



Menstrual migraine in university students

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Introduction

Migraine is a chronic neurological disease that mostly affects women, mainly due to hormonal fluctuations during the menstrual cycle. It is estimated that menstrual migraine (MM) affects around 6% of women in reproductive age and, despite this, remains underdiagnosed, mostly due to lack of epidemiological data.

Objective

This study aims to analyze the prevalence and impacts of menstrual migraine in students at a university in the south of Santa Catarina, Brazil.

Methods

We developed a cross-sectional analytical observational study carried out with 613 female students from a university in the south of Santa Catarina. A self-administered online questionnaire was created based on the ICHD-3 migraine diagnostic criteria and the HIT-6 questionnaire, internationally validated for measuring the impacts of headaches. Furthermore, personal and sociodemographic data were collected.

Results

A prevalence of approximately 12% (n=71) of female students who met the criteria for MM was found among the 613 participants, with a mean age of 24.87 ± 6.96 years. Of these, 50.7% were using hormonal contraceptive methods, mostly combined oral contraceptives with hormone-free interval. Regarding the impacts generated by MM, 69% of the participants had a severe impact on functionality, according to the HIT-6 questionnaire, and 43.6% reported abstaining from their leisure activities approximately 1 to 4 times in the last year due to MM.

Conclusion

The results suggest that the prevalence of MM is important among the studied population and contributes to severe impacts on daily activities.



Introduction

Migraine is a neurological disorder with significant disabling potential and it affects more women than men, with women being up to three times more likely to experience it (1,2). This disparity occurs due to the cyclical hormonal fluctuations in post-pubertal females, particularly the abrupt drop in estrogen levels that precedes menstruation (3,4). In contrast, menstrual migraine (MM) is characterized by crisis that have a strong association with the perimenstrual period, occurring exclusively during this time or also manifesting at other points in the cycle (2). Its occurrence is especially frequent in young women, starting after puberty and peaking in frequency around the age of 30 (3–5).

Regarding epidemiology, the estimated prevalence of MM is 6%, although it can reach up to 22% among women already diagnosed with migraine in some population-based studies (4,6). The most common occurrence of MM happens in the form of attacks without aura, which can also be unrelated to the menstrual cycle, characterizing the subtype known as menstrually related migraine (MRM) (3,5). In this subtype, MM manifests with a higher overall disease burden, as those who are affected, also experience attacks outside the perimenstrual window (7,8).

Regarding its impacts, among young adult women, migraine is the leading cause of lost healthy years of life, even though it does not result in premature death (9,10). Furthermore, MM attacks tend to be more debilitating, featuring longer duration and reduced responsiveness to treatments compared to those occurring in other phases of the menstrual cycle (3,7).

Despite the significant impact on quality of life for women with MM and its relevance in medical literature, its identification remains limited, and many patients continue to be underdiagnosed. This occurs partly due to a lack of awareness about the condition's importance and the difficulty patients face in associating migraine attacks with menstrual cycle phases.

Therefore, it is essential to determine how frequently MM occurs and assess its repercussions to contribute to a more comprehensive understanding of the disorder. For this reason, the present study analyzed the prevalence, associated factors, and impacts of MM on quality of life among students at a university in southern Santa Catarina.

Methods

Study Design

This was a cross-sectional analytical observational study. This article followed the recommendations and is structured in accordance with the STROBE checklist.

Population

To assess the presence of MM, female students aged 18 or older enrolled in any in-person course at a university in the southern region of Santa Catarina were included.

Sample

The sample consisted of 613 female students aged 18 and older enrolled at the University of Southern Santa Catarina, located in Criciúma, Santa Catarina, Brazil, during the first semester of 2024.

Ethical Aspects

This study was approved by the Research Ethics Committee of the University of Southern Santa Catarina under protocol number 6,678,434. Prior to the study, participants signed the Informed Consent Form.

Data Collection

The questionnaires were made available through Google Forms and distributed to university students via social media and institutional email. Validated questionnaires were used for data collection. The characterization of menstrual migraine was based on the criteria defined by the third edition of the International Classification of Headache Disorders (ICHD-3) (11), the criteria were developed by the Classification Committee of the International Headache Society (IHS) and adapted for the questionnaire format.

The analysis followed the criteria defined by ICHD-3 for the identification of MM, which requires the occurrence of migraine attacks associated with the menstrual cycle in at least 3 consecutive menstrual cycles. The attacks can occur exclusively between 2 days before and 3 days after the onset of menstrual flow, characterizing pure menstrual migraine, and if they also occur in other phases of the menstrual cycle, it is characterized as MRM. Only the participants who reported all the classification criteria for MM were included in the final analysis.

Furthermore, to determine the impacts generated by MM on the functionality of the affected participant, the full HIT-6 questionnaire was used (12), in its version translated and validated to Portuguese (13,14). This tool was developed by an international team of headache specialists, led by John B. Kosinski and Michael W. Drummond, and it proves to be efficient and reliable for the tracking and assessment of headaches (12).

The questionnaire consists of 6 questions that cover important areas to assess the impact of headaches,



including pain, limitations in social role, cognitive functioning, psychological distress, and vitality (12,13). The possible answers for each question are: "never," which corresponds to 6 points; "rarely," which corresponds to 8 points; "sometimes," which corresponds to 10 points; "very frequently," which corresponds to 11 points; and "always," which corresponds to 13 points.

The result of the questionnaire is obtained by summing the points of the 6 questions, ranging from 36 points, which indicates no impact, to 76 points, representing the greatest impact (15). According to the functioning of the tool, a score of 60 or more points indicates a severe impact caused by the headache on the patient's life, suggesting that the condition significantly affects the participant's social, cognitive, and emotional activities. Scores between 56 and 59 points correspond to a substantial impact, 50 to 55 points indicate some impact, and 49 or fewer points indicate little, or no impact caused by the headache.

In addition to the aforementioned questionnaires, information was also collected on the students' sociodemographic profiles and personal data related to the menstrual cycle. These pieces of information included variables such as sex, age, hormonal contraceptive method, presence of headaches, perception of menstrual bleeding or menstrual cycle milestones, and the pattern of menstrual cycle regularity.

Regarding the characteristics of the headache, questions were included about the previous diagnosis of migraine and the use of prophylactic medications for the episodes, when applicable. After the characterization of menstrual migraine, the number of these migraine episodes experienced in the past year was also questioned.

Finally, information was collected on how the episodes of MM directly affected the participants' involvement in academic, work, and leisure activities. For this, the number of episodes in the last 12 months in which the participant abstained from these commitments due to MM was questioned, in addition to investigating whether this limitation of activities occurred in all menstrual cycles during the period.

Statistical Analysis

The data collected were analyzed with the aid of the IBM Statistical Package for the Social Sciences (SPSS) software, version 25.0. Quantitative variables were expressed as mean and standard deviation, and qualitative variables were expressed as frequency and percentage.

Statistical tests were performed with a significance level $\alpha = 0.05$ and, therefore, a confidence of 95%. Regarding data analysis, the investigation of the distribution of the variable age in relation to normality was carried

out through the application of the Shapiro-Wilk test and the investigation of the existence of an association between qualitative variables was carried out through the application of Pearson's Chi-square test and Likelihood Ratio. The comparison of the mean age of women who met and of those who did not meet criteria for MM was performed using the Mann-Whitney U test.

Results

The study included 613 students from the in-person courses of the higher education institution who responded to the questionnaire. Among the participants, a prevalence of about 11.6% (n=71) of female students who met the criteria for MM was found (Table 1).

Regarding the age group, the total sample (n=613) had a mean age of 24.44 ± 7.48 years. Of these, 57.1% reported the use of hormonal contraception, the majority (54.6%) using COC with a break and 19.1% using COC without a break. In addition, 63% (n=386) reported having some type of headache, and only 11.6% met criteria for classification of MM (Table 1).

Table 1. Profile of female students from a university in southern Santa Catarina in the first semester of 2024, participants in the research

	Means \pm DP, n (%) n = 613
Age (years)	24.44 \pm 7.48
Use of hormonal contraceptive method	
Yes	350 (57.1)
No	263 (42.9)
Type of hormonal contraceptive method used	
COC with break*	191 (54.6)
COC without break*	67 (19.1)
Hormonal IUD **	48 (13.7)
Subdermal implant	16 (4.6)
Minipill or Progestin-only pill	10 (2.9)
Monthly Injection	9 (2.6)
Quarterly Injection	6 (1.7)
Vaginal Ring	2 (0.6)
Transdermal Patch	1 (0.3)
Omitted (do not use hormonal methods)	263
Presence of cephalgia	
Yes	386 (63.0)
No	227 (37.0)
Presence of menstrual migraine	
Yes	71 (11.6)
No	542 (88.4)

Source: research data, 2024.

*COC – Combined oral contraceptives

**IUD - Intrauterine device



We did not obtain incomplete questionnaires or criteria for excluding participants able to answer the survey. Participants who did not present noticeable menstrual bleeding or who did not meet the criteria for MM, did not follow the questionnaire from the initial screening.

Among the 71 students who met the criteria for MM, a mean age of 24.87 ± 6.96 years was found, with a higher prevalence of participants in the age group of 18 to 22 years (52.1%), as shown in Table 2. The presence of aura, characterized by the participants as visual, sensory, or motor alterations that accompanied the crises, was evidenced in 42.3% (n=30) of the students with MM.

In addition, regarding the MM-type subtypes, 71.8% (n=51) reported the presence of migraine between 2 days before and 3 days after the beginning of menstruation, but also at other times of the cycle, characterizing the MRM subtype, and only 28.2% (n=20) had the MMP subtype (Table 2).

Table 2. Characterization of female students (n = 71) from a university in southern Santa Catarina in the first semester of 2024 who are participants in the research and have menstrual migraines

	Means ± DP
Age (years)	24.87 ± 6.96
Age Brackets (years)	Means (n %)
18 to 22	37 (52.1)
23 to 27	15 (21.3)
28 to 32	8 (11.2)
33 to 37	5 (7.0)
38 or more	6 (8.4)
Migraine Crisis with presence of aura	
Yes	30 (42.3)
No	41 (57.7)
MM-type subtypes	
Pure Menstrual Migraine	20 (28.2)
Migraine Related to Menstruation	51 (71.8)
Use of hormonal contraceptive method	
Yes	36 (50.7)
No	35 (49.3)
Which method	
COC with break*	17 (47.2)
COC without break*	8 (22.2)
Hormonal IUD**	7 (19.4)
Monthly Injection	2 (5.6)
Vaginal Ring	1 (2.8)
Subdermal implant	1 (2.8)
Regular Cycles	
Yes	71 (100)
No	0 (0.0)

Source: research data, 2024.

*COC – Combined oral contraceptives

**IUD - Intrauterine device

Regarding the use of hormonal contraceptive methods, it was found that 49.3% (n=35) of the participants with MM did not use hormonal methods, while 50.7% (n=36) used hormonal contraception. Among the hormonal contraceptive users, 47.2% (n=17) used COC with a break, while 22.2% (n=8) used COC without a break (Table 2). The likelihood ratio test showed a statistically significant relationship between the use of hormonal contraceptive methods and the method used ($p < 0.001$) for the presence of MM. Next, the residual analysis indicated that the hormonal contraceptive methods most associated with this relationship are COC with break and COC without break, as expressed in Table 3.

Table 3. Relationship between the use of hormonal contraceptive method and the type of method used in the presence of menstrual migraine among female students at a university in southern Santa Catarina in the first semester of 2024, participants in the research

Type of hormonal method	Use of hormonal contraceptive method		Value-p	Adjusted residue
	Yes (n = 36)	No (n = 35)		
	n (%)	n (%)	< 0.001‡	
COC with break*	17 (47.2)	17 (49.3)		4.7†
COC without break*	8 (22.2)	8 (22.9)		3†
Hormonal IUD **	7 (19.4)	7 (20.0)		2.7†
Monthly Injection	2 (5.6)	2 (5.7)		1†
Vaginal Ring	1 (2.8)	1 (2.9)		1†
Subdermal implant	1 (2.8)	1 (2.9)		1†
Progestin-only pill	0 (0.0)	0 (0.0)		
Transdermal Patch	0 (0.0)	0 (0.0)		
Quarterly Injection	0 (0.0)	0 (0.0)		

Source: research data, 2024.

*COC – Combined oral contraceptives

**IUD - Intrauterine device

‡Value obtained after applying the Likelihood Ratio test

†Value obtained after residue analysis

Despite this, for the complete sample, it was found that there is no statistically significant impact between the presence of menstrual migraine and the use of hormonal contraceptive method (p -value 0.247), as well as the type of method (p -value 0.384). There was also no evidence of a statistically significant difference between the mean ages of women who met and did not meet criteria for MM (p -value 0.190) (Table 4).



Table 4. Relationship between age, use of hormonal contraceptive method, type of method and the presence of menstrual migraine in the students at a university in the south of Santa Catarina in the first semester of 2024, participants in the research

	MM Presence*		P-Value
	Yes n = 71	No n = 542	
Age (years)	24.87 ± 6.963	24.39 ± 7.544	0.190‡
Use of hormonal contraceptive method			
Yes	36 (50.7)	314 (57.9)	0.247†
No	35 (49.3)	228 (42.1)	
Which method			
COC with break**	17 (47.2)	174 (55.4)	0.384††
COC without break**	8 (22.2)	59 (18.8)	
Hormonal IUD***	7 (19.4)	41 (13.1)	
Monthly Injection	2 (5.6)	7 (2.2)	
Vaginal Ring	1 (2.8)	1 (0.3)	
Subdermal implant	1 (2.8)	15 (4.8)	
Progestin-only pill	0 (0.0)	10 (3.2)	
Transdermal Patch	0 (0.0)	1 (0.3)	
Quarterly Injection	0 (0.0)	6 (1.9)	

Source: survey data, 2024.

*MM – menstrual migraine

**ACO – Combined Oral Contraceptive

IUD – Intrauterine Device

‡Value obtained after applying the Mann-Whitney U test.

†Value obtained after applying the Chi-square test

††Value obtained after applying the Likelihood Ratio test

Regarding the impacts caused by migraine on participation in academic and work activities in the last year, 26.8% (n=19) reported that they did not have to abstain from their activities once and 29.6% (n=21) reported that they failed to attend these appointments only once or twice. Regarding leisure activities, 43.6% (n=31) reported abstention in 1 to 4 episodes and 32.5% (n=23) in 5 to 8 episodes in the last year (Table 5).

Regarding the evaluation of the participants' functionality, the application of the HIT-6 test resulted in sums that represent a severe impact in 69% (n=49), a substantial impact in 15.5% (n=11) and some impact in 15.5% of the participants, as described in Table 5. None of the participants obtained a score that indicated no impact caused by headache.

Table 5. Characterization of the profile of impacts of menstrual migraine on the lives of students at a university in southern Santa Catarina in the first semester of 2024, participants in the research

	Means ± DP, n (%) n = 71
Absence from academic activities or work due to MM* in the last year.	
Not once	19 (26.8)
1 or 2	21 (29.6)
3 or 4	14 (19.7)
5 or 6	6 (8.5)
7 or 8	3 (4.2)
9 to 11	6 (8.5)
12 or more	2 (2.8)
Did MM* refrain from working or attending classes happen during every cycle of the year?	
Yes	22 (31.0)
No	31 (43.7)
Didn't happen	18 (25.4)
Abstention from leisure activities due to MM* in the last year.	
Not once	6 (8.5)
1 or 2	16 (22.5)
3 or 4	15 (21.1)
5 or 6	13 (18.3)
7 or 8	10 (14.1)
9 to 11	5 (7.0)
12 or more	6 (8.5)
Did MM* refrain from leisure activities happen during every cycle of the year?	
Yes	25 (35.2)
No	40 (56.3)
Didn't happen	6 (8.5)
HIT-6**	
Some impact (50-55)	11 (15.5)
Substantial impact (56-59)	11 (15.5)
Severe impact (60 or more)	49 (69.0)

Source: survey data, 2024.

*MM – menstrual migraine

**ACO – Combined Oral Contraceptive

IUD – Intrauterine Device

‡Value obtained after applying the Mann-Whitney U test.

†Value obtained after applying the Chi-square test

††Value obtained after applying the Likelihood Ratio test



Discussion

The present study sought to evaluate the prevalence of MM and its impacts on the quality of life and daily activities of affected women. The study showed that 12% of the students evaluated are affected by this condition, a fact that is in line with what had already been described in the literature, since the prevalence of MM for the general population is estimated at around 6 to 22% (4,6).

Despite this, previous population studies, conducted with samples like the present work, found higher percentages of MM presence among the participants. Carman et al. (16) found a rate of 25.9% of young people with MM among adolescents in Turkey (16). Moreover, a study conducted with Spanish university students found a percentage of 45.15% of women with MM (17). This disparity may be related to differences in the diagnostic criteria used, sample characteristics, and study methodology, given that cultural, social, and temporal factors can be important in the variation of MM prevalence among different populations (3,5,8).

Regarding the frequency of MM by age group, the research found a predominance of the condition among participants aged 18 to 22. This predominance in young women has already been evidenced by other authors, such as Fernández-Martínez et al. (17), who found an average age of 20 years for the occurrence of MM among university students. This higher incidence of MM in young women may be related to the abrupt physiological fluctuations in estrogen levels that occur at these ages, due to the cyclical hormonal fluctuations characteristic of the menarche (17,18). In addition, it was found that 50.7% of the students with MM were using hormonal contraceptive methods, with the majority using COC with a break between cycles. These data corroborate the evidence that the administration of combined COCs without a break contributes to a significant decrease in the frequency of MM crises (18,19).

Moreover, this trend may indicate that estrogen supplementation during the breaks could also play a role in preventing migraine attacks, as already described in the literature (18,19). This relationship can be explained by the greater hormonal fluctuations of estrogen in women who use COC with a break compared to those who use it without a break, since estrogen withdrawal is a fundamental component of the pathophysiology of the MM (5,18,19).

Finally, according to the HIT-6 questionnaire, it was found that 69% of the participants obtained a score indicating a severe impact of MM on functionality, with 43.6% reporting the need to refrain from their leisure activities about 1 to 4 times in the past year due to MM. This significant impact on the quality of life of the affected women is similar to

what has already been reported in other studies. Pavlović et al. (7) also found, through the application of the HIT-6, that women with MM scored higher on the test and had greater impairment in their ability to work compared to those with non-menstrual migraine (7).

Similarly, Casteren et al. (20), suggested that attacks during the perimenstrual period were linked to longer durations, higher intensity, and a higher chance of recurrence than attacks that occurred outside of this window (20). It is believed that the drop in estrogen levels, characteristic of the perimenstrual period, is responsible for the exacerbated sensitization of the pathophysiological mechanisms of migraine involving vascular neuroinflammation and the trigeminoautonomic system, triggering crises with a greater impact (3).

Limitations and Strengths

One of the main limitations of the present study is related to the fact that its cross-sectional design was conducted at a single university, which determined a limited sample size, a disparity between the total number of participants and those with MM, and a predominant young age group. In addition, the information was collected through online questionnaires and retrospective self-reports, which may have impaired the accuracy of the results obtained. In addition, the participants were not asked about comorbidities that could potentially influence the occurrence of migraine.

However, despite the aforementioned limitations, this study provides exploratory information on a comorbidity that has been little studied among Brazilian women and highlights its relevance and impact on the lives of this population. In this context, this work offers a contribution to the field of neurology, deepening the understanding of menstrual migraine, as well as interdisciplinarity with the area of gynecology and obstetrics. From this perspective, the study highlights the need for greater knowledge about MM by the entire medical community, in order to overcome underdiagnosis and provide greater quality of life to patients.

Conclusion

It was concluded that the prevalence of menstrual migraine was 11.6%, especially among women aged 18 to 22 years and using COC with a break. In addition, 69% of women with MM reported severe impact on their daily activities, which reinforces the need for proper diagnosis and recognition of this condition. In this sense, we suggest the development of larger, multicenter studies to deepen knowledge about menstrual migraine and recognize its impact, aiming at early diagnosis and effective management.



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