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Research Article

Impact of Physical Activity and Sport on the Symptoms of Menstrual and Premenstrual Periods

Talitha Allegretti de Lima-Trostdorf[1, 2], Eliane Cristina Hilberath Moreira[2], Josiane Marques Felcar Piaie de Oliveira[2], Julia Emanuele Grotti[1], Laura Casagrande Zago[1], Christiane de Souza Guerino Macedo[1, 2*]

[1]Laboratory of Teaching, Research, and Extension in Sports Physiotherapy, Universiade Estadual de Londrina, Paraná, Brazil

[2]Post-graduate Program in Rehabilitation Sciences – UEL/UNOPAR, Universidade Estadual de Londrina, Paraná Brazil

[*]Corresponding author: Christiane de Souza Guerino Macedo, University Hospital, State University of Londrina, Health Sciences Center, Department of Physiotherapy. Av. Robert Koch, 60 – Vila Operária, Londrina, Parana – Brazil, Phone: +55 43 33712288

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Abstract

Differences in physical and mentalsymptoms of menstrual and premenstrual periods were analyzed in sedentary, active, and athlete women. Thewomen (227: 77 sedentary, 90 active and 60 athletes) answered the online questionnaire about symptoms related to the menstrual and premenstrual periods.In the menstrual period, the most intense symptoms were dysmenorrhea, bad mood, discouragement, and anxiety. In the premenstrual periodthe main symptoms were headache, edema, bad mood and sadness. The athletes showed less symptoms than sedentary and active women in menstrual and premenstrual periods.The menstrual symptomswere worse than in the premenstrual period. Finally, 62.1% of participants used medication to relieve menstrual period symptoms and 23.3% for premenstrual symptoms, the majority of which were self-administered. The active women and the

athletesreduced the intensity of their training in menstrual period. Up to 80.5% of participants reported a preference to discuss menstrual cycle issues with women, and were embarrassed. Then, the symptoms of the menstrual period are greater and worse than those presented in the premenstrual period. Athletes presented fewer physical and mental symptoms. The symptoms presented in the menstrual period should also be evaluated and treated to improve the physical and mental symptoms of women.

Keywords: Menstrual Cycle; Menstruation; Exercise; Physical Activity; Sport

1. Introduction

The menstrual period is usually associated with dysmenorrhea and other symptoms such as nausea, vomiting, low back pain, headache, dizziness, fatigue, and insomnia [1, 2]. The premenstrual period can be accompanied by somatic, affective, cognitive, and behavioral alterations [3] which affect up to 90% of women [4]. To minimize these symptoms, it is pointed out that physical exercise has led to positive effects [5-7] and that physical activity could be a way to manage the symptoms of the female menstrual cycle [8]. The effects of exercise on symptoms related to the menstrual cycle are presented in several studies. Peinado-Molina et al. established that the effects of physical exercise are directly related to the number of hours per week of physical exercises, body type, level of physical exercise [9], and marital status Samy et al. reported that Zumba exercises improve primary dysmenorrhea [6]. Paludo et al. and Dehnavi et al. concluded that aerobic exercise improves mood, headache, nausea, constipation/ diarrhea, and edema [5, 10]. Swimming has also been shown to be effective in improving anxiety, depression, tension, mood swings, feeling out of control, insomnia, confusion, headache, fatigue, pain, breast tenderness, cramps, and swelling reported as part of premenstrual syndrome [11]. Vaghela et al. pointed out the effects of aerobic exercise and yoga in women with premenstrual syndrome, with significant improvement in pain for both groups, and greater for the yoga group [7]. However, even with exercise, the symptoms of the menstrual cycle are present in active women and athletes, who report negative experiences related to the menstrual cycle [8, 12, 13]. And there are no reports of the comparison between the symptoms of sedentary, active, and athlete women, since the latter are subjected to high intensities of physical and mental training.

The relationship between sport and symptoms related to the menstrual cycle is less studied, and there are gaps in the literature, such as the main physical and mental symptoms and their influences on sports performance. Freemas et al. pointed out that cycling athletes report greater mood disorders and fatigue in the premenstrual phase [14]. Graja et al. established a significant decrease in peak power, less maximum voluntary contraction, worse neuromuscular efficiency, and lower values of median frequency of the vastus lateralis and rectus femoris in the premenstrual phase [15]. Wojtys et al. claim that hormonal variations alter postural stability, coordination, speed, and emotional aspects and can make athletes more prone to injuries, with a significant association with anterior cruciate ligament injuries [16]. It is noteworthy that athletes are not immune to these symptoms and require information coherent and compatible with their reality, to better deal with the symptoms and their consequences on daily activities, training, and competitions [12, 13].

Although there have been many publications on the symptoms of the female menstrual cycle, mainly during the menstrual and premenstrual periods, little is known about the symptoms established by athletes and even less about the comparison of menstrual and premenstrual symptoms in sedentary, active, and athlete

women. Thus, the aim of this study was to establish differences in physical and mental symptoms in sedentary, active, and athlete women in menstrual and premenstrual periods. It was hypothesized that sedentary women would report greater symptoms and complaints in the menstrual and premenstrual periods, however the differences between active women and athletes were not known, or whether the menstrual phase has greater symptoms than the premenstrual period, which highlights the importance of the present study.

2. Materials and Methods

2.1 Type of study and ethical approval

A cross-sectional study, through an online questionnaire, approved by the University's Research and Ethics Committee (Opinion No. 4,246,552). The participants were informed about the procedures and objectives of the study, and signed the authorization through the free and informed consent form online.

2.2 Participants and recruitment

The convenience sample was established by recruiting participants through social networks, messaging applications, and the telephone. For inclusion, healthy women (without autoimmune diseases, oncological diseases, or any alteration that could influence the results of the survey) were considered, 18 to 35 years of age, sedentary, active, and athletes. The women were distributed into groups: Sedentary: those who did not practice any physical activity or who performed less than one hour of exercise on three days a week (Tucci et al. 2014); Active: those who practiced physical activity three to five times a week, with at least one hour daily, and Athletes: those who practiced five to six workouts per week, who belonged to a team and participated in sports competitions. As exclusion criteria, women who used oral contraceptives continuously, and athletes who had decreased their training (in intensity or duration) due to the COVID-19 pandemic were considered.

2.3 Online questionnaire

The study was carried out with the application of an online questionnaire through the *Google Forms*service. The questions were related to anthropometric data, level of physical activity, sports practice, health changes, information related to the use of contraceptives, and information about the symptoms of menstrual and premenstrual periods. Considering information related to symptoms in the menstrual and premenstrual periods, the participants responded with a score from 0 (nonexistent) to 10 (as strong/intense as possible). Questionnaires for sedentary, active, and athlete women are presented as appendices (APPENDICES I AND II). To find out how active participants and athletes were assisted in relation to physical and mental symptoms resulting from the menstrual cycle, all of them indicated whether they talked about the subject, whether there were women in the training team/technical committee, and whether constant monitoring was carried out of these symptoms.

2.4 Data analysis

The data are described in absolute (mean and standard deviation or median and interquartile range) or relative values (in percentage). To verify the normality of the data, the Shapiro Wilk test was applied. For the comparison between the three study groups and their differences, the Kruskal Wallis test and the Dunn post-test were used. To establish the differences between symptoms in the menstrual and premenstrual phases, in the intra-group comparison, the Mann Whitney U test was applied. For all tests, the established significance was 5%. Data analysis was performed using the program *Statistical Packagefor Social Science* (SPSS®, Chicago, Illinois, USA), version 22.0.

3. Results

In the present study, 276 women were interviewed, through an online questionnaire. Of this total, 49 were excluded for using continuous contraceptives (19 sedentary, 22 actives, and 8 athletes). Thus, the sample included 227 women, aged 18 to 35 years and who had a regular menstrual cycle (72.3%), with an average of 28 days (56.4%). These were distributed into the following groups: Sedentary (n = 77), Active (n = 90), and Athletes (n = 60). The sedentary women did not engage in any regular physical activity, the active women exercised three to five times a week, and the athletes attended five to six workouts per week and participated in competitions in the following modalities: rugby 30% (18), crossfit 20% (12), basketball 15% (9), futsal 11.7% (7), football 8.3% (5), ballet 8.3% (5), others (handball, sailing, rhythmic gymnastics) 6.7% (4). The sample characterization data are shown in Table 1.

The results on the characteristics of the menstrual cycle and frequency of use of contraceptive medication are shown in Table 2. In addition, it was established that sedentary women did not talk about their menstrual cycle, and that only 10% (9) of active participants and 26.7% (16) of athletes talked about their menstrual period with any professional. The preference for talking about the subject with female professionals was highlighted by sedentary, active, and athlete women in 80.5% (62), 62.2% (56), and 60% (36), respectively. In addition, 73.3% (44) of the athletes reported having women on the technical committee of their teams, but only 6.7% (4) had direct monitoring of the menstrual cycle by the team, through a questionnaire or through an indication that they were menstruating. during training,

Regarding the physical and emotional symptoms presented by sedentary, active, and athlete women during the menstrual period, it is possible to observe greater complaints of pain, bad mood, discouragement, irritability, anxiety, crying, anger, and impact on activities of daily living (ADLs) (Figure 1A). In addition, it was possible to highlight differences between the groups for headache, neck and shoulder pain, daytime sleepiness, worry, sadness, crying, agitation, influence on ADLs, and training (Table 3), always with lower values for athletes and active women. Regarding the development of physical activities or training, during the menstrual period, 45.7% of the active participants and 23.3% of the athletes indicated a reduction in the intensity (time, rhythm, and repetitions) of their training. The participants also mentioned not performing physical activity on the first one or two first days (11.2% of the active and 1.7% of the athletes), not performing abdominal exercises (6.7% of the active women), reducing the load (1.7% of the athletes), and reducing the time of physical activity (13.3% of the active women). When the symptoms reported in the premenstrual period were analyzed and compared, it was possible to highlight the complaints of headache, edema/water retention, bad mood, sadness, irritability, anxiety, crying, and anger (Figure 1B). However, the difference between sedentary, active, and athlete women was established for the symptoms of low back pain, headache, neck and shoulder pain, difficulty concentrating, daytime sleepiness, discouragement, sadness, irritability, crying, and influence on training (Table 4), also with lower values for athletes and active women.

The comparison of physical and mental symptoms between menstrual and premenstrual periods for the three groups established that the menstrual period presented more frequent and intense symptoms. Sedentary women reported 14 symptoms that were significantly worse in the menstrual period, in active worse11 symptoms were worse, and for athletes, the menstrual period showed significant worsening of 12

symptoms (Table 5). Furthermore, sedentary women presented nine symptoms with an intensity equal to or greater than seven (dysmenorrhea, bad mood, discouragement, sadness, irritability, anxiety, crying, anger, and impact on ADLs), active women five symptoms (bad mood, discouragement, irritability, anxiety, and crying), and athletes pointed out only two symptoms (bad mood and anxiety) with a score equal to or greater than 7 for the menstrual period.

	Sedentary (N=77)	**Active (N=90)**	**Athletes (N=60)**	**P-value**
Age	22 (21-24.5)	22 (20.0-24.0)	23 (19.0-26.8)	0.77
Weight	63 (55.5-72.0)	62 (55.7-73.2)	65.5 (56.0-74.0)	0.54
Height	163 (158.5-165.0)	163.5 (160.0-168.0)	164.0 (160.0-169.0)	0.26
Number of workouts per week	0 (0.0-0.0)	3 (3.0-5.0)	5 (5.0-6.0)	0.00 *#@
Hours of training per week	0 (0.0-0.0)	3 (3.0-5.0)	10 (5.0-15.0)	0.00 *#@

Variables presented in median and interquartile ranges or in relative (%) and absolute (n) values. *Differences between sedentary and active. # Differences between sedentary and athletes. @ Difference between active and athletes.

Table 1: Characterization data of women participating in the study.

Questions answered	**Sedentary (n=77)**	**Active (n=90)**	**Athletes (n=60)**
Do you follow your menstrual cycle?			
Yes	88.3% (68)	95.6% (86)	85% (51)
No	11.7% (9)	4.4% (4)	15% (9)
Is your menstrual cycle regular?			
Yes	66.2% (51)	76.7% (69)	73.4% (44)
No	29.9% (23)	23.3% (21)	23.3 (14)
I don't know	3.9% (3)	-	3.3% (2)
How many days is your menstrual cycle?			
Less than 28 days	5.2% (4)	18.9% (17)	20% (12)
About 28 days	55.8% (43)	58.9% (53)	53.3% (32)
More than 28 days	27.3% (21)	18.9% (17)	10% (6)
I don't know	11.7% (9)	3.3% (3)	16.7% (10)
How many days is your menstruation?	5 (4.0-6.0)	5 (4.0-5.7)	5(4.0-5.3)
What is the amount of your period?			
Light	15.6% (12)	7.8% (7)	5% (3)
Normal	66.2% (51)	72.2% (65)	68.3% (41)
Heavy	18.2% (14)	20% (18)	26.7% (16)
Do you perform hormone level tests?			
Yes	49.4%% (38)	54.4% (49)	36.7% (22)
No	50.6% (39)	45.6% (41)	63.3% (38)

Do you use a hormonal contraceptive method/Contraceptive?			
Yes	45.5% (35)	53.3% (48)	26.7% (16)
No	54.5% (42)	46.7% (42)	73.3% (44)

Data presented as percentage and absolute frequency. Days of menstruation duration presented as median (interquartile range).

Table 2: Characteristics of menstrual cycle monitoring and use of hormonal contraceptive method.

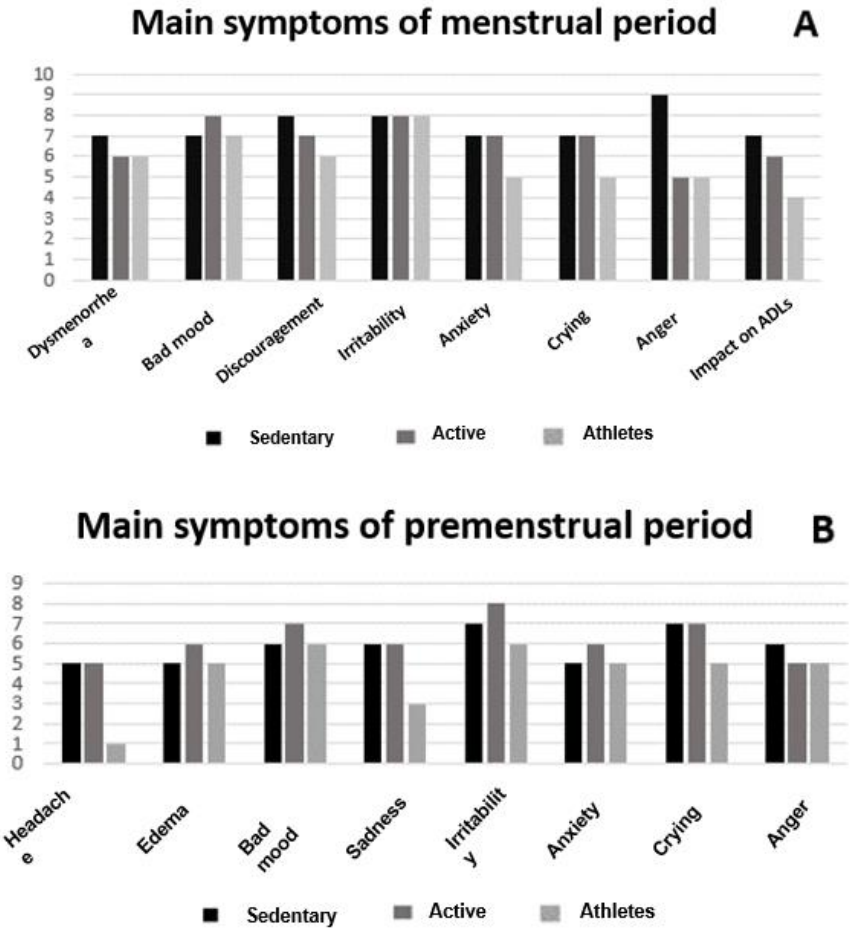

Figure 1: Main symptoms pointed out in the menstrual period (1A) and premenstrual period (1B).

Symptoms presented	**Sedentary (n=77)**	**Active (n=90)**	**Athletes (n=60)**	**P-value**
Dysmenorrhea	7 (2.5-9)	6 (3-8)	6 (4-8)	0.33
Backache	6 (2-8)	5 (1-8)	4(0-8)	0.26
Headache	3 (2-8)	4 (1-7)	2 (0-5)	0.02 #
Mastalgia	3 (1-7)	4 (1-5)	4 (0-6)	0.84

Neck and shoulder pain	1 (0-5)	1 (0-3)	0 (0-2)	0.00 #@
Lower limb pain	1 (0-5)	0 (0-5)	0 (0-5)	0.38
Pain in the knees	0 (0-0)	0 (0-0)	0 (0-0)	0.98
Edema / water retention	6 (2-8)	6 (4-8)	5 (3-8)	0.29
Difficulty concentrating	4 (2-7)	4 (1-7)	3.5 (0-7)	0.26
Daytime sleepiness	6 (3-8)	5 (1-8)	5 (0-7)	0.00 #
Insomnia	2 (0-5)	0 (0-4)	2 (0-6)	0.23
Bad mood	7 (5-10)	8 (5-9)	7 (2-8)	0.19
Worry	6 (2-9)	3 (0-7)	4 (0-7)	0.04 *#
Discouragement	8 (4-10)	7 (4-9)	6 (2-8)	0.09
Sadness	7 (3-9)	6 (2-8)	4 (1-7)	0.00 #@
Irritability	8 (5-10)	8 (5-10)	8 (4-9)	0.11
Anxiety	7 (3-9)	7 (3-9)	5 (1-8)	0.14
Crying	7 (5-10)	7 (2-10)	5 (2-8)	0.01 #@
Agitation	4 (0-6)	1 (0-6)	1 (0-4)	0.04 #
Anger	9 (2-10)	5 (1-9)	5 (2-7)	0.12
Impact on ADLs	7 (4-8)	6 (4-7)	4 (2-7)	0.00 #
Impact on training	0 (0-0)	5 (3-8)	5 (2-8)	0.00 *#
Impact on appetite	4 (2-8)	3 (0-7)	3.5 (0-6)	0.27

Values established between zero and 10, where zero was no complaint and 10 complaints of great intensity. *Differences between sedentary and active. # Differences between sedentary and athletes. @ Difference between active and athletes.

Table 3: Characterization and comparison of physical and mental symptoms in the menstrual period among sedentary, active, and athlete women.

Symptoms presented	**Sedentary**	**Active**	**Athletes**	**P-value**
Dysmenorrhea	3 (0.0-6.0)	3 (0.8-6.0)	1 (0.0-6.0)	0.59
Backache	3 (0.0-7.0)	3 (0.0-6.0)	0.5 (0.0-5.8)	0.04 @
Headache	5 (1.0-8.0)	5 (0.0-7.0)	1 (0.0-5.8)	0.01 #@
Mastalgia	3 (0.0-7.5)	4 (1.0-7.0)	3.5 (0.0-6.0)	0.47
Neck and shoulder pain	0 (0.0-5.0)	0 (0.0-3.0)	0 (0.0-0.0)	0.04 #
Lower limb pain	0 (0.0-3.0)	0 (0.0-3.3)	0 (0.0-1.0)	0.36
Pain in the knees	0 (0.0-0.0)	0 (0.0-0.0)	0 (0.0-0.0)	0.49
Edema / water retention	5 (0.0-8.0)	6 (3.8-8.0)	5 (2.0-7.0)	0.16
Difficulty concentrating	2 (0.0-6.0)	3 (0.0-5.0)	0 (0.0-4.0)	0.04 #@
Daytime sleepiness	2 (0.0-6.0)	3 (0.0-7.0)	0 (0.0-4.0)	0.01 #@
Insomnia	0 (0.0-3.5)	0 (0.0-3.0)	0 (0.0-4.8)	0.95
Bad mood	6 (4.0-10.0)	7 (5.0-9.0)	6 (3.0-8.0)	0.25

Worry	4 (0.0-8.0)	3 (0.0-7.3)	2.5 (0.0-6.0)	0.19
Discouragement	5 (3.0-9.0)	5 (2.8-8.0)	3 (1.3-7.0)	0.02 #@
Sadness	6 (3.0-9.0)	6 (3.0-9.0)	3.5 (0.3-6.8)	0.00 #@
Irritability	7 (4.0-10.0)	8 (5.0-10.0)	6.5 (3.3-8.0)	0.03 @
Anxiety	5 (2.0-8.5)	6 (3.0-9.3)	5 (1.0-7.0)	0.08
Crying	7 (4.0-10.0)	7.5 (4.0-10.0)	5 (1.0-7.8)	0.00#@
Agitation	3 (0.0-6.0)	1 (0.0-6.0)	1 (0.0-5.0)	0.10
Anger	6 (1.5-9.5)	5 (2.3-9.3)	5 (2.0-7.0)	0.36
Impact on ADLs	5 (2.0-7.0)	4 (1.0-6.3)	3 (1.0-5.8)	0.07
Impact on training	0 (0.0-3.0)	2 (0.0-5.0)	3.5 (0.0-5.0)	0.00*#
Impact on appetite	2 (0.0-5.0)	1 (0.0-6.3)	1 (0.0-5.0)	0.58

Values established between zero and 10, where zero was no complaint and 10 complaints of great intensity. Differences between groups were established using the Kruskal Wallis test and Dunn's post-test* Differences between sedentary and active. # Differences between sedentary and athletes. @ Differences between active and athletes.

Table 4: Characterization and comparison of physical and mental symptoms in the premenstrual period among sedentary, active, and athlete women.

Symptoms presented	**Sedentary**		**Active**		**Athletes**	
	Premenstrual	**Menstrual**	**Premenstrual**	**Menstrual**	**Premenstrual**	**Menstrual**
Dysmenorrhea	3 (0-6)	7 (2.5-9)*	3 (1-6)	6 (3-8)*	1 (0-6)	6 (4-8)*
Backache	3 (0-7)	6 (2-8)*	3 (0-6)	5 (1-8)*	0.5 (0-6)	4 (0-8)*
Headache	5 (1-8)	3 (2-8)	5 (0-7)	4 (1-7)	1 (0-6)	2 (0-5)
Mastalgia	3 (0-7.5)	3 (1-7)	4 (1-7)	4 (1-5)*	3.5 (0-6)	4 (0-6)
Neck and shoulder pain	0 (0-5)	1 (0-5)*	0 (0-3)	1 (0-3)*	0 (0-0)	0 (0-2)
Lower limb pain	0 (0-3)	1 (0-5.5)*	0 (0-3)	0 (0-5)*	0 (0-1)	0 (0-5)*
Pain in the knees	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
Edema/water retention	5 (0-8)	6 (2.5-8)*	6 (4-8)	6 (4-8)	5 (2-7)	5 (3-8)
Difficulty concentrating	2 (0-6)	4 (2-7)*	3 (0-5)	4 (1-7)*	0 (0-4)	3.5 (0-7)*
Daytime sleepiness	2 (0-6)	6 (3.5-8.5)*	3 (0-7)	5 (1-8)*	0 (0-4)	5 (0-7)*
Insomnia	0 (0-3.5)	2 (0-5)*	0 (0-3)	0 (0-4)	0 (0-5)	2 (0-6)*
Bad mood	6 (4-10)	7 (5-10)	7 (5-9)	8 (5-9.)	6 (3-8)	7 (2-8)
Worry	4 (0-8)	6 (2-9)*	3 (0-7)	3 (0-7)	2.5 (0-6)	4 (0-7)*
Discouragement	5 (3-9)	8 (4-10)*	5 (3-8)	7 (4-9)*	3 (1-7)	6 (2-8)*
Sadness	6 (3-9)	7 (3-9.5)	6 (3-9)	6 (2-8)	3.5 (0-7)	4 (1-7)

Irritability	7 (4-10)	8 (5.5-10)*	8 (5-10)	8 (5-10)	6.5 (3-8)	8 (4-9)*
Anxiety	5 (2-8.5)	7 (3.5-9)*	6 (3-9)	7 (3-9)	5 (1-7)	5 (1-8)*
Crying	7 (4-10)	7 (5-10)	8 (4-10)	7 (2-10)*	5 (1-8)	5 (2-8)
Agitation	3 (0-6)	4 (0-6.5)	1 (0-6)	1 (0-6)	1 (0-5)	1 (0-4)
Anger	6 (1.5-9.5)	9 (2-10)	5 (2-9)	5 (1-9)	5 (2-7)	5 (2-7)
Impact on ADLs	5 (2-7)	7 (4-8)*	4 (1-6)	6 (4-7)*	3 (1-6)	4 (2-7)
Impact on training	0 (0-0)	0 (0-0)	2 (0-5)	5.0 (3.0-8.0)*	3.5 (0-5)	5 (2-8)*
Impact on appetite	2 (0-5)	4 (2-8)*	1 (0-6)	3.0 (0.0-7.0)	1 (0-5)	3.5 (0-6)*

Values established between zero and 10, where zero was no complaint and 10 complaints of great intensity. * Significant difference between the premenstrual and menstrual periods ($P<0.05$) using the Mann Whitney U test.

Table 5: Intragroup comparison of the intensity and impact of symptoms between menstrual and premenstrual periods among sedentary, active, and athlete women.

Finally, 62.1% of the participants reported using medication (analgesics, anti-inflammatory, and muscle relaxants) and other resources to relieve the symptoms of the menstrual period and 23.3% during the premenstrual period. Medication use was reported by 41% of participants in the menstrual period and 10.1% in the premenstrual period, the majority without medical indication (78.5% during the menstrual period and 69.6% in the premenstrual period). Among the other resources for symptom relief were hot compresses (39.2% during the menstrual period and 8.4% in the premenstrual period) and teas (18.9% during the menstrual period and 8.4% in the premenstrual period). It was also observed that during the menstrual period, 51.1% of the participants needed to use more than one resource for the relief of symptoms.

4. Discussion

The present study is the first to establish that athletes presented lower physical and mental symptoms related to the menstrual cycle when compared to active and sedentary women, and that the symptoms of the menstrual period were greater than those presented in the premenstrual period. However, although minor, the symptoms presented by the athletes during the menstrual period can interfere in their quality of life and in their training, which demonstrates the need to monitor and establish a profile of the menstrual cycle of athletes and their teams [13]. The participants in the present study were similar in age, weight, and height; and differed in the number of training hours per week, which demonstrates the methodological quality for the comparison between the three groups (Table 1). Regarding the menstrual cycle, the majority of sedentary, active, and athlete women, similarly pointed out that they follow their menstrual cycle, which is regular, with an average of 28 days, a duration of five days, and a flow intensity considered normal. It is noteworthy that the majority of athletes have never undergone an examination for hormonal levels and do not use contraceptives (Table 2), which could favor the appearance and intensity of symptoms associated with the menstrual cycle, since the use of hormonal contraceptive methods decreases symptoms related to the menstrual period [17, 18]. However, in contrast, the athletes in the present study, despite lower use of horm-

onal contraceptives, presented less symptoms.

The results on the intensity of menstrual flow corroborate with Findlay et al. [13] where 33% of rugby athletes reported heavy bleeding and 67% considered that this factor impairs sports performance. Brown et al. point out that menstruation, in addition to being inconvenient, generates greater worry and distraction in training and competitions, because in addition to the discomfort there is the concern about "stained" clothes, which causes embarrassment [12]. In addition, talking about the menstrual cycle with men is still considered taboo as our results showed that 80% of sedentary women, 62.2% of active women, and 60% of athletes prefer to talk about the subject with female professionals, and corroborate Brown et al. by establishing that the conversations were more empathetic and positive with other women [12]. The present study also highlights that the athletes indicated their preference for having women on the coaching staff and the need for further monitoring and clarification through sports teams.

Among the physical and mental symptoms related to the menstrual period, sedentary, active, and athlete women presented pain (dysmenorrhea) in a similar way and of great intensity (six to seven points on the pain scale) (Table 3), which may be associated with limitations in activities, lost productivity, absenteeism, and reduced quality of life [19, 20]. In addition, the high intensity (above seven on a scale of 0 to 10) of bad mood, discouragement, irritability, anxiety, crying, and anger stand out as symptoms associated with the menstrual period, as presented by Brown et al. [12], Bruinvels et al. [8], and Paludo et al. [5]. Sedentary women reported greater symptoms when compared to athletes, which confirms that a sedentary lifestyle worsens symptoms related to the menstrual period [21]. Furthermore, the higher intensity and frequency of training performed by athletes may be associated with fewer symptoms, since active women had higher scores for neck and shoulder pain, sadness, and crying than sedentary women, which highlights positive aspects of sports practice to decrease the symptoms of the menstrual period. In addition, the symptoms reported in the menstrual period were greater than those reported in the premenstrual period (Table 5), which increases the importance of evaluating and monitoring women during menstruation, with monitoring of the intensity of the exercises [22].

Among the symptoms presented during the menstrual period, headache is frequent [2], related to low estrogen [23], and is more commonly reported in sedentary women, which confirms the results of the present study, and may be more intense on the first day, being severe on the first two days of menstruation [1]. Nausea, vomiting, pain in the lower limbs, diarrhea, dizziness, fatigue, and insomnia [2, 24] are also symptoms of the menstrual period. Sleep disorders are reported in the menstrual phase, such as poor quality, insomnia, and daytime sleepiness [25, 26]. Our results showed that sedentary women had more daytime sleepiness, which could also be associated with discouragement and irritability. Regarding the impact of the menstrual period on the training sessions performed by athletes and active women, the literature shows that 6, 812 women from seven countries, all physically active, presented changes in mood and anxiety, increased appetite, breast pain/sensitivity, and tiredness/fatigue, which compromised their training, with probabilities of absences both in training/sporting events and at work [8]. This again highlights the importance of systematic and organized monitoring of active women and athletes during the menstrual period.

For the premenstrual period, sedentary, active, and athlete women showed high intensity (above six points) for bad mood, excitability, and crying (Table 4), which

are confirmed by Saglam and Orsal, Fatemi et al., and Prazeres et al. when pointing out changes in appetite, weight gain, abdominal pain, back pain, low back pain, headache, edema, and tenderness in the breasts, nausea, constipation, anxiety, irritability, anger, fatigue, restlessness, mood swings, depression, and crying related to the premenstrual phase [4, 21, 27]. Notably, the comparison between active and sedentary women did not show differences in symptoms, and athletes established fewer symptoms than sedentary women (headache, neck and shoulder pain, difficulty concentrating, sleep, discouragement, sadness, and crying) and active women (low back pain, headache, difficulty concentrating, sleep, discouragement, sadness, irritability, and crying), which confirms the positive effects of sport also on the symptoms of the premenstrual period. In addition, the literature reports that well-trained women may have a greater inflammatory response to interleukin-6 (IL-6) in the premenstrual phase [22, 28], with greater inflammation when progesterone levels are elevated.

To alleviate the effects of symptoms related to the menstrual cycle, the participants reported the use of self-medication, teas, and hot compresses, without making reference to exercise, and not following the guidelines in the literature that suggest changes in lifestyle with the regular practice of physical activity, avoiding stress, good sleep habits, and increased intake of complex carbohydrates that increase levels of tryptophan, a precursor of serotonin [1, 27, 29]. However, Findlay et al. report that two thirds of athletes used self-medication [13], Costa et al. and Martins and Garlet showed positive effects of medicinal plants [30, 31], and Santos, Silva and Alfieri evidenced that the use of a cold compress was effective in the treatment of primary dysmenorrhea, with a greater reduction in the intensity of pain compared to a hot compress [32]. The present study has some limitations, such as memory bias, since the participants answered the online questionnaire according to their recall, and the low number of athletes, as many were not training normally during the COVID-19 pandemic and were excluded. However, it is believed that this study can contribute to better understanding of the symptoms presented in menstrual and premenstrual periods, to awaken the need for better monitoring of these symptoms and to foster care strategies for sedentary, active, and athlete women.

5. Conclusion

Athletes report fewer physical and mental symptoms in the menstrual and premenstrual periods when compared to active and sedentary women and talking about these symptoms is still taboo for the women who participated in the study. During the menstrual period, the main symptoms pointed out were pain, bad mood, discouragement, irritability, anxiety, anger, crying, and impact on ADLs and training. In the premenstrual period, headache, edema, bad mood, irritability, and crying were observed. In addition, worse symptoms were reported in the menstrual period when compared to the premenstrual period for sedentary, active, and athlete women.

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