

# HEADACHES DURING PREGNANCY IN WOMEN WITH A PRIOR HISTORY OF MENSTRUAL HEADACHES

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**ABSTRACT - Objective:** To evaluate the presence of menstrual headaches prior to pregnancy according to the International Headache Society (IHS) classification criteria, 2004, and also study the outcome (frequency and intensity) of these pre-existing headaches during the gestational trimesters. **Method:** This study involved 1,101 pregnant women (12 to 45 years old). A semi-structured questionnaire was used to interview the women during the first, second and third gestational trimesters as well as after delivery. All the interviews were conducted by one of the researchers by applying the IHS Classification (IHSC-2004). **Results:** A 1,029 women out of the 1,101 women interviewed presented headaches prior to gestation, which made it possible to study headaches in 993 women during the gestational trimesters. Menstrually related headaches were represented by 360 of the 993 women. Migraine was reported by 332/360 women (92.22%) with menstrual headaches and 516/633 women (81.51%) without menstrual headaches, respectively, prior to gestation. The majority of the women with menstrual migraine presented a headache improvement or disappearance during gestation (62.22% during the first trimester; 74.17% during the second trimester; 77.78% during the third trimester). **Conclusion:** Most of the pregnant women with menstrual or non-menstrual headaches prior to gestation presented migraine, which either improved or disappeared during pregnancy. Women who suffered from non-menstrual headaches improved during pregnancy but not as much as women with menstrual headaches.

**KEY WORDS:** headache, pregnancy, menstrual, migraine.

## Cefaléia durante a gestação em mulheres com história de cefaléia menstrual

**RESUMO - Objetivo:** Avaliar a presença de cefaléia relacionada ao ciclo menstrual, antes da gestação, classificá-las, segundo os critérios da Sociedade Internacional de Cefaleia (SIC) de 2004, e estudar o comportamento (frequência e intensidade) dessas cefaléias pré-existentes à gestação durante os trimestres gestacionais. **Método:** Foram estudados 1101 mulheres grávidas (12 a 45 anos) entrevistadas através de questionário semi-estruturado durante o primeiro, o segundo e o terceiro trimestres gestacionais e imediatamente após o parto. Todas as entrevistas foram conduzidas por um dos autores, usando a classificação da SIC, 2004. **Resultados:** De 1101 mulheres, 1029 apresentavam cefaléia antes da gestação, sendo possível estudar o comportamento das cefaléias durante os trimestres gestacionais em 993. Apresentaram cefaléia relacionada à menstruação 360/993 mulheres. Encontramos migrânea em, 332/360 (92,22%) mulheres com cefaléia menstrual e em 516/633 (81,51%) mulheres com cefaléia não menstrual antes da gestação. A maioria das mulheres com migrânea menstrual apresentou melhora da cefaléia durante a gestação (62,22% no primeiro trimestre; 74,17% no segundo trimestre; 77,78% no terceiro trimestre). **Conclusão:** A maioria das mulheres grávidas, com cefaléia tanto menstrual quanto não menstrual, antes da gestação, apresentou migrânea, sendo que a mesma melhora ou desaparece durante a gestação. Mulheres com cefaléia não menstrual antes da gestação melhoram em proporção menor do que aquelas com cefaléia menstrual.

**PALAVRAS-CHAVE:** cefaléia, gravidez, menstrual, migrânea.

The fact that migraine episodes improve during pregnancy in 55 to 90% of the cases is a common sense<sup>1-4</sup> and usually occurs in women with non-aura migraines. The menstrually-related migraine shows the greatest improvement during pregnancy, especially the strictly menstrual migraine<sup>4-9</sup>.

Migraines that worsen during pregnancy usually do so more often during the first gestational trimester<sup>1,2</sup>. Extensive literature suggests that the cyclic variation of the female sexual hormones is related to migraines<sup>10,11</sup> and its stabilization during pregnancy<sup>11</sup> is available.

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The purpose of this present epidemiological study was to conduct a follow up of the pregnant women at the prenatal care services in Catanduva (a city with 100,000 inhabitants, northwest of the State of São Paulo, Brazil), in order to classify headaches before gestation according to the 2004 criteria of the International Headache Society (IHS)<sup>12</sup> and assess the pre-existing menstrually-related and non-related headaches comparing the outcome during the gestational trimesters.

## METHOD

This is a prospective study conducted from January/1998 to June/2002. Patients were interviewed at three public prenatal care services: 1. Hospital Emílio Carlos Outpatient Obstetric Clinic, 2. Hospital Padre Albino Prenatal Care Inpatient Service, and, 3. Prenatal Care Outpatient Health Center (Centro de Saúde José Perri) in Catanduva, State of São Paulo, Brazil. The three prenatal care services are integrated and all labors are referred to Hospital Padre Albino, a University Hospital. These prenatal care services receive patients from the Catanduva region.

The criteria for inclusion were: 1. To be pregnant, to agree to participate in the study; 2. To be up to 16 weeks of gestation at the first interview; 3. The last interview had to be between 36 and 42 gestational weeks or post-delivery (32 weeks in case of twin pregnancy) 4. To sign the informed consent submitted and approved by the Research Ethics Committee of the institution.

Exclusion criteria were: 1. Miss the trimester follow-up visit; 2. Change in address (city or state) during the research period; 3. Dubious or incongruent information at different interviews; 4. Fetal miscarriage or death before the third trimester (resulting in the potential loss of follow up regarding the main objective of the study). Neither previous history of headache nor other medical conditions were considered as exclusion criteria.

The pregnant women underwent an interview according to a semi-structured questionnaire with questions about previous and ongoing pregnancy headaches and gestational conditions. The questionnaire investigated: patient identification- name, age, schooling, occupation, origin, marital status, gestational age; information related to gestation- number of previous gestations, number of prior deliveries, number of prior miscarriages, number of prior Caesarean sections, gestation age (in weeks); smoking; blood pressure; pulse. Several open questions were included: - Have you ever had headache? When was the last time? How many times have you had headache? How long have you had headaches? What are the pain characteristics and location? Do you have photophobia? Phonophobia? Nausea? Vomiting? Osmophobia? Do your symptoms precede or accompany the headache? Premonitory phenomena? Do you have to slow down or interrupt daily activities during the headache? Does the pain get worse during routine physi-

cal activity? What is the pain frequency and duration? Is there relationship between your pain and menses? Does it happen before, after or during the menstrual period? How many days before, during or after does it occur? Does it bother your sleep? Does sleep improve the pain? When exactly does the headache start? Do you have aura? If so, how is the aura? During gestation: Have you had headaches during this gestation? Did your headache appear only during this gestation? If you have had headaches before this gestation, how does the pattern now compare regarding intensity and periodicity.

All interviews were conducted by the same author, a neurologist with expertise in headache. First interview was conducted during the first trimester (maximum 16 gestational weeks). Subsequently, follow up visits were established in the second and third trimesters or first days after delivery. After the first interview, patients were reevaluated on two other occasions as outpatients, through home visits, or if otherwise unfeasible, by telephone calls. The aim of these contacts was to assure the pregnancy and headache outcome.

Headaches were classified according to the diagnostic criteria of the IHS (IHSC - 2004)<sup>12</sup>.

Statistical analysis was performed using Chi-square or Fisher's exact test to assess association of the variables of interest. Level of significance was set at  $p \leq 0.05$ . To assess "pain disappearance + pain improvement" during each gestational trimester, the test and confidence interval for one proportion was utilized. McNemar (tabulated statistics) test was used to verify headache improvement, deterioration and absence of change between the first and second trimester and between the second and third trimester.

Pain disappearance was considered when patient referred no pain during gestation. Pain improvement was considered when patient referred improvement in at least 50% frequency or intensity or both.

Menstrual migraine was considered when it occurred two days before and three days after the menstrual flow<sup>13,14</sup>. When it occurred in other part of the period it was called menstrually related migraine. When it occurred exclusively in the menstrual period it was called pure menstrual migraine<sup>12</sup>.

Dependence analysis was performed to compare proportions of women with menstrual and non-menstrual headache.

## RESULTS

One thousand four-hundred and ninety-four pregnant women with headache were interviewed at least once. We excluded 393 patients because of abortions, fetal death before the third trimester, unreliable information or change of address during the gestational period. We interviewed 1,101 women at follow-up consultations during gestation and delivery. Seventy-four women were con-

Table 1. Headache classification of menstrual related headaches in 360 women, according to the criteria of the IHS -2004.

	N	%
1.1 Migraine without aura	140	38.89
1.6.1 Probable migraine without aura	125	34.72
1.2 Migraine with aura	36	10.00
2 Tension-type headache	22	6.11
1.1 and 1.2 Migraine without aura and with aura	20	5.56
1.6.2. Probable migraine with aura	9	2.50
8.4.3 Oestrogen-withdrawal headache	2	0.56
8.2 Medication-overuse headache	2	0.56
2.4 Probable tension-type headache	2	0.56
1.5 1 Chronic migraine	1	0.28
1.2.6 Basilar-type migraine	1	0.28
	360	

N, total of patients.

Table 2. Headache classification of non-menstrual related headaches in 633 women, according to the criteria of the IHS - 2004.

	N	%
1.6.1 Probable migraine without aura	219	34.60
1.1 Migraine without aura	197	31.12
2 Tension-type headache	79	12.48
1.2 Migraine with aura	51	8.06
1.1 and 1.2 Migraine without aura and with aura	29	4.58
1.6.2 Probable migraine with aura	13	2.05
4.1 Primary stabbing headache	8	1.26
2.4 Probable tension-type headache	9	1.42
8.4.3 Oestrogen-withdrawal headache	7	1.11
1.5 1 Chronic migraine	6	0.95
8.2 Medication-overuse headache	6	0.95
13.11 Cold-stimulus headache	5	0.79
11.3.2 Refraction error headache	1	0.16
1.2.6 Basilar-type migraine	1	0.16
2.3 Chronic tension-type headache	1	0.16
4.8 New daily-persistent headache	1	0.16
Total	633	

N, total of patients.

tacted by phone calls during second and third trimester or post-delivery.

Age range: 59 (5.3%) women were between 12 and 15 years, 305 women (27.7%) between 16 and 19 years, 610 women (55.4%) between 20 and 30 years and 127 women (11.5%) were 31 years or older. Average age was 22.95 years.

Educational level [according to Brazilian Law n°5692- 1971 and 9394- 1993<sup>15,16</sup>]: 31 (2.8%) were illiterate, 715 (64.94%) had less than four years of schooling, 110 (10%) had four years, 108 (9.8%) had less than eight years, 98 (8.9%) had eight years, 18 (1.63%) had more than 8 and less than 11 years and 21 (1.9%) had 11 or more years.

Number of gestations: 457 (41.51%) women were in first gestation, 304 (27.61%) were in second, 200 (18.17%) were on third, 87 (7.90%) were

in fourth, 30 (2.72%) were on fifth, 14 (1.27%) were in sixth and 9 (0.82%) were between the seventh and tenth gestations.

Headaches prior to pregnancy were presented by 1029/1101 women (93.46%). It was possible to study headache behavior during the gestational trimesters in 993/1029 women.

The following observations were made with regard to the presence of menstrually-related headache in 993 pregnant women who had headaches prior to pregnancy: menstrually-related headache: 360/993 (36.25%) pregnant women; pure menstrual headache: 19/360 (5.28%) pregnant women; non-menstrual headache: 612/993 (61.63%) pregnant women; unable to answer: 21/993 (2.12%) pregnant women.

The periods during which the headaches oc-

Table 3. Comparison of headache improvement, deterioration and unchanged condition in the two groups of women with menstrual related and non menstrual related headaches.

	Menstrual headache	Non-menstrual headache
<b>First Trimester</b>		
Improvement or disappearance	224/360 (62.22%)	275/612 (44.93%)
No change	46/360 (12.78%)	238/612 (38.88%)
Pain deterioration	84/360 (23.33%)	92/612 (15.03%)
Mixed condition	6/360 (1.67%)	7/612 (1.14%)
<b>Second Trimester</b>		
Improvement or disappearance	267/360 (74.17%)	316/612 (51.63%)
No changes	39/360 (10.83%)	231/612 (37.74%)
Pain deterioration	50/360 (13.89%)	60/612 (9.80%)
Mixed condition	4/360 (1.11%)	5/612 (0.82%)
<b>Third Trimester</b>		
Improvement or disappearance	280/360 (77.78%)	336/612 (54.90%)
No changes	36/360 (10.00%)	223/612 (36.43%)
Pain deterioration	39/360 (10.83%)	47/612 (7.68%)
Mixed condition	5/360 (1.39%)	6/612 (0.98%)

Table 4. Menstrual and non-menstrual headache outcome during the first, second and third gestational trimester.

	Improvement	Unchanged	Deterioration	Total	Mixed condition
<b>Headache-First trimester</b>					
Non menstrual	275	238	92	605	7
Menstrual	224	46	84	354	6
p=0.000					
<b>Percentage</b>					
Non menstrual	45.45	39.34	15.21		
Menstrual	63.28	12.99	23.73		
<b>Headache-Second trimester</b>					
Non menstrual	316	231	60	607	5
Menstrual	267	39	50	356	4
p=0,000					
<b>Percentage</b>					
Non menstrual	52.06	38.06	9.88		
Menstrual	75.00	10.96	14.04		
<b>Headache-Third trimester</b>					
Non menstrual	336	223	47	606	6
Menstrual	280	36	39	355	5
p=0,000					
<b>Percentage</b>					
Non menstrual	55.45	36.80	7.76		
Menstrual	78.87	10.14	10.99		

cured in the 360 pregnant women who had menstruation related headaches prior to pregnancy were: headache before menstruation: 198/360 (55.0%); headache during menstruation: 84/360 (23.33%); headache before and during menstruation: 27/360 (7.5%); headache before and after menstruation: 20/360 (5.56%); headache after menstruation: 13/360 (3.61%); headache before, during and after menstruation: 11/360 (3.06%);

unable to report the period during which the headaches occurred: 7/360 (1.94%).

Table 1 shows the classification of menstrual ly-related headaches suffered by 360 women before pregnancy according to the diagnostic criteria of the HIS-2004<sup>12</sup>.

Table 2 shows the classification of headaches, according to the criteria of the IHS in 633 pregnant women who had headaches prior to preg-

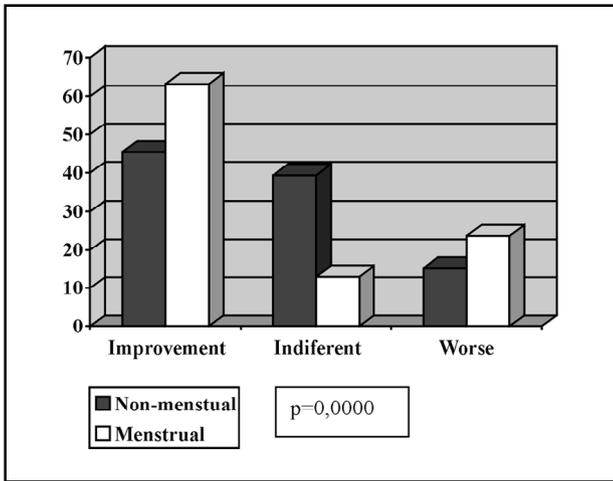


Fig 1. Menstrual and non-menstrual headache outcome during the first trimester.

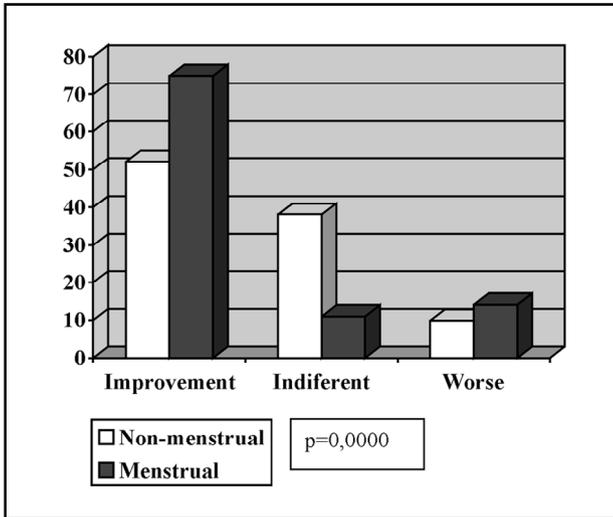


Fig 2. Menstrual and non-menstrual headache outcome during the second trimester.

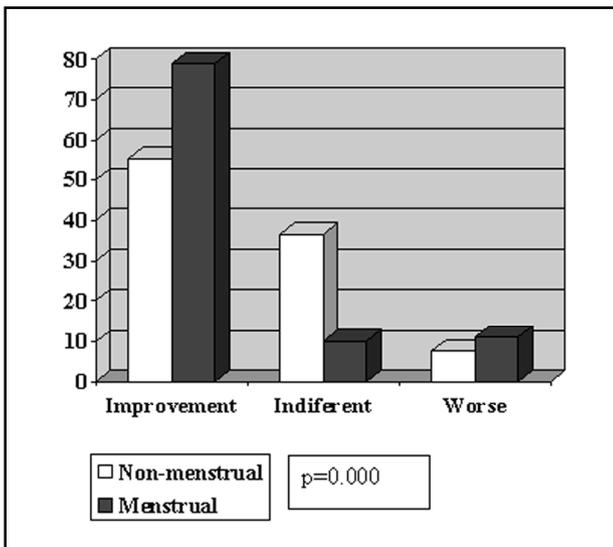


Fig 3. Menstrual and non-menstrual headache outcome during the third trimester.

nancy, non-related to the menstrual cycle as well as those who did not know if their headaches were related to the menstrual cycle (21/633).

The headache pattern before pregnancy in 360/993 pregnant women with menstrually-related headaches during the gestational trimesters regarding improvement and disappearance, deterioration or unmodified pain is shown according to the gestational trimester.

*First trimester* – Improvement + disappearance: 224/360 (62.22%) pregnant women; unmodified pain: 46/360 (12.78%); increased pain: 84/ 360 (23.33%); mixed condition: 6/360 (1.67%) (less frequent with more intensity and vice-versa).

*Second trimester* – Improvement + disappearance: 267/360 (74.17%); unmodified pain: 39/360 (10.83%); increased pain: 50/360 (13.89%); mixed condition: 4/360 (1.11%). Tabulated statistics: the evidence revealed that the improvement in the second trimester was greater than in the first (p=0.0000).

*Third trimester* – Improvement + disappearance: 280/360 (77.78%) women; unmodified pain: 36/360 (10.00%) women; increased pain: 39/360 (10.83%) women; mixed condition: 5/360 (1.39%). Tabulated statistics: the evidence revealed that the improvement in the third trimester was greater than in the second (p=0.003).

Regarding the pattern of non-menstrual related headaches (612 - as 21 women were not able to specify if they were menstrual or non-menstrual related), the results were the following:

*First trimester* – Improvement + disappearance: 275/612 (44.93%) women: unmodified pain: 238/612 (38.89%) women; increased pain: 92/612 (15.03%); mixed condition: 7/612 (1.14%).

*Second trimester* – Improvement + disappearance: 316/612 (51.63%) women; unmodified pain: 231/612 (37.75%) women; increased pain: 60/612 (9.80%) women; mixed condition: 5/612 (0.82%). Tabulated statistics: there is evidence that greater improvement occurred in the second trimester than in the first (p =0.0000).

*Third trimester* – Improvement + disappearance: 336/612 (54.90%) women; unmodified pain: 223/ 612 (36.44%) women; increased pain: 47/612 (7.68%) women; mixed conditions: 6/612 (0.98%). Tabulated statistics: there is evidence that the im-

provement was greater in the third trimester than in the second ( $p = 0.0002$ ).

Table 3 compares the improvement percentage, deterioration and non-modification of headaches in two groups of women with menstrual and non-menstrual headaches. There is evidence of an association between the outcome pattern of headaches in the first and second gestational trimesters; and between second and third trimesters: although the change in the outcome pattern of both menstrual and non-menstrual headaches in the first and second trimester, and second and third trimester is small ( $p=0.000$  and  $p=0.000$  respectively) is significant.

The pattern of menstrual and non-menstrual headaches during the trimesters revealed a significant difference in each trimester using the dependent analysis method (Table 4 and Figs 1, 2, 3). Women with menstrually-related headache demonstrated a greater improvement and disappearance of headaches than the women with non-menstrual headaches.

Menstrually-related headaches occurred in 188/360 (52.22%) pregnant women since menarche; 16/360 (4.45%) women who did not know if the headaches were related to menarche; 156/360 (43.33%) denied that menstrually-related headaches occurred since menarche.

There was no evidence of a relationship of menstrually-related headache outcome initiated at menarche or not in the first gestational trimester ( $p=0.54$ ), in the second gestational trimester ( $p=0.42$ ) and the third gestational trimester ( $p=0.27$ ) using the dependence analysis method, which meant that headaches initiated at menarche did not reveal more significant improvement than headaches that did not begin at menarche.

The dependence analysis did not reveal a statistically significant difference in relation to the three trimesters regarding the behavior displayed by different forms of headaches according to the IHSC-2004<sup>13</sup> (tension-type headache, migraine without aura, probable migraine without aura, migraine with aura) in the group of women with menstrually-related headaches (360): first trimester  $p=0.28$ ; second trimester  $p=0.39$  and third trimester  $p=0.75$ ). This indicates that there is not a type of headache that presents a predominant improvement or deterioration.

## DISCUSSION

This screening study was conducted through personal interviews by a single neurologist specially trained in the diagnosis and treatment of headache, using a semi-structured questionnaire that was complemented by open questions as appropriate. This is considered the best procedure for obtaining relevant information for distinguishing the different types of headaches<sup>17,18</sup>. The women included in this study used the public prenatal care assistance in Catanduva, a medium sized Brazilian city. Most of these women had a low education level, less than four school years.

Majority of these pregnant women presented a history of headaches prior to gestation that were classified as migrainous according to the IHS, 2004<sup>13</sup> in a large number of cases.

Majority of the epidemiological studies<sup>1-4,6,7,10</sup> demonstrate that pregnant women with headaches prior to pregnancy report an improvement in 55 to 90% of the cases, while in a smaller contingent of pregnant women, there is an onset of headaches during pregnancy<sup>5</sup>.

In this present study, women with menstrually-related headaches presented a greater percentage of improvement and disappearance of the headaches than the non menstrual headache women. However, the improvement in both groups increased progressively from the first to the third trimester, exactly as in the international literature<sup>19-21</sup>. Other studies did not detect a relationship between improvement of headaches and menstrually-related headaches<sup>22</sup>.

Majority of the epidemiological studies in the literature on headaches and pregnancy were retrospective<sup>2,5</sup>, while this present study accompanied the pregnant women during the three gestational trimesters. Although some of the studies were retrospective and the present study prospective, all confirmed the same headache improvement pattern during the three gestational trimesters with a significantly high improvement in the second trimester and even higher improvement in the third trimester.

A recent prospective study revealed that there was an improvement or migraine remission in 46.8% during the first trimester, 83% during the second trimester and 87% in the third gestational trimester<sup>24</sup>, which once again confirmed the findings of this prospective study that demonstrated a pro-

gressive improvement in the headaches during the trimesters.

Regular occurrence of migraines approximately two days before and three days after the menstrual flow are considered menstrual migraine<sup>13,14</sup>. Migraines that occur from seven days up to three days before the menstrual flow may be considered as premenstrual migraine and associated with the premenstrual syndrome<sup>24</sup>. Between 52 to 70% of the migraine cases in women are related to the menstrual cycle<sup>10,25-27</sup>. Migraines that occur exclusively during the menstrual flow are called "true menstrual migraine" (between 24 to 48 hours before bleeding onset)<sup>25</sup> and affect approximately 14% of the migraine individuals<sup>10,25-27</sup>. Our report demonstrates relatively low percentages of menstrually-related headaches and migraines that occur exclusively during menstruation (36% and 5%, respectively). The above cited definitions for menstrual migraines were applied in this study. Classic population studies<sup>5</sup> demonstrate that menstruation triggers off migraine in only 24% and tensional headaches in 39%, results very close to those obtained by this present study.

According to Rasmussen<sup>3</sup>, migraine crises occur a day or two before menstruation in 67% of the cases and during menstruation in 28%. These results were similar to those obtained in this study, where the occurrence of headaches before menstrual flow is more common (55%) and during menstrual flow comes second (23%).

This present study did not detect a difference in the percentage improvement between menarche related and non related headaches during pregnancies.

The results demonstrate that the majority of pregnant women with headaches presented these symptoms before pregnancy. The most common etiology in both, women with menstrual headaches as well as non-menstrual headaches prior to pregnancy was migraine<sup>12</sup>.

In most of the women, the headaches improved or disappeared during pregnancy, particularly during the last two trimesters. Menstrually-related headaches demonstrated the greatest improvement or disappeared during pregnancy, while menstrual headaches that began at menarche did not present greater improvement than menstrual headaches that did not begin at menarche.

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