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Original Article

Headache as a sign of ear, nose, and throat diseases: evidence from a specialized clinic

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Abstract

***Background & Aims*:** Headache has been a common problem for humans since ancient times. The aim of this study was to investigate the prevalence of ear, nose, and throat diseases in patients with headache.

***Materials & Methods*:** In this descriptive cross-sectional study, we reviewed medical records of 100 patients presenting with headache to the ENT clinic of Imam Khomeini Hospital in Urmia, Iran, between 2019 and 2021. The type of headache (primary or secondary) was diagnosed based on medical history, clinical examinations, and paraclinical examinations (CT scan) and completion of a checklist for each patient. Chi-square and independent t-tests were used to analyze data. The p value < 0.05 was considered significant.

***Results*:** Of 100 patients, 58 (58%) had primary headaches with a mean age of 1.72 ± 4.77 years, and 42 (42%) had secondary headaches with a mean age of 5.57 ± 1.43 years ($p < 0.01$). There was a significant difference in the type of headache and location of pain in patients except for the back of the head and the top of the head ($p < 0.05$). Of the 58 patients with primary headaches, 26 (44.8%), and of the 42 patients with secondary headaches, 10 (23.8%) woke up from sleep due to headache ($p < 0.03$). Of the 58 patients with primary headaches, 38 (65.5%), and of the 42 patients with secondary headaches, 12 (28.6%) had their headache worsened by light and noise ($p < 0.001$).

***Conclusion*:** Of all patients, 42% had secondary headaches, which most commonly had symptoms of sinus pain. These patients were treated by an otolaryngologist. Patients with non-sinus headaches were referred to a neurologist.

***Keywords*:** Ear, nose, and throat diseases, Headache, Primary headache, Secondary headache,

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Introduction

Headache is one of the most common reasons for seeking medical attention. This neurological symptom is one of the most prevalent causes of absenteeism from work or refraining from personal or social activities. The frequent occurrence of headaches can adversely impact a patient's lifestyle, well-being, and engagement in social activities. The lifetime prevalence of headaches is 93% in men and up to 99% in women (1). Studies have shown that headaches cause £611 million in financial damage annually in England and $13 billion in the United States (2). Headaches can have various causes, with stress and migraines being the most common triggers. Headaches are categorized as either primary or secondary. Primary headaches occur independently and include migraines, neuralgia, and cluster headaches, while secondary headaches occur as a result of an underlying condition (3). One potential underlying cause can be ear, nose, and throat (ENT) diseases.

Sinus conditions such as rhinitis and sinusitis (4), external otitis and osteomyelitis (5), and otitis media (6) may initially manifest as headaches. The association between ENT diseases and headaches is not well understood, but some studies suggest a role for substance P release in these headache types. Substance P is a neuropeptide with potent vasodilatory effects that is released in the pathway of secondary afferent C fibers in response to stimuli such as temperature changes, infections, toxins, or mechanical stress, including pressure. This substance is also considered a mediator of pain (7). Additionally, contact points between the external nasal cavity wall and the septum may contribute to headache onset and exacerbation through the trigeminal-vascular system (8).

Since headache is one of the symptoms of ENT diseases, in addition to general headache classification types, ENT specialists categorize headache causes into three categories: 1) Headaches that can definitively be attributable to sinus issues like inflammatory diseases, neoplasms, trauma, etc.; 2) headaches that can definitively be occurring due to non-sinus triggers like migraines, neuralgia, cervical nerve root disorders, very high or low blood pressure, or, in general, other vascular disorders, temporomandibular joint disease, allergies, etc.; and 3) without specific identifiable causes including sinusitis (9). Headaches arising from ENT diseases may initially be mild, with patients self-medicating with over-the-counter analgesics rather than seeking medical attention. Typically, patients consulting ENT specialists presume their headaches are sinus-related (10).

While few studies have examined the relationship between headaches and ENT diseases to date, the present study investigates the prevalence of ENT diseases in headache patients presenting to the ENT clinic at Imam Khomeini Hospital in Urmia, Iran. We hope this research will provide an effective step toward preserving and promoting the health of the human capital of this borderland region.

Materials & Methods

In this descriptive cross-sectional study, we first reviewed the medical records of all patients presenting with a headache to the ENT clinic of Imam Khomeini Hospital in Urmia, Iran, between 2019 and 2021, with the inclusion criteria. These records were screened for the following inclusion criteria:

1. The reason for the patient's visit to the ENT clinic is a headache.
2. The information obtained from the patient, which is recorded in the relevant forms, should be complete.
3. The information provided by the patient should be reliable
4. The patient completed requested diagnostic tests.
5. Informed consent was obtained.

The headache type (primary or secondary) was determined via medical history, clinical examinations, paraclinical exams like CT scans, and completion of a checklist for each patient. If clinical and paraclinical examinations were normal in terms of ENT conditions, patients were referred to neurology specialists.

Exclusion criteria were:

1. Prior headache diagnosis and treatment.
2. Recent antibiotic use.

After removing the documents that met at least one of the exclusion criteria, we recorded the information related to patients whose headache is attributed to ENT issues. This information included demographic information (age, gender, headache type), and clinical data such as primary/secondary headache classification and the patient having underlying diseases. Conditions such as trigeminal neuralgia, temporomandibular joint disease, sinusitis, and oral and dental diseases were investigated. Most patients reported bilateral pain, so laterality was not specified.

In this study, convenience sampling was used. Based on Kaur et al.'s study (11) and considering an allergic rhinitis prevalence of 5.79%, a minimum sample size of 84 was calculated for a 5% error and 95% confidence interval. 100 samples were included to account for potential attrition.

$$n = \frac{\left(z_{1-\alpha/2}\right)^2 * p(1-p)}{d^2}$$

Standard deviation:

P = 0.0579

Statistical Analysis:

Appropriate descriptive statistics such as tables and measures like the mean were used in data description. For data analysis, statistical tests including Chi-square and independent t-test were employed. The software utilized in this research was SPSS version 20, with significance set at $p < 0.05$.

Results

In this descriptive cross-sectional study, 100 patients presenting with a headache to the Otolaryngology Clinic at Imam Khomeini Hospital in Urmia, Iran were investigated. Of these patients, 49 (49%) were male, and 51 (51%) were female. Among the 100 patients, 58 (58%) had primary headaches, and 42 (42%) had secondary headaches.

The mean age of patients presenting with a headache was 9.69 ± 37.44 years. The mean age was 8.67 ± 37.73 years in those with secondary headaches and 10.44 ± 37.22 years in those with primary headaches. An independent t-test found that there is no significant difference between the mean age of patients and the type of headache (p = 0.79). The mean headache severity score was 1.72 ± 4.77 in primary headaches and 1.43 ± 5.57 in secondary headaches. According to the T-test statistical analysis, there was a significant difference in mean headache severity among patients with primary and secondary headaches who visited ENT clinics (p = 0.01) (Table 1).

Table 1. Comparison of mean and standard deviation of age based on headache type

Variable	Secondary headache	Primary headache	*p* value
Mean ± standard deviation of age (years)	37.73 ± 8.67	37.22 ± 10.44	0.79
Mean ± standard deviation of headache severity	1.43 ± 5.57	1.72 ± 4.77	0.01

Independent T-test

According to the results reported in Table 2, the frequency of ENT diseases in 42 patients who referred with headache, 30 (30%) had chronic sinusitis, (7) 7% had sinus thickening and septal deviation, which were recommended for septoplasty, and 5 (5%) had otitis media. Among the 22 male patients, 14 (63.6%) had chronic sinusitis, 3 (13.6%) had sinus thickening and septal deviation, and 5 had otitis media. Of the 20 female patients, 16 (80%) had chronic sinusitis, and 4 (20%) had sinus thickening and septal deviation. According to the Chi-square statistical test, there was no significant difference between gender and the prevalence of ENT diseases (p = 0.07).

There was a significant difference in the location of pain in patients referred to the ENT clinic based on the gender of the patients only in terms of neck pain (p = 0.01), but there was no significant difference in other cases.

Table 2. Prevalence of ear, nose, and throat (ENT) diseases in patients with headache by gender

p value	Otitis media	Thickening of the sinuses and septal deviation	Chronic sinusitis	Gender
	5 (22.7%)	3 (13.6%)	14 (63.6%)	Male
0.07	0 (0%)	4 (20%)	16 (80%)	Female
	5 (11.9%)	7 (16.7%)	30 (71.4%)	Total

Chi- square

There is a significant difference in the type of headache and the location of the pain, except for the back of the head and the top of the head, in patients referred to the ENT clinic, so that in secondary pain, patients complain more about pain in the temple, forehead, around the head, and neck ($p < 0.05$) (Table 3).

Table 3. Comparison of the prevalence of ear, nose, throat diseases based on the type of headache

Location of pain	headache Primary	headache Secondary	*p* value
Temples			
Yes	0 (0%)	10 (23.8 %)	0.001
No	58 (100%)	32 (76.2 %)	
Total	58 (100%)	42 (100%)	
Forehead			
Yes	0 (0%)	28 (66.7 %)	0.001
No	58 (100%)	14 (33.3 %)	
Total	58 (58%)	42 (100%)	
Back of the head			
Yes	0 (0%)	2 (4.8 %)	
No	58 (100%)	40 (95.2 %)	0.09
Total	58 (100%)	42 (100%)	
Around the head			
Yes	0 (0%)	3 (7.1 %)	
No	58 (100%)	39 (92.9 %)	0.03
Total	58 (100%)	42 (100%)	
Top of the head "Hairband" area			
Yes	0 (0%)	2 (4.8 %)	
No	58 (100%)	40 (95.2 %)	0.09
Total	58 (100%)	42 (100%)	
Neck			
Yes	0 (0%)	5 (11.9 %)	
No	58 (100%)	37 (88.1 %)	0.007
Total	58 (100%)	42 (100%)	
Other (generalized pain)			
Yes	0 (0%)	3 (7.1 %)	
No	58 (100%)	39 (92.9 %)	0.03
Total	58 (100%)	42 (100%)	

Chi- square

Among the 100 patients visiting the ENT clinic, 38% (38) reported pressing pain, 35% (35) throbbing pain, 20% (20) dull pain, 5% (5) sharp pain, and 20% (2) complained of severe headaches (Figure 1).

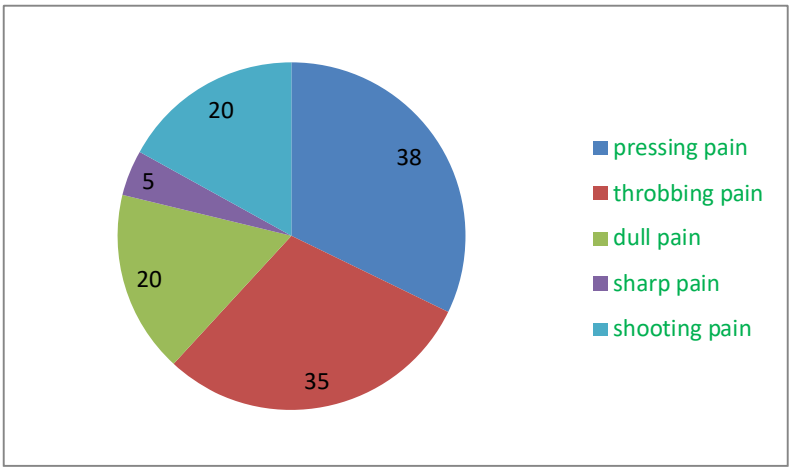

Fig. 1. Absolute and relative frequency distribution of headache types in patients presenting to the ENT clinic.

Of the 58 patients with primary headaches, 26 (44.8%) woke up from sleep at night due to headache. In the 42 patients with secondary headaches, 10 (23.8%) woke up from sleep at night. A chi-square test revealed a significant difference between headache type and nocturnal awakening ($p = 0.03$).

Additionally, 38 (65.5%) of the 58 primary headache patients had their headaches exacerbated by light and noise, compared to 28.6% of the 42 secondary headache patients. A chi-square test showed a significant difference between headache types and exacerbation by light and noise ($p = 0.001$) (Table 4).

Table 4. Comparison of the type of headache with waking up from sleep at night in patients visiting the ENT clinic

	Primary headache	Secondary headache	*p* value
Waking up at night			
Yes	26 (44.8 %)	10 (23.8 %)	0.03
No	32 (55.2 %)	32 (76.2 %)	
Aggravation of headache by light and sound			
Yes	38 (65.5 %)	12 (28.6 %)	0.001
No	20 (34.5 %)	30 (71.4 %)	

Discussion

The frequent occurrence of headaches has many adverse effects on the patient's lifestyle, sense of well-being, and social activity. To the extent that they are among the most common reasons for work absenteeism and avoiding personal or social activities. Headaches impede patients' daily routines and ability to perform regular tasks. As patients often presume any headache indicates sinusitis, they may self-medicate with antibiotics or analgesics such as acetaminophen, ibuprofen, gelophene, etc.

The lifetime headache prevalence is 93% in men and up to 99% in women (1). In our study, 49 (49%) male and 51 (51%) female patients presented to the clinic for headache, reflecting a higher prevalence among women as seen in the literature. In a study by Sabral et al. (12), the female to male ratio for migraine was 3:1, corroborating the greater burden among women.

In our study, 58% of patients presented with primary headaches, while 42% had secondary headaches. In contrast, Sabra et al. (12) found that among 1,002 ENT clinic patients, only 21% had headache as the primary complaint, with 35% experiencing migraine dizziness and 46% presenting for other chief issues. Their findings underscore the

importance of recognizing atypical, non-headache migraine symptoms for accurate diagnosis and management by ENT specialists, as undiagnosed migraines may manifest with diverse, atypical symptoms.

Benjamin et al. (13) reported that migraine is clearly involved in the generation of numerous otologic symptoms, including vertigo, tinnitus, aural pressure, otalgia, and HL. Aligning with our results, this and other studies indicate many ENT clinic headache patients have underlying primary headaches, often accompanied by sinus pain. Prompt migraine evaluation is crucial for precise headache diagnosis and effective treatment.

Another study (14) used CT imaging to relate pain severity with acute sinusitis severity revealed that the prevalence of paranasal sinuses abnormalities in asymptomatic Saudi patients was high (33%). Most of the affected sinuses were the maxillary. The male patients were more affected than females in all findings. Furthermore, Sabra et al. (12) found that disease severity cannot predict symptoms. Several factors may explain discordant sinus versus migraine symptoms, including migraine weather sensitivity, concurrent migraine and nasal allergy, and cranial autonomic symptoms like congestion during migraine attacks (15,16).

In our study, 38% of patients had throbbing headaches and 35% had pulsating headaches. Additionally, a significant difference was observed in our study regarding the exacerbation of headaches with light and sound. In patients with primary headaches, 65.5% reported worsening of their headaches with light and sound, while in those with secondary headaches, only 28.6% complained of exacerbation with light and sound. In Sabra et al.'s study, patients with unilateral pulsatile headaches, who had primary headaches, were sensitive to light and sound. These symptoms indicate migraine, necessitating the intervention of neurology specialists for some patients who seek help from ENT specialists for headaches and dizziness. In our study, specialists in ENT referred patients with primary headaches to neurologists.

In this study, a significant difference was observed in waking up from nocturnal sleep between patients with primary and secondary headaches (p = 0.03). In patients with secondary headaches, 23.8% woke up due to headaches, while in patients with primary headaches, 44.8% woke up from nocturnal sleep. Rains et al. (17) have identified sleep apnea as one of several recognized factors in the occurrence of migraines, stating in their study that in a group of patients who regularly visit the ENT clinic seeking the cause of their headaches, there is a strong correlation between waking up from sleep and nasal congestion and migraines. This finding aligns with the results of our study, indicating a concordance in terms of the frequency of waking up from sleep in patients with primary headaches.

According to the reports presented in this study, a significant difference was found in the type of headache and the location of pain among those seeking treatment at the ENT clinic. In secondary headaches, pain in the temple, forehead, and around the head is significantly more common. However, in our study, patients who visited the ENT clinic with headaches did not show a significant difference in the location of pain (temples and forehead, back of the head, and around the head) concerning the gender of the patients. In the study of Sabra et al. (12), the ratio of women with migraine to men was 3 to 1, and the average age of patients with migraine was significantly different in the two groups. Due to the fact that in our study, we did not check the average age and sex of the patients based on the occurrence of primary headaches (migraines) because it was not among the study objectives, therefore, it is not possible to compare these objectives in this study, However, it is recommended that in future studies, this matter be reconsidered by other colleagues.

Conclusion

The results of our study showed that of all patients presenting to the ENT clinic who were also evaluated for headache, 58% had primary headaches and 42% had secondary headaches. Patients with secondary

headaches commonly had sinus pain symptoms and received appropriate treatment from the ENT specialist. Patients with non-sinus headaches were referred to a neurologist. Overall, interdisciplinary care can also be very effective in the successful treatment of patients presenting to the ENT clinic. Given that this study was conducted with a smaller sample size due to the COVID-19 pandemic and the reduction in outpatient referrals, it is recommended that future studies with a larger sample size be conducted by respected colleagues to achieve better results.

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Conflict of Interest

There is no conflict of interest between the authors.

Author Contributions

All authors contributed equally to this study.

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Ethical Statement

This study was approved by the Ethics Committee of Urmia University of Medical Sciences with the code IR.UMSU.REC.1398.224.

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