

# Odors as triggering and worsening factors for migraine in men

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## ABSTRACT

**Objective:** To assess the role of odors in triggering or worsening migraine in men. **Method:** Ninety-eight male migraineurs from the general population were assessed individually through questionnaires. Environmental factors relating to their migraine were reported, with special focus on the role of odors. **Results:** Odors were the second most frequent triggering factor for migraine attacks (48%), behind stressful situations (59%). Likewise, odors were the second most frequent worsening factor (73%), just behind excessive light (74%). Thirty-three individuals (33.4%) stated that odors were both triggering and worsening factors for their migraine attacks. Perfume, cigarette smoke and cleaning products were the most frequent migraine-related odors reported by these male migraineurs. **Conclusion:** This was the first study to assess the role of odors in migraine exclusively in men. There was a high degree of odor-related migraine among these men, thus suggesting that patient education could alert such individuals to gender-related factors, since different triggering and worsening factors have been reported by males and females. **Key words:** migraine, olfactory stimuli, osmophobia, environmental factors.

## Odores como fatores desencadeantes e de piora na enxaqueca de homens

### RESUMO

**Objetivo:** Avaliar o papel dos odores como fatores desencadeantes e de piora da enxaqueca em homens. **Método:** Noventa e oito homens com enxaqueca na população geral foram avaliados individualmente por questionários. Os fatores ambientais relacionados à enxaqueca foram relatados, com foco especial no papel dos odores. **Resultados:** Os odores foram o segundo fator mais frequente no desencadeamento de crise de enxaqueca (48%), atrás das situações de estresse (59%). Da mesma forma, os odores foram a segunda causa mais frequente de piora das crises (73%), apenas atrás do excesso de luminosidade (74%). Trinta e três indivíduos (33,4%) relataram que os odores eram tanto fatores desencadeantes quanto fatores de piora de suas crises de enxaqueca. Perfume, fumaça de cigarro e produtos de limpeza foram os odores mais relatados como sendo relacionados a enxaqueca pelos homens. **Conclusão:** Este foi o primeiro estudo que avaliou o papel dos odores exclusivamente em homens com enxaqueca. Houve um alto índice de enxaqueca relacionada a odores, sugerindo que a educação dos pacientes poderia alertar fatores dependentes do gênero do paciente, uma vez que diferentes fatores desencadeantes e de piora das crises tem sido relatados por homens e mulheres. **Palavras-chave:** enxaqueca, estímulo olfatório, osmofobia, fatores ambientais.

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The prevalence of migraine in the adult population is estimated to be of the order of 10% to 15%. These values have been systematically reported in several countries<sup>1</sup>, including Brazil<sup>2</sup>, thus high-

lighting the need for efficient approaches towards this condition. Migraine has a significant impact on the quality of life<sup>3</sup>, on health resources<sup>4</sup>, and on patients' professional and personal activities<sup>5</sup>.

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Migraine management demands not only adherence to treatment, but also education of patients on the mechanisms of the disease<sup>6,7</sup>. The importance of environmental factors that might trigger and/or worsen migraine is infrequently reported<sup>8</sup>, thereby leaving a potential gap in studying migraine avoidance, while focusing on migraine treatment. Although these environmental factors may be difficult to manage, it is important to acknowledge their existence and to guide patients on the possible role of such factors in migraine.

Sensitivity to odors among migraineurs is well known. Osmophobia has been demonstrated to be a rather insensitive, but highly specific finding in migraine<sup>9-12</sup>. According to Zanchin et al.<sup>9</sup>, intolerance to odors in migraine is so specific that it can be used in the differential diagnosis with tension-type headache (TTH). Their comparative study showed that no cases of TTH presented osmophobia, while more than a third of migraineurs reported such symptom. The rate of osmophobia reported by different authors has been within the range of 25% to 50% of patients. The presence of aura, disease duration and other migraine characteristics does not seem to affect these values. However, regarding the role of gender, few comparative results have been reported. Porta-Etessam et al.<sup>11</sup> observed that intolerance to odors seemed to be more prominent among women. This finding was not corroborated by the work of Kelman et al.<sup>10</sup>.

The intolerance to odors that is observed among patients with migraine has been studied mainly in women<sup>9-14</sup>. Johansson et al.<sup>14</sup> reported that female migraineurs were twice as susceptible towards presenting sensitivity to odors as male migraineurs were. Sjostrand et al.<sup>12</sup> recently reported their results among women only, showing that over 70% of the female migraineurs studied were sensitive to odors. In our own previous study on the subject, with a predominantly female population of migraineurs<sup>13</sup>, the rate of sensitivity to odors was of the order of 30%. In the same study from our group, perfume, cigarettes and cleaning products were the most relevant odors for triggering or worsening migraine attacks. No studies on osmophobia exclusively assessing male migraineurs have been conducted.

The aim of the present study was to assess triggering and/or worsening factors reported by male migraineurs, with special emphasis on the role of olfactory stimuli. In order to avoid bias towards the most severe cases of migraine that might be under treatment in specialized centers, the present work focused on the general population.

## METHOD

This study was approved by the Ethics Committee of Universidade Metropolitana de Santos. Individuals from

the general population with migraine for at least one year, presenting attacks at least four times a year were invited to participate in the study. Cases of chronic headache were excluded. These individuals were all male, aged 18 years or over. They signed an informed consent statement and their participation in the study was voluntary.

The volunteers answered two questionnaires. The first one was to confirm the diagnosis of migraine with or without aura according to the IHC-2004 criteria<sup>15</sup>. Individuals with probable migraine (fulfilling all but one criterion) and/or individuals with mixed primary headaches were excluded and did not proceed to the second questionnaire. The participants who fulfilled the IHC-2004 criteria for migraine answered a second questionnaire, to provide details on the triggering and worsening factors for their migraine. The participants were not aware of our particular interest in odors, and spontaneously listed the factors that could trigger or worsen their migraine attacks. When odors were mentioned, they were asked to give further details on specific odors that could be related to these attacks.

The findings were analyzed as percentages of the total sample, and were mostly presented as a descriptive analysis of the data. Whenever applicable, mean values and standard deviations were used for data presentation. Pearson correlation analysis was used to assess the individuals' demographic data in relation to the role of odors in triggering or worsening migraine.

## RESULTS

Ninety-six males aged between 18 and 82 years (mean age 38±4.9 years) fulfilled the IHS migraine criteria and answered the second questionnaire on triggering and worsening factors for migraine. They all declared that they had had migraine for at least one year, with four or more episodes every year, but did not present chronic migraine, according to the same IHS criteria.

All the participants reported that they had at least one triggering and one worsening factor for their migraine attacks. These factors are presented in Table 1. Odors were the second most frequent triggering factor (48%), behind stressful situations (59%). Likewise, odors were the second most frequent worsening factor (73%), just behind excessive light (74%). Thirty-three individuals (33.4%) reported that odors were both triggering and worsening factors for their migraine attacks. Among the subgroup of participants reporting one or more migraine attacks per month, odors were both triggering and worsening factors for migraine in 72.5% of the cases.

The most frequent odor related to migraine was reported to be perfume, although cigarette smoke and cleaning products rated highly among the triggering and worsening factors. These results are summarized in Table 2.

Table 3 shows a comparison of results between our previous study<sup>13</sup> on a predominantly female population and the present study exclusively on males. In the previous study, with a population in which 88% were women, odors were the fourth most frequent triggering factor and the fifth most frequent worsening factor. When males were studied using the same methodology, odors rated second for triggering and worsening migraine. In both studies, stress was considered to be the most frequent trigger of migraine, while excessive light was the most frequent worsening factor.

## DISCUSSION

The association of sensitivity with odors and migraine has long been recognized. The mechanisms involved in this association are still not fully understood, but brain mapping studies are providing interesting data<sup>16</sup>. These studies have shown that trigeminal-associated odors, such as acetone, activate the anterior and central insula, claustrum, cingulus and facial area of the primary sensory cortex. The same areas are associated with painful stimuli. Many odors activate the amygdala via the olfactory system, and repetitive migraine attacks might render the patient more susceptible to odors<sup>12</sup>. The data from the present study are in agreement with this statement, since the individuals with more frequent migraine attacks also showed higher sensitivity to odors.

Cortical hyperexcitability, which is well-known to be associated with migraine<sup>17</sup>, may also play a role in the olfactory sensitivity of some migraineurs.

The sensitivity to odors among migraineurs that was observed in the present work was in line with findings reported in similar studies, typically ranging from 35 to 75%<sup>9-13,18-20</sup>. However, the present assessment of male migraineurs alone, focusing on odors as triggering and worsening factors for their attacks, has provided further potentially interesting data. While Kelman et al.<sup>10</sup> did not observe any differences in odor sensitivity between males and females, the work of Porta-Essam et al.<sup>9</sup> showed that women were more sensitive to odors. Theeler et al.<sup>19</sup>, studying a predominantly male population, did not focus their investigation on odors and it is therefore difficult to compare their results to ours. Other studies have investigated patients attending specialized headache clinics, which also makes it difficult to establish comparisons with the migraineurs assessed in our study, who were recruited from the general population. Despite methodological and gender-specific differences, all the detailed studies on odors and migraine have shown very similar results regarding the role of perfume, cigarette smoke and cleaning products as triggering or worsening factors for headache<sup>9,12,13</sup>. These odors are all found very frequently in the environment and, in the present study,

**Table 1.** Prevalence of triggering and worsening factors for migraine according to 96 males who presented migraine for at least one year, with at least four headache attacks per year.

Triggering and worsening factors for migraine in 96 men		
Factor	Triggering (%)	Worsening (%)
Stress	59	51
Odor	48	73
Light	44	74
Foods	42	32
Alcohol	31	31
Sound	29	51
Physical activities	18	21
Crying	9	10
Others	10	4

**Table 2.** Specific odors as triggering and worsening factors for migraine according to 96 males who presented migraine for at least one year, with at least four headache attacks per year.

Odors reported as being responsible for triggering or worsening the migraine attacks in 96 men		
Odor	Triggering (%)	Worsening (%)
Perfume	26	36
Cigarette smoke	23	33
Cleaning products	20	24
Kerosene	19	23
Ammoniac	16	24
Bleach	15	24
Petrol	15	28
Pollution	12	18
Wax	6	14
Others	6	4

**Table 3.** Comparison of data from our previous study 13 and the present results regarding triggering and worsening factors for migraine in females and in males.

Importance of odors in migraine of males and females				
Factor	174 women; 24 men <sup>13</sup>		96 men	
Triggering	29%		48%	
Worsening	30%		73%	
	174 women; 24 men <sup>13</sup>		96 men	
	Triggering	Worsening	Triggering	Worsening
1 <sup>st</sup>	Stress	Light	Stress	Light
2 <sup>nd</sup>	Crying	Sound	Odor	Odor
3 <sup>rd</sup>	Light	Stress	Light	Stress/Sound
4 <sup>th</sup>	Odor	Crying	Foods	Foods
5 <sup>th</sup>	Sound	Odor	Alcohol	Alcohol

these stimuli were comparable with well-known migraine-related factors such as stress and light, and considerably more important than sound. It may be difficult for individuals to completely avoid odors, stress and light in order to avoid migraine attacks. However, recognition of these factors in migraineurs' home and working environments may ultimately be part of the prophylactic treatment for such patients.

It is also important to highlight possible cultural gender-related factors in these findings. Women rated crying among the five most frequent migraine-related factors, while men did not rate crying very often. At the same time, men reported food and alcohol among their five most frequent factors, while these were not reported as often by women. The results from the present study may be used in tailoring a gender-related educational guide for patients suffering from migraine.

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