatory cycle; on the other hand, it is often used as an effective strategy to alleviate premenstrual symptoms that interfere with the continuity of training [15]. Despite such dynamic growth in women's sports, the scientific literature still lacks methodologically sound studies on this group of individuals. This gap is currently being filled intensively by content on social media, where unverified, rigorous models of exercise periodization—allegedly tailored to the phases of the menstrual cycle—are often promoted.

2. Methods

To compare the principles of evidence-based medicine with popular beliefs regarding exercise periodization in women, a systematic literature review was conducted in the PubMed and Google Scholar databases. The search included scientific publications from 2018 to 2026. The search strategy was based on the use of logical operators (AND, OR) and the following combinations of keywords: ("menstrual cycle" OR "menstrual phase") AND ("periodization" OR "resistance training" OR "aerobic performance") AND ("female athletes" OR "trained women").

Concurrently, an analysis of publicly available data in the digital space was conducted to identify leading trends and recommendations directed at women who exercise by influencers, trainers, and health advocates.

Searches on Google and YouTube were conducted in Polish and English, using the following corresponding search terms: "cycle periodization," "menstrual cycle training," and "cycle-syncing workout." The analysis included content and links found on the first three pages of Google search results (with the highest ranking and click-through rates) as well as the top 20 most popular videos on YouTube, sorted by number of views.

To conduct a more in-depth comparison of scientific knowledge with the prevailing media narrative, a qualitative review of content on TikTok and Instagram was conducted. The analysis focused on the most popular videos (TikToks) and image posts tagged with the hashtags that had the widest reach: #menstrualcyclesyn and #cyclesyncing.

This study aims to provide a systematic review of current scientific evidence and a critical assessment of the effectiveness of training periodization strategies tailored to the specific phases of the menstrual cycle. Additionally, the study attempts to compare current evidence-based guidelines (EBM) with the prevailing narrative on social media in order to verify its reliability.

3. Periodization of strength training based on the phases of the menstrual cycle according to EBM

The available literature indicates that strength training performed during the follicular phase is more effective for hypertrophy and strength development than during the luteal phase. This translates to better muscle adaptability and, consequently, more effective performance optimization in female athletes [1]. On the other hand, fluctuations in hormone levels are not significant enough to disrupt the physiological adaptations induced by high-intensity interval training (HIIT) [2]. It has been demonstrated that ventilatory output (VE) and heart rate (HR) are among the parameters subject to the greatest fluctuations during the menstrual cycle. Consequently, training programs based on heart rate zones should take into account the current phase of the cycle—with particular emphasis on the follicular phase as a period characterized by a different, often more stable, hemodynamic response [3,4].

An effect of estrogen concentration on respiratory volume has also been observed; as a result, during the follicular phase—when estrogen levels are at their lowest—lung ventilation is higher compared to the ovulatory phase [5]. Romero-Parra et al. indicate that higher concentrations of estrogen and progesterone (reported during the mid-luteal phase) minimize the decline in muscle strength and reduce delayed-onset muscle soreness (DOMS) in the women studied [6]. Similarly, data presented by Yeh et al. demonstrate that the mid-luteal phase has a positive effect on the mechanical and metabolic parameters of exercise, as evidenced by higher movement speed and lower lactate levels [7].

However, attention is drawn to a certain paradox—the same phase of the menstrual cycle, from the perspective of ventilatory parameters, may prolong the time required for full recovery after interval training [8]. Furthermore, menstrual pain itself may lead to skipping training sessions and, in the long term, impair performance outcomes [9]. As L. Ekenros et al. point out, the potential decline in physical performance in women occurs mainly during the early follicular phase, which coaching staff should take into account when planning training loads [10]. Alleviating menstrual symptoms with oral hormonal contraceptives may serve as a strategy to help maintain stable training readiness in female athletes who are strongly affected by hormonal fluctuations [11].

It is worth noting, however, that numerous research reports do not confirm the need to modify training loads; the analyzed variables did not show that the physiological cost of LIT- or HIT-type sessions differs at the population level depending on the phase of the menstrual cycle [12]. A study conducted by H. Docter et al. demonstrated that the phase of the menstrual cycle does not interfere with the ability to maintain running economy, which calls into question the validity of modifying training loads based on theoretical phase-related assumptions [13]. Additionally, mood swings, sleep disturbances, and impaired recovery during specific phases of the cycle may secondarily limit female athletes' adaptive capacity and endurance performance [14]. The mid-luteal phase (MLP) negatively affects objective measures of sleep quality; however, this does not correlate with a subjective sense of impaired recovery. This effect remains consistent regardless of the nature of the exercise (LIT vs. HIT), which rules out a synergistic, negative interaction between intense training and the luteal phase on the quality of nighttime rest [15,16].

To maximize female athletes' training readiness, it is also crucial to implement appropriate dietary strategies. Sound nutritional knowledge is, in fact, a prerequisite for understanding the impact of daily dietary choices on optimizing athletic performance, preventive health care, and the effectiveness of recovery [17,18]. Finally, recent studies suggest that motivation to engage in physical activity plays a more significant role in improving exercise capacity than fluctuations in hormone levels during the menstrual cycle [10].

4. Periodization of strength training based on the phases of the menstrual cycle, according to materials in the general media

4.1 Periodization of strength training based on the phases of the menstrual cycle, according to materials found on the Google search engine

Widespread access to the internet—particularly to Google and social media platforms—is significantly redefining how knowledge about the physiology of physical exercise in women is acquired. For most female athletes and coaching staff, these tools are the primary source of information.

According to the "cycle syncing" method, which has been popularized in the media, adjusting physical activity to the phases of the menstrual cycle is said to increase training effectiveness, support recovery, and

improve well-being. According to this model, during menstruation, it is recommended to reduce exercise intensity and avoid straining the abdominal muscles in favor of relaxing activities such as yoga or Pilates. During the follicular phase, exercise intensity is gradually increased, culminating—with activities such as heavy strength training—during the ovulatory phase [1.1,2.1]. In contrast, the luteal phase is a period of gradual, successive reduction in exercise intensity. Proponents of this method They argue that progesterone, released after ovulation, has a negative effect on mood and muscle mass synthesis; therefore, they recommend reducing the frequency of workouts to 1–3 sessions per week [3.1]. It is worth noting, however, that high hormone levels during the periovulatory period are sometimes associated in the literature with an increased risk of injury; hence, some authors suggest prioritizing safe exercises focused on motor skills and technical precision during this time [4.1]. Interestingly, engaging in moderate physical activity during the menstrual phase can support anti-inflammatory processes, which helps alleviate uterine contractions and the associated lower abdominal pain [5.1]. The culmination of this strategy is the inclusion of a so-called “recovery week” spanning the last days of the current cycle and the first days of the next [6.1].

The nutritional strategy suggested within this model follows a similar periodization. During menstruation, the priority is to ensure an adequate intake of high-quality protein and iron, which helps compensate for blood loss and supports the regeneration of the endometrium. The follicular phase is considered the optimal time to potentially introduce a moderate energy deficit, while the ovulatory phase requires meals with high nutritional density, based on fresh vegetables and fruits. In the luteal phase, in response to the physiological increase in basal metabolic rate (BMR), the diet should consist of foods with a high satiety index and high fiber content, which helps control appetite [7.1]. During this period, it is advisable to increase the proportion of fats as the primary energy source while simultaneously limiting simple carbohydrates. This strategy promotes stable blood glucose levels and minimizes the risk of sudden episodes of increased appetite (so-called food cravings) [8.1]. Furthermore, as the luteal phase progresses, the diet should be gradually enriched with anti-inflammatory foods, including fatty fish, tomatoes, dark leafy vegetables, and berries [9.1].

Importantly, publicly available materials on Google reveal a variety of perspectives on training periodization. According to this alternative approach, the development of strength and endurance, as well as the rate of recovery, depend primarily on total muscle mass, diet, nervous system stimulation, and training history, rather than solely on fluctuations in hormone levels during the menstrual cycle [10.1].

4.2 Periodization of Strength Training Based on the Phases of the Menstrual Cycle, According to Materials Available on YouTube

Alongside Google, the second key source of information for women who exercise is content available on YouTube. This content is highly subjective—the creators of the most popular videos rarely cite clinical studies, basing their recommendations regarding cycle syncing on their own individual body transformation successes. This form of communication, lacking critical scientific perspective, encourages the uncritical replication of training regimens that, in the light of evidence-based medicine (EBM), lack universal physiological justification.

Content creators on YouTube also suggest that ignoring hormonal fluctuations when planning training loads negatively impacts training goals, slowing down the rate of fat loss and the achievement of body composition goals. [1.2] Furthermore, thanks to this approach, exercisers report higher subjective energy levels and greater self-confidence while working out. This helps prevent overexertion during phases of the cycle characterized by reduced secretion of sex hormones [2.2]. The analyzed materials also commonly present ready-made training programs tailored to specific phases of the cycle. For example, during menstruation, gentle, relaxation-focused Pilates is recommended to alleviate lower abdominal pain [3.2]. The follicular phase is presented as the ideal time to combine resistance training with cardio exercise [4.2], while the ovulatory phase is identified as the optimal time for high-intensity workouts that promote muscle strength and maximize fat loss [5.2]. The luteal phase, on the other hand, is intended to be a period of reduced training load, during which mat exercises (e.g., Pilates) are meant to reduce bloating and alleviate symptoms of premenstrual syndrome (PMS) [6.2].

Proponents of this method also emphasize that implementing phase-based periodization helps minimize—or even completely eliminate—PMS symptoms and pain during the menstrual phase. This is said to result from optimal support for the body’s physiological needs, which translates into a reduction in mood swings and an overall improvement in psychophysical well-being [7.2].

On the other hand, there are also EBM-based studies that highlight the lack of evidence supporting the effectiveness of rigidly scheduling training around the menstrual cycle. These authors recommend the concept

of self-regulation, in which subjectively perceived symptoms and current psychophysical condition become the key determinants of exercise intensity [8.2,9.2]. In light of these reports, it seems far more reasonable to manage the training process flexibly based on the body's current capabilities than to blindly follow a predetermined template of training loads assigned to a given phase of the cycle [10].

4.3 Periodization of Strength Training Based on the Phases of the Menstrual Cycle, According to Content Available on Social Media (TikTok, Instagram)

In addition to Google Search and YouTube, TikTok and Instagram are key channels for disseminating this method. Through dynamic video content (Reels, TikToks) and simplified infographics, these platforms promote ready-made, one-size-fits-all training and nutrition templates for each phase of the cycle. Visually appealing content and promises of rapid improvements in well-being encourage users to eagerly follow these recommendations, often ignoring the fact that the advice presented there is based on generalized algorithms that, in the light of evidence-based medicine (EBM), lack clear scientific justification.

Another important topic covered in these media is the optimization of nutrition in relation to the phases of the menstrual cycle. According to the guidelines presented there, the menstrual phase requires an increased intake of macronutrients—particularly high-quality protein—as well as attention to proper hydration. In contrast, during the follicular phase, it is recommended to choose easily digestible meals. The ovulatory phase should focus on increasing the intake of dietary fiber and foods with high antioxidant potential, while during the luteal phase, it is recommended to incorporate low-glycemic-index foods into the diet to stabilize blood glucose levels and prevent fluctuations [1.3–3.3]. Online content creators also point to the need to avoid certain ingredients during menstruation. They recommend avoiding fried foods, processed foods, alcohol, caffeine, and simple sugars, citing the risk of exacerbating physical discomfort and worsening overall well-being [4.3].

These materials also promote a holistic approach to this method, suggesting that tailoring activities to the phases of the cycle promotes better social functioning and allows for optimized skin care [5]. Furthermore, according to the authors of these publications, spreading knowledge about synchronization is intended to help partners understand female physiology and the dynamics of emotional states. [6.3] The intention is for this to serve as a practical guide explaining how to adapt forms of support and communication to a woman's needs during the various phases of her cycle [7.3,8.3].

Another key element of the online narrative is the somatic changes that affect body image perception during the various phases of the cycle [9.3]. The authors note that the luteal and menstrual phases predispose women to increased water retention, which causes a subjective sensation of tissue swelling. The opposite trend is observed during the follicular phase and at ovulation. High estrogen levels correlate with a reduction in swelling, which directly translates into a more positive self-assessment and a perception of the figure as slimmer [10.3].

Table 1. A summary of recommendations and narratives regarding "cycle syncing" on social media in relation to the phases of the menstrual cycle.

Cycle Phase	Recommended Physical Activity and Sources	Dominant Dietary Recommendations and Sources	Subjective Sensations, Body Perception, and Sources
Menstrual	Calm, relaxing mat pilates aimed at alleviating lower abdominal pain. [3.2]	Increased protein supply, high hydration [7.1]; avoiding fried, highly processed dishes, alcohol, caffeine, and simple sugars [4.3]	Sensation of body swelling, tendency toward water retention in the body [10.3]
Follicular	Combination of resistance training with cardio effort [4.2]	Choice of easily digestible dishes with lower energy density [7.1]	More favorable self-body perception, viewing the silhouette as slimmer [10.3]
Ovulatory	Highest-intensity units favoring muscle strength building [5.2]	Increased supply of dietary fiber and products with high antioxidant potential [7.1]	Peak physical capabilities, higher satisfaction with appearance [10.3]
Luteal	Renewed load reduction, recovery-directed mat pilates [6.2]	Composing low glycemic index meals to stabilize blood sugar levels [8-9.1]	Potential water retention in the body [10.3]; intensification of bloating and PMS symptoms [6-7.2]

The overview presented in Table 1 illustrates just how detailed and multifaceted the recommendations regarding the cycle-syncing method promoted on social media are. However, the impact of this content on the training and nutritional decisions of modern women requires critical analysis in light of current medical and sports science knowledge.

5. Discussion

In analyzing the content available on YouTube, TikTok, and Instagram, the main finding is that the concept of synchronizing exercise with the menstrual cycle is recognized as a widespread lifestyle trend. However, while the idea of promoting awareness of one's own body and its capabilities is positive, the message conveyed by this content is not fully consistent with the principles of evidence-based medicine (EBM) and sports theory. Methodologically, it seems unjustified to create a universal algorithm that averages the course of the menstrual cycle in women, as this phenomenon is characterized by high individual variability and requires a personalized approach.

A common factual error in the media is the assumption that every woman's menstrual cycle lasts 28 days and that its phases are perfectly symmetrical. This approach contradicts scientific findings, which indicate that the physiological cycle length in healthy women of reproductive age ranges from 21 to 35 days, and the duration of the follicular phase shows significant individual variation. Furthermore, hormone levels and their dynamics can vary from cycle to cycle in the same woman due to external factors such as stress, sleep deprivation, energy deficit, or past infections. Consequently, attempting to fit training and nutritional plans into a rigid time frame proves to be an imprecise method lacking biological justification.

Based on data from the scientific literature, it cannot be unequivocally demonstrated that synchronizing exercise with the phases of the menstrual cycle offers an advantage over classical, linear models of training periodization. Although sex hormones exhibit antagonistic effects—estrogens are anabolic, while progesterone is catabolic—research reviews and meta-analyses show that differences in muscle strength and aerobic capacity between phases are too small in most women to serve as a basis for designing universal training algorithms. Furthermore, imposing restrictions—especially a drastic reduction in exercise intensity during the luteal or menstrual phase—can hinder athletic progress and negatively affect bone mineral density (BMD) adaptation. Restrictive dietary recommendations also lack strong scientific evidence, and their thoughtless implementation carries the risk of developing disordered eating behaviors.

The most rational and evidence-based alternative is self-regulation. It is based on an ongoing assessment of the body's psychophysical readiness, as reflected, among other things, by the subjective rate of perceived exertion (RPE), sleep quality, stress levels, and monitoring of heart rate variability (HRV). These parameters should determine the intensity of a training session. Self-regulation allows for flexible management of training loads: if an athlete in the luteal phase (theoretically a weaker phase) feels well and has high energy levels, there are no contraindications to performing a heavy resistance training session. Conversely, if she feels less energetic during the follicular phase (theoretically the stronger phase), the volume and intensity of her workouts should be reduced accordingly. Self-regulation respects a woman's individual physiology, protecting her from overtraining and injuries more effectively than the one-size-fits-all templates promoted on social media.

6. Conclusions

The concept of "cycle syncing"—synchronizing training with the menstrual cycle—promoted on social media is based on a nonscientific, one-size-fits-all, and formulaic approach to women's physiology.

Contemporary evidence-based medicine (EBM) does not demonstrate any advantage of phase-oriented training programs over traditional, linear periodization of training loads.

Uncritical implementation of online recommendations regarding reducing exercise intensity and dietary restrictions may have negative consequences for physical health, athletic progress, and one's relationship with food.

The most reasonable and safe alternative to rigid schemes promoted by the mass media is individual self-regulation of exercise, based on ongoing monitoring of the body's psychophysical readiness.

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