



# Does menstruation-related headache occur exclusively in women with migraine?

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## Abstract

To determine the relation between headache and menstruation in women with migraine and the use of estrogen by these women. This was a prospective, cross-sectional, observational study with group comparison, using non-random sample and convenience. We interviewed 79 women diagnosed with migraine or tension-type headache (TTH), according to the ICHD-3, regarding the relation between headache and menstruation. Of the 79 women with headache, 60 (76%) had migraine and 19 (24%) had episodic TTH. The most frequent subtype of migraine was without aura (54/60, 90%). The age ranged from 18 to 42 years, with an average of  $22.6 \pm 4.1$  years. Migraine affected women aged  $22.4 \pm 3.6$  years, whereas in TTH, the age was  $23.0 \pm 5.4$  years. Menstruation-related headache occurred in 41.9% of women with migraine and in only 6.3% of those with TTH. These differences were significant ( $\chi^2 = 5.2$ ;  $p = 0.022$ ). Of the five women diagnosed with migraine with aura, two used estrogen. Menstruation-related headache predominates in women with migraine and often women with migraine with aura use estrogen.

**Keywords** Migraine · Menstruation · Estrogen · Triggering factors

## Introduction

In primary headaches, several factors may trigger or aggravate headache attacks, such as stress, odors, prolonged fasting, sleep deprivation or excess, physical exercise, alcohol intake, certain foods and menstruation [1].

Usually, it is observed in women with migraine that menstruation is one of the main triggers of headache in any form of migraine [2, 3]. However, in the appendix of International Classification of Headache Disorders, Third Edition (ICHD-3) three further subtypes of migraine without aura are proposed: (1) pure menstrual migraine in which the headache attacks occur exclusively during menstruation and at no other time of the cycle; (2) menstrual-related migraine, in which headache attacks occur during menstruation and additionally at other times of the cycle; (3) non-menstrual migraine since headache does not fulfil the criteria for either of these two situations [4].

Despite its relevance, the association between headache and menstruation in women with migraine is poorly studied. Therefore, this relationship is not yet characterized as a diagnostic criterion for the menstrual migraine subtype to be included in the classification of headache.

## Patients and methods

### Study design and patients

A prospective, cross-sectional, group-comparative study was conducted on a non-random and convenience sampling which was selected from medical students enrolled in a public university and invited to participate in this research. The sample consisted of 79 women diagnosed with primary headaches (60 with migraine and 19 with a tension-type headache—TTH), according to the ICHD-3 criteria [4].

### Inclusion and exclusion criteria

The study included women aged 18–42 years with a diagnosis of primary headaches according to the ICHD-3 criteria

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[4] who agreed to undergo an interview. Those who reported daily or near-daily headache, no headache in the last 12 months, association of two or more primary headaches, concomitantly or at different times, secondary headaches, using any drug other than estrogen, diagnosed with other diseases and pregnant women were excluded.

## Data collection

After fulfilling the inclusion and exclusion criteria, a structured interview was conducted by the first researcher, based on a questionnaire to diagnose the presence and type of primary headache and its relation to menstruation in the last 3 months.

## Statistical analysis

Once the information was organized in a database, the Statistical Package for Social Sciences (SPSS™) version 17.0 was used for statistical analysis. The Chi-square test with Yates correction was used for the difference of means of unpaired samples, with a significance level of 0.05.

## Ethical aspects

This study was approved by the Ethics in Research Involving Human Subjects Committee at the Federal University of Piauí, protocol number 3,071,611 and the National Ethics in Research System, registry number 02133918.0.0000.5669, on December 11, 2018. Data were collected from March to May 2019 and all volunteers signed the Informed Consent Form.

## Results

The study sample consisted of 79 women who reported headache and was characterized by an average age of  $22.6 \pm 4.1$  years, ranging from 18 to 42 years. Migraine affected women aged  $22.4 \pm 3.6$  years, while in TTH, the age was  $23.0 \pm 5.4$  years. These differences were not significant ( $p=0.931$ ), as shown in Table 1.

Upon establishing the diagnosis of headache, it was found that 60 (76%) women had migraine and 19 (24%) fulfilled the criteria for episodic TTH. Among migraine, the most frequent was migraine without aura (54/60; 90%), as shown in Table 2.

Among the 43 women with migraine who had a menstrual cycle, in 18 (41.9%) headache was related to menstruation and only 1 out of 16 patients with TTH presented the same characteristic. Menstruation-related headache predominated in women with migraine. These differences were statistically

**Table 1** Distribution of age according to diagnosis of 60 patients with migraine and 19 with tension-type headache

Variables	Diagnosis		p-value
	Migraine	TTH	
Age (years)			0.931*
Average (SD)	22.4 (3.6)	23.0 (5.4)	
Median	22.0	22.0	
Variation	18–37	18–42	

TTH tension-type headache

\* $p$ -value based on Chi-square test for mean difference of unpaired samples

**Table 2** Distribution of established diagnoses for 79 women with headache

Categories	Frequency	
	<i>N</i>	%
Migraine	60	76.0
Without aura*	55	91.7
With aura*	5	8.3
Tension-type headache	19	24.0

\*Calculated percentages of the total of the respective category

significant ( $\chi^2 = 5.2$ ;  $p = 0.022$ ). Two of the five women diagnosed with migraine with aura used estrogen.

## Discussion

In this study, we investigated the relation between menstruation and headache in patients with the menstrual cycle, comparing two groups of volunteers diagnosed with migraine or TTH. Therefore, to obtain valid and consistent data, a correct diagnosis was established for each headache, according to the ICHD-3 criteria [4]. The selection modality was female medical students. All met the inclusion criteria. All 79 women diagnosed with primary headaches who were enrolled in medical school were interviewed and this justifies the sample size. In addition, a minority had tension-type headache and this was the main limitation of our study.

All women were young, as the sample consisted of young students in the early years of medical school. It was found that 76% of women filled diagnostic criteria for migraine, with a predominance of migraine without aura (Table 2). Some studies have shown that migraine affects approximately 20% of women after the pubertal period, with increased prevalence in gynecological age, showing the action of female sex hormones [2, 5, 6].

Our study showed that most women have no headache during menstruation, but when headache is present, these

**Table 3** Distribution of 79 women interviewed, according to diagnosis, estrogen use and relationship of headache to menstruation

Variables	Categories	Diagnosis		<i>p</i> value
		Migraine <i>n</i> (%)	TTH <i>n</i> (%)	
Estrogen use	No	31 (51.7)	12 (63.2)	0.540
	Yes	29 (48.3) <sup>a</sup>	7 (36.8)	
Presence of menstrual cycle	No	17 (28.3) <sup>b</sup>	3 (15.8) <sup>b</sup>	0.428
	Yes	43 (71.7)	16 (84.2)	
Relation of headache to menstruation	None	25 (58.1)	15 (93.7)	<b>0.022</b>
	During menstrual period	18 (41.9)	1 (6.3)	

Significance *p* value is in bold ( $p < 0.05$ )

TTH tension-type headache

<sup>a</sup>Two patients had migraine with aura

<sup>b</sup>Continuous use of estrogen

women commonly have migraine (Table 3). That result did not agree with the study by Karli et al. which demonstrated the occurrence of headache during menstruation in 54.3% of women with migraine [7]. Our findings show that there is a relation between migraine and menstrual cycle and they are confirmed by previous studies, in which women with migraine have a higher risk of a menstrual headache than those with TTH. However, there is a significant improvement in migraine symptoms after menopause [2, 8–10].

In Table 3, we demonstrate that occurrence of headache during the menstrual period was predominantly in women with migraine. This finding refers to menstruation as a trigger for migraine attacks, as has been shown in other studies comparing migraine with TTH [3, 7].

Most women believe that menstrual headache is inherent in the menstrual period, but most of the time, it is just the manifestation of migraine. In menstrual migraine, headache attacks have a longer duration, intensity, association with other symptoms, and they are less responsive to therapy than in non-menstrual migraine. In addition, menstrual migraine affects many areas of a woman's life, such as work, leisure, sports, and her interpersonal relationships. Thus, proper diagnosis and management of this disease are very important [6, 9–11].

There are evidences that hormonal fluctuation is involved in the pathophysiological mechanisms of menstrual migraine [12, 13]. Research on the relation between migraine and continuous contraceptive use showed that these women had fewer headaches during the menstrual period than those on non-continuous use [14].

Our study showed that of the five women diagnosed with migraine with aura, two used estrogen and this was a worrisome finding. It is reported in the literature that the use of estrogen-based oral contraceptives in women with migraine with aura increases the risk of cerebrovascular disease, especially stroke. This risk is higher in women with other risk

factors such as hypertension, obesity, smoking and others, although some studies show that low doses have no significant effect [9, 10].

These women can replace estrogen with progesterone, as some studies have shown the efficacy of progesterone-only contraceptives, significantly reducing intensity, duration and degree of disability caused by pain without increasing thromboembolic and cardiovascular risk [10, 12].

It is important that gynecologists, neurologists and general practitioners know the relation between menstruation and headache in women with menstrual cycles since both migraine and estrogen use are frequent conditions from the first menstruation to menopause. In addition, the patient's medical history, lifestyle, comorbidities and factors that may or may not indicate estrogen use should be known [10, 12]

## Conclusions

Menstruation-related headache predominates in women with migraine. Its management is multidisciplinary and the use of estrogen in women diagnosed with migraine with aura should be avoided.

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## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** This study was approved by the Ethics in Research Involving Human Subjects Committee at the Federal University of Piauí, protocol number 3,071,611 and the National Ethics in Research System, registry number 02133918.0.0000.5669, on December 11, 2018.

**Informed consent** Data were collected from March to May 2019 and all volunteers signed the informed consent form.

## References

1. Parashar R, Bhalla P, Rai NK, Pakhare A, Babbar R (2014) Migraine: is it related to hormonal disturbances or stress? *Int J Womens Health* 6:921–925
2. Vetvik KG, MacGregor EA, Lundqvist C, Russell MB (2014) Prevalence of menstrual migraine: a population-based study. *Cephalalgia* 34(4):280–288
3. Wang J, Huang Q, Li N, Tan G, Chen L, Zhou Z (2013) Triggers of migraine and tension-type headache in China: a clinic-based survey. *Eur J Neur* 20(4):689–696
4. Headache Classification Subcommittee of the International Headache Society (2018) The international classification of headache disorders, 3rd edition. *Cephalalgia* 38(1):1–211
5. Bianchin L, Bozzola M, Battistella Pier A, Bernasconi S, Bona G, Buzi F et al (2019) Menstrual cycle and headache in teenagers. *Indian J Pediatr* 86(Suppl 1):25–33
6. Lichten EM (2018) Menstrual migraine and treatment options: review. *Headache* 58(1):145–146
7. Karlı N, Baykan B, Ertaş M, Zarifoğlu M, Siva A, Saip S et al (2012) Impact of sex hormonal changes on tension-type headache and migraine: a cross-sectional population-based survey in 2,600 women. *J Headache Pain* 13(7):557–565
8. Vetvik KG, MacGregor EA, Lundqvist C, Russell MB (2015) A clinical interview versus prospective headache diaries in the diagnosis of menstrual migraine without aura. *Cephalalgia* 35(5):410–416
9. Allais L, Chiarle L, Sinigaglia S, Airola L, Schiapparelli P, Benedetto C (2018) Estrogen, migraine, and vascular risk. *Neurol Sci* 39(Suppl 1):11–20
10. Allais G, Chiarle G, Bergandi F, Benedetto C (2016) The use of progestogen-only pill in migraine patients. *Expert Rev Neurother* 16(1):71–82
11. Bushman ET, Varner MW, Digre KB (2018) Headaches through a woman's life. *Obstet Gynecol Surv* 73(3):161–173
12. Allais L, Chiarle L, Sinigaglia S, Airola L, Schiapparelli P, Bergandi F et al (2017) Treating migraine with contraceptives. *Neurol Sci* 38(Suppl 1):85–89
13. Coffee AL, Sulak PJ, Hill AJ, Hansen DJ, Kuehl TJ, Clark JW (2014) Extended cycle combined oral contraceptives and prophylactic frovatriptan during the hormone-free interval in women with menstrual-related migraines. *J Womens Health (Larchmt)* 23(4):310–317
14. Vetvik KG, MacGregor EA, Lundqvist C, Russell MB (2014) Contraceptive-induced amenorrhoea leads to reduced migraine frequency in women with menstrual migraine without aura. *J Headache Pain* 15(1):30

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