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Influence of Personality on Pre-menstrual Syndrome in Athletes

Patrícia Aparecida Gaion and Lenamar Fiorese Vieira

Universidade Estadual de Maringá (Brazil)

The purpose of this study was to investigate the influence of personality on Premenstrual Syndrome (PMS) in athletes. The sample included 25 Brazilian athletes, between 18 and 49 years of age. A diary of PMS symptoms was used (based on the criteria from the *American College of Obstetricians and Gynecologist,* ACOG, 2000) and the Factorial Personality Inventory (Pasquali, Azevedo, & Ghesti, 1997). The *Fisher* exact test was used for data analysis, with $p < .05$. The athletes with PMS showed a strong need for performance, low need for assistance and introversión and very low need for change, while athletes without PMS demonstrated a very strong need for denial and strong needs for assistance, dominance, and persistence. There was a significant association between low denial (not submitting passively to external forces) and PMS ($p < .05$). It was concluded that certain personality traits may predispose athletes to react more intensely to needs and pressures produced by changes caused by the menstrual cycle, contributing to the onset of PMS.
Keywords: premenstrual syndrome, personality, athletes, menstrual cycle.

El objetivo de este estudio fue investigar la influencia de la personalidad en el síndrome premenstrual (SPM) en un grupo de atletas. La muestra incluía 25 atletas brasileños, con edades comprendidas entre los 18 y los 49 años. Se utilizó un diario de síntomas SPM (basado en el criterio del *Colegio americano de obstetricia y ginecología,* ACOG, 2000) y un Inventario factorial de personalidad (Pascquali, Azevedo y Ghesti, 1997). Para el análisis de datos se usó el test de *Fisher*, con un nivel de significación $p < .05$. Los atletas con SPM mostraron una alta necesidad de ejecución, baja necesidad de ayuda e introversión y muy baja necesidad de cambio; los atletas sin SPM mostraron una elevada necesidad de negación y una alta necesidad de ayuda, dominancia y persistencia. Los datos mostraron una asociación significativa entre baja negación (no sometimiento pasivo a obligaciones externas) y SPM ($p < .05$). Se concluye que algunos rasgos de personalidad predisponen a los atletas a rechazar en mayor medida necesidades y presiones producidas por cambios motivados por el ciclo menstrual, contribuyendo a la aparición del SPM.
Palabras clave: síndrome premenstrual, personalidad, atletas, ciclo menstrual.

This study is part of the author's Masters thesis, supervised by Prof. Dr. Lenamar Fiorese Vieira (co-author of the article), developed at the Post Graduate Associate Program in Physical Education at the State University of Maringá and State University of Londrina, Paraná, Brazil.

Correspondence concerning this article should be addressed to Patrícia Aparecida Gaion. Departamento de Educação Física da Universidade Estadual de Maringá. Av. Colombo, 5.790. Campus Universitário. 87.020-900 Paraná. (Brazil). E-mail: patriciagrd@yahoo.com.br

Premenstrual Syndrome (PMS) is a set of persistent and uncomfortable emotional and physical symptoms that negatively affect the behavior of women during their premenstrual period. Premenstrual symptoms may include, but are not limited to: depression, anxiety, irritability, confusion, explosive anger, isolation, breast pain, abdominal discomfort, edema, and others (ACOG, 2000).

Due to the diversity and frequency of the occurrence of these symptoms, it is difficult to establish a single cause for PMS (Valadares, Ferreira, Correa Filho, & Romano-Silva, 2006). It is known that hormonal changes resulting from the ovulatory-menstrual cycle play a fundamental role. However, studies have not succeeded in justifying the etiology of PMS only via hormonal means (Dickerson, Mazyck, & Hunter, 2003). This suggests that other factors, such as personality characteristics, may be related to PMS (Rubinow & Schmidt, 2006), since, despite that fact that most women basically experience the same hormonal fluctuations throughout the menstrual cycle (Dickerson et al., 2003), only some experience PMS. It is believed that these women may have vulnerable personality traits, which, in response to some triggering stimulus, bring premenstrual symptoms to the fore (Halbreich, 1997).

Some personality characteristics have been associated with how individuals perceive daily events. A study from Librán (2006) showed that neuroticism is one of the variables that most predisposes subjects to experience a low level of wellbeing. In terms of gender, it is known that both clinical variables and personality differences may predispose more women than men to some psychological disorders, such as depression (Carrillo, Rojo, & Staats, 2004).

This study was based on the perspective that biological changes resulting from the normal menstrual cycle interact with certain psychological components, which, in some women, may generate PMS. Thus, Murray's personology theory was used as a theoretical basis, being a theory that emphasizes the inter-relation of biological and psychological processes as determining factors in behavior.

According to Murray's personology theory, a segment of behavior can not be understood in isolation from the rest of the person in operation, indicating the existence of co-existing physiological processes, functionally linked, which accompany all psychological processes (Hall, Lindzey, & Campbell, 2000).

Murray (1951) emphasized that the dynamics of personality are characterized by relationships between needs and pressures. Necessity represents a force (in the region of the brain) that organizes behavior in such manner as to transform, in a certain direction, an existing, unsatisfactory situation into a final situation that calms the organism (Murray, 1938).

Needs operate under mutual influences, but there is a hierarchy among them, in which predominant needs are those which are most immediate (e.g. hunger, thirst, pain, etc.), meaning, those for which minimal satisfaction must occur in order for other needs to be met (Hall & Lindzey, 1973).

Just as needs represent significant determinants of behavior in a person, the concept of pressure represents the effective or significant determinants in the environment (Hall et al., 2000). Pressures are represented by objects or persons in the environment that arouse the subjects' needs, causing them to reach a state of tension until the needs are satisfied (Murray, 1938).

Based on the relationship between needs and pressures, one may infer that some personality traits may influence the appearance of PMS, either through the manner in which women experience the hormonal fluctuations produced by ovulatory menstrual cycles (primary needs), or even through the way in which they experience environmental pressures occurring during the premenstrual period. Thus, the manner in which each woman perceives and assess these situations determines the manner in which she will react (Straub, 2005).

Although there are other studies that investigated the association between personality traits and PMS (Halbreich, 1997; Montes & Vaz, 2003), as well as between personality traits and sports (Bäckmand, Kaprio, Kujala, & Sarna, 2001; Bara Filho, Ribeiro, & Garcia, 2005; Filaire, Le Scanff, Duche, & Lac, 1999; Vallance, Dunn, & Dunn, 2006), no studies were found in the literature regarding the association between personality traits and PMS in athletes.

It is possible that the lack of studies on this subject is due to the methodological rigor of this type of study, since, for a correct diagnosis of PMS, various rigorous criteria are necessary, which ends up excluding many participants from the sample. As such, the objective of this study was to investigate the influence of personality on PMS in Brazilian athletes from a city in the Northwest of Paraná, Brazil.

Method

Participants

The sample included all athletes, between 18 and 49 years of age, connected to the Secretary of Sports in a city in the Northwest of Paraná, Brazil, totaling 57 athletes. The following exclusion criteria were established: (a) not having a eumenorrheic menstrual cycle (normal menstrual cycles with intervals of 21 to 35 days – Creinin, Keverline, & Meyn, 2004); (b) having experienced menarche within less than two years; (c) use during data collection or during the three previous menstrual cycles, of hormonal contraceptives, drug therapies, illicit drugs and/or alcohol to excess (ACOG, 2000); (d) stopping training during the period of data collection; (e) failure to respond to the data collection instruments.

Of the 57 athletes studied, 8 were excluded for not having a eumenorrheic menstrual cycle, 12 for using hormonal contraceptives, 6 for stopping training during

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the data collection period, and 6 for lack of availability to complete the diaries during two consecutive menstrual cycles. Thus, the final sample was composed of 25 athletes from 10 different sports; Track and field (02 athletes), basketball (06 athletes), cycling (01 athletes), gymnastics (01 athletes), handball (07 athletes), karate (04 athletes), swimming (01 athletes), volleyball (01 athletes), beach volleyball (01 athletes) and chess (01 athletes).

The athletes had *Mdn*= 21 (6) years of age, *Mdn* = 13 (2) years of age at menarche, *Mdn* = 9 (6) years of sports practice and *Mdn* = 12 (8) hours of training weekly. Three athletes (12%) had already participated in international competitions, 19 athletes (76%) in national competitions, and 3 (12%) had competed at State level.

Instruments

The diary of symptoms based on the criteria from the *American College of Obstetricians and Gynecologist* (ACOG, 2000) was used for diagnosis of PMS, having been the most recommended method (Braverman, 2007; Rapkin, 2003). The diary was composed of emotional symptoms, such as depression (low self esteem/excessive sadness), anxiety, confusion, irritability, isolation, and explosive anger; and physical symptoms, such as breast tenderness, abdominal discomfort, headache and edema. Additionally, the "other(s)" option was added so that the athletes could report other symptoms not taken into consideration in the diary.

Over the course of two consecutive menstrual cycles, at the end of each day, the athletes had to indicate only those symptoms that were present throughout the day, and that had significantly interfered with their daily activities. The first day of completing the diary corresponded to the first day of the menstrual cycle (first day of menstruation).

PMS was diagnosed when the athlete had the combination of at least one symptom of one emotional and one physical symptom, necessarily occurring during the premenstrual period (five days prior to menstruation) and absent in the follicular period (sixth to tenth day of the menstrual cycle) (ACOG , 2000).

Regarding the reliability of the PMS symptoms diary, it is known that due to the influence of the psychological component, and lack of a reference standard to validate different biological definitions of PMS, there is still no consensus on a diagnostic criterion for PMS (Braverman, 2007; Dean, Borenstein, Knight, & Yonkers, 2006; Freeman, 2007). The protocol that has been considered a standard of reference for diagnosis of PMS is the daily record of symptoms during two or three menstrual cycles (Braverman, 2007; Rapkin, 2003). Although there are many forms for symptom diaries, no report of symptoms has been technically validated (Campagne & Campagne, 2007), but there is no evidence that affects the quality of the information. It is important to note the frequency of occurrence of symptoms, knowing how to differentiate the luteal phase (measured during the five days preceding the first day of menstruation) from the follicular phase of the menstrual cycle (period of six to 10 days following the first day of menstruation) (Freeman, 2007) . As such, since it was not possible to calculate the reliability of the PMS symptoms diary, we chose to be very careful about the criteria for exclusion of participants, clarifying all the symptoms and procedures regarding the diary; We conducted weekly monitoring with all the athletes and the diaries were analyzed by a gynecologist.

The Factor Personality Inventory (FPI) based on the *Edwards Personal Preference Schedule (EPPS),* an instrument developed by Allen L. Edwards in 1953 and revised in 1959, based on the theory of basic needs formulated by Murray (1938), which in 1997 was adapted and validated for Portuguese (Pasquali, Ghesti, & Azevedo, 1997) was used to trace the personality profiles of the athletes.

The IFP is intended to assess normal subjects in 15 needs or psychological motivations: assistance, intraception, physical affection, deference, affiliation, dominance, denial, performance, exhibition, aggression, order, persistence, change, autonomy and heterosexuality. The IFP's reliability indices are calculated on two scales: a scale for validity, the purpose of which is to verify if the subject responded appropriately to the inventor, and a desirability scale, which is intended to identify the subjects who attempted to present themselves in such a manner that others would like to see. For the test to be considered valid, it is necessary for the participants to obtain less than 30 points on the validity scale, and have a score no higher than the 70th percentile for social desirability.

For each of the 155 questions, each athlete gives an answer based on 7 point *Likert* scale, where 1 represented "not characteristic" and 7 represented "quite typical". The raw score for each need was given by the sum of their respective questions and percentile (Pasquali et. al., 1997).

The personality profile for each athlete was expressed according to the percentile of each need, in which values ≤ 25th percentile represented very weak needs, percentile scores between 30 and 40 percentile indicated weak needs, values above the 60th percentile to ≤ 70th percentile represented strong needs, and scores > 70th percentile indicated very strong needs .

Procedure

After approval of the study from the Permanent Committee on Ethics in Research with Human Subjects (COPEP, Comitê Permanente de Ética em Pesquisa Envolvendo Seres Humanos) at the University where the study was conducted (Opinion no. 064/2007), the sports coaches selected were asked for permission to carry out the study with the teams. Coaches and athletes were informed of the research procedures, and, after expressing interest, the athletes signed a free and informed consent form.

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Initially the IFP was applied, and, in sequence, the PMS symptoms diaries were distributed, which the athletes had to begin filling out starting at their next period. The IFP was applied and examined by a psychologist, and the analysis of the PMS symptoms diaries was conducted by a medical gynecologist. Diaries were exchanged weekly, by the researcher, at the athletes' training location, and data collection lasted for 20 weeks.

For analysis of age, age at menarche, years of sports practice, and weekly training hours, we used the median (*Mdn*) and interquartile amplitude. For the types of competition in which they had already participated and personality traits the absolute frequency and percentage *were used*. The *Fisher* Exact Test was applied for the association between PMS and personality traits. The significant adopted was $p < .05$. The athletes were divided into two groups according to presence (GSPM) or absence (Gs/SPM) of PMS. The GSPM was composed of 12 athletes and Gs/SPM of 13 athletes.

Results

It was possible to trace the athletes' personality profile with the IFP. No athlete was excluded from the analysis, since all had values of up to 30 points on the validity scale and less than 70th percentile for social desirability.

Figure 1 shows the personality profile (in percentile) of the athletes and due to the presence and absence of PMS. Values ≤ 25th percentile represent very weak needs, scores between the 30th and 40th percentile indicate weak needs, values above the 60th and ≤ the 70th percentile represent strong needs, and scores > the 70th percentile indicated very strong needs for the athletes.

Athletes with PMS showed strong needs for affiliation (65th percentile), performance (70th percentile) and autonomy (65th percentile); low need for assistance (30th percentile), intraception (35th percentile) and physical affection (30th percentile); very weak needs for aggression (between the 20 and 25 percentile), change (20th percentile) and heterosexuality (25th percentile). The athletes without PMS had very strong needs for affiliation (80th percentile) and denial (80th percentile), strong needs for assistance (percentile between 65 and 70), dominance (70th percentile), persistence (65th percentile) and autonomy (70th percentile); and low need for physical affection (30th percentile), aggression (35th percentile) and heterosexuality (percentile between 30 and 35).

Table 1 shows the distribution of athletes with and without PMS according to personality characteristics (having a cutoff percentile ≤ 25 to classify as very weak and needs > 70th percentile to categorize the needs as very strong). A significant association between PMS and low need for denial was verified ($p < .05$).

Discussion

This study enabled tracing and comparison of the personality profiles of athletes with and without PMS. It was noted that the personality profiles of athletes with PMS indicate that they like to establish strong friendship relationships (affiliation) without requiring a lot of protection and support (physical affection); they are less aggressive (aggression), but show little concern for helping others (assistance); they do not like changes in their routines (change), they have high standards for achievement (performance) and like to act freely (autonomy); they are practical and unimaginative

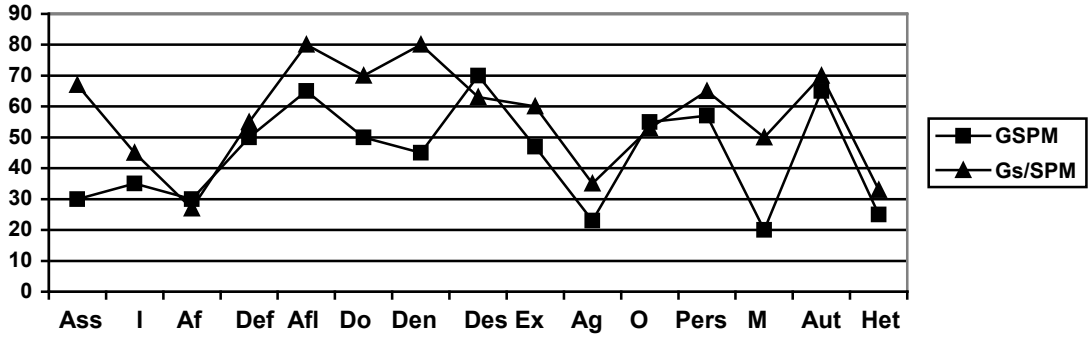

Figure 1. Personality profiles of athletes with and without premenstrual syndrome, where GSPM = group with pre-menstrual syndrome; Gs/SPM = group without premenstrual syndrome; Ass = Attendance; I = Intraception; Af = Physical affection; Def = Deference; Afl = Affiliation; Do = Dominance; Den = Denial; Des = Performance; Ex = Exhibition; Ag = Aggression; O = Order; Pers = Persistence; M = Change; Aut = Autonomy; Het = Heterosexuality.

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Table 1
Distribution of athletes with and without premenstrual syndrome according to personality traits

		Premenstrual Syndrome						
		Presence (n = 12)		Absence (n = 13)				
Needs		*f*	%	*F*	%	*f*	%	*P*
Assistance	Weak	5	62%	3	38%	8	100%	.315
	Strong	2	25%	6	75%	8	100%	
Intraception	Weak	3	43%	4	57%	7	100%	.576
	Strong	1	20%	4	80%	5	100%	
Pat	Weak	5	56%	4	44%	9	100%	1.000
	Strong	2	40%	3	60%	5	100%	
Deference	Weak	1	25%	3	75%	4	100%	1.000
	Strong	2	29%	5	71%	7	100%	
Affiliation	Weak	3	75%	1	25%	4	100%	.294
	Strong	5	38%	8	62%	13	100%	
Dominance	Weak	3	60%	2	40%	5	100%	.580
	Strong	3	33%	6	67%	9	100%	
Denial	Weak	3	100%	-	-	3	100%	.035*
	Strong	2	20%	8	80%	10	100%	
Performance	Weak	1	33%	2	67%	3	100%	1.000
	Strong	6	54%	5	46%	11	100%	
Exhibition	Weak	3	75%	1	25%	4	100%	.242
	Strong	2	29%	5	71%	7	100%	
Aggression	Weak	6	54%	5	46%	11	100%	1.000
	Strong	1	33%	2	67%	3	100%	
Order	Weak	2	33%	4	66%	6	100%	.058
	Strong	3	100%	-	-	3	100%	
Persistence	Weak	1	33%	2	67%	3	100%	.898
	Strong	3	38%	5	62%	8	100%	
Change	Weak	7	64%	4	36%	11	100%	.282
	Strong	1	33%	3	67%	4	100%	
Autonomy	Weak	4	57%	3	43%	7	100%	.315
	Strong	2	25%	6	75%	8	100%	
Heterosexuality	Weak	6	50%	6	50%	12	100%	1.000
	Strong	-	-	1	100%	1	100%	

Note: n = number of athletes; f = absolute frequency; % = percentage; * Significant difference $p < .05$; *Fisher's Exact Test*.

(intraception) and present a very weak need in respect to matters related to the opposite sex (heterosexuality).

On the other hand, the personality profiles of athletes without PMS show that they like to establish strong friendship relations (affiliation), while preferring to help others (assistance), and to receive affection (physical affection); they submit passively to external forces (denial), but also like control (dominance), especially without being too aggressive (aggression); They need to be independent (autonomy) and must complete any work they have started (persistence). They also show a weak need to address issues related to the opposite sex (heterosexuality).

Comparing the two personality profiles, it was observed that the greatest discrepancies in percentages between athletes with and without PMS were for the needs for denial, assistance, intraception, dominance, performance, persistence and change.

The main need that differentiated the athletes with PMS from those without was denial, since a greater proportion of athletes with PMS showed a weak need for denial and more athletes without PMS showed a strong need for denial. It is known that the need for denial is related to the desire or tendency to submit passively to external force, to admit inferiority, error or failure (Pasquali et al., 1997). Thus, as the way that individuals cognitively perceive their illness influences their behavior towards the disease (Rodrigues, Rosa, Moura, & Baptista, 2000), the strong need for denial in these athletes without PMS helps these athletes to accept these changes in their body, not turning their symptoms into uncontrolled behaviors.

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On the other hand, athletes with PMS have greater difficult in passively accepting the hormonal changes triggered by the menstrual cycle, and this behavior is reinforced by other needs presented by the athletes with PMS, such as performance.

These athletes present a strong need for performance, while athletes without PMS present median values for this characteristic. Always wanting to overcome obstacles and maintain high standards for achievement, athletes with PMS are more sensitive to any alteration that leaves them outside of their "ideal standard", such as the hormonal alterations in their menstrual cycle.

It is interesting to note that the characteristics that value reaching high levels of achievement, such as perfectionism, were associated, in other studies, with the presence of certain disorders, such as anorexia nervosa (Bachner-Melman, Zohar, Ebstein, Elizur, & Constantini, 2006). Vallance et al., (2006), in a study with 229 hockey players, observed a relationship between perfectionism and anger, since individuals with a high degree of perfectionism were particularly prone to experience stress and negative affects when they experienced failure.

These studies reinforce our findings related to the strong need for performance, since athletes with perfectionist leanings may be more likely to develop certain disorders, since they demonstrate a strong need to always do well, not admitting inferiority and becoming stressed more easily in situations in which they are not in their best physical or emotional state to achieve their goals.

The weak need for change in athletes with PMS reinforces such behaviors, while athletes without PMS have median values in this category. The very weak need for change indicates that athletes with PMS prefer a fixed routine, and, thus, do not like changes in their lives (Pasquali et al., 1997). Thus, internal changes caused by their menstrual cycle, especially hormonal changes related to the premenstrual period (Doyle, Ewald, & Ewald, 2007), are perceived in a more intense and negative manner by these athletes (GSPM) than for those who do not show this need as very low (Gs/SPM).

Another characteristic that differentiated athletes with and without PMS was the introversion that athletes with PSM demonstrate low intraception, while athletes without PMS present median values for this variable. This need indicates that athletes with PMS are less introspective and imaginative, and this can cause them, by not having the habit of examining their own feelings and intentions, or to consider the perspective others, when they experience mood swings, to act out of control, projecting their bad mood on others around them (Halbreich, Borenstein, Pearlstein, & Kahn, 2003).

Supporting this issue, Montes and Vaz (2003), in a study of 43 university students 18-35 years of age, verified through the Zulliger (Z-Test collectively) technique that women with PMS tend to emotionally react more intensely and tend to lose emotional control at a higher rate than women without PMS.

It was observed that the athletes without PMS showed some strong needs (assistance, dominance and persistence) that distinguish them from athletes with PMS. In case of the need for assistance, while the athletes without PMS showed high scores, athletes with PMS had values considered lower for assistance. So, while athletes with PMS are not very interested in giving emotional support or help defenseless others (Pasquali et al., 1997), athletes without PMS are characterized by desires and feelings of pity, compassion and kindness toward others, which indicates a greater ability to considering matters from another's perspective, and thus to better control the changes caused by the menstrual cycle.

In the case of the need for dominance, athletes without PMS showed a strong need, while athletes with PMS showed median values for the need for dominance. This need is characterized by feelings of self-confidence and desire to control the environment (Murray, 1938), which also favors greater self-control, thus causing athletes without PMS to not allow themselves be affected by hormonal changes caused by the menstrual cycle.

Furthermore, athletes without PMS also had high scores for the need for persistence, while athletes without PMS had median scores. The need for persistence is characterized by perseverance in the face of adversities to reach a goal, which enables these athletes to more persistent in attempting to maintain well-being.

Despite the originality of the study, some methodological limitations must be mentioned. One of the limitations encountered was in relation to the number of participants in the study sample; although the entire population of athletes from the city in which the study was conducted were investigated, the diagnostic criteria for PMS necessitated a reduction in the total number of athletes studied. It was not possible to include athletes from other cities, since this would render the diary follow-up necessary for the PMS diagnostic infeasible. However, despite the reduction, the sample still represented nearly 50% of the total population of athletes in the city, highlighting that athletes that were excluded did not meet the criteria necessary for correct diagnosis of PMS, for which they could not be included in the study.

Another limitation in this article is that the results can not be generalized for the population of athletes in general, since the study was limited to athletes from one city in Southern Brazil. However, given the lack of studies on the influence of personality on PMS in athletes, this study was intended to contribute to the literature to clarify this matter, and, especially to encourage further research on the topic with professional athletes.

Conclusion

Thus, we concluded that certain personality traits may contribute to the perception in athletes of internal changes

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related to the premenstrual period (primary needs) and external changes (environmental pressures) as negative, thus favoring the development of PMS. Such findings show that in order to understand athletic performance in female athletes, integrated work from the technical commission is needed, that goes beyond the observations of biological alterations (as is the case with the hormonal alterations that contribute to the appearance of PMS symptoms).

In this study, we were able to demonstrate that behavior in the premenstrual period is affected by some psychological components, especially the difficulty for athletes with PMS in submitting to external forces, admitting inferiority, and dealing with defeat or failure (denial).

These findings highlight the need for the work of sports psychologists in professional teams, for the purpose of assisting athletes in resolving their conflicts, meeting their needs, and overcoming environmental pressures in an integrated manner.

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