

## COMPARATIVE EVALUATION OF PAIN CHARACTERISTICS AND RADIOLOGICAL IMAGING FINDINGS IN PATIENTS WITH SECONDARY TYPE HEADACHE IN THE EMERGENCY DEPARTMENT; A PROSPECTIVE ANALYSIS

*Acil Serviste Sekonder Tip Baş Ağrı Tanılı Hastalarda Ağrı Karakteri ile Radyolojik Görüntüleme Bulgularının Karşılaştırılmalı Olarak Değerlendirilmesi; Prospektif Analiz*

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### ABSTRACT

**Objective:** Secondary type headache is observed at a rate of 4-5% in the emergency department. In this prospective study, it was aimed to evaluate the results of patients with secondary headache, such as consultation, hospitalization, and discharge decision in correlation with radiological imaging findings.

**Material and Methods:** This is a single-center, prospective and methodological study. According to International Headache Society criteria, sociodemographic characteristics, emergency department examination findings of a total of 200 patients with secondary headache were recorded.

**Results:** Fifty percent of the patients had throbbing pain, 29.5% had constrictive pain, and the rate of pathological findings on CT was significantly higher in patients with squeezing pain ( $p=0.019$ ). The hospitalization rate was significantly higher in the patients for whom consultation was requested, and 69.0% of the patients who were admitted to the hospital had constrictive pain ( $p<0.05$ ).

**Conclusion:** It has been observed that careful questioning of pain characteristics, good evaluation of radiological imaging indications, and working in cooperation with other clinics when necessary in the diagnosis of secondary type headache in patients presenting to the emergency department with headache play an important role in making faster and more accurate decisions on behalf of the patient.

**Keywords:** Emergency department, headache, pain characteristics, radiological imagings

### ÖZ

**Amaç:** Sekonder tip baş ağrıları acil serviste %4-5 oranında gözlenir. Bu çalışmada sekonder tip baş ağrısı olan hastalarda ağrı karakterinin radyolojik görüntüleme bulguları ile değerlendirildiğinde hastaların konsültasyon, yatış, taburculuk kararı gibi ortaya çıkan sonuçlarının prospektif olarak değerlendirilmesi amaçlandı.

**Gereç ve Yöntemler:** Bu, tek merkezli, prospektif ve metodolojik bir çalışmadır. International Headache Society kriterlerine göre sekonder tipte baş ağrısı olan toplamda 200 hastanın sosyo-demografik özellikleri, acil servise başvuru muayene bulguları ve tetkik sonuçları kayıt altına alındı.

**Bulgular:** Hastaların %50'sinde zonklayıcı tipte, %29.5'inde sıkıştırıcı tipte ağrı mevcuttu ve sıkıştırıcı tipte ağrı olan hastalarda BT'de patolojik bulgu saptanma oranı anlamlı oranda daha yüksek idi ( $p=0.019$ ). Konsültasyon istenen hastaların yatış oranı anlamlı oranda daha yüksek idi ve yatış kararı verilen hastaların %69.0'ında sıkıştırıcı karakterde ağrı mevcuttu ( $p<0.05$ ).

**Sonuç:** Baş ağrısı ile acil servise başvuran hastalarda sekonder tip baş ağrısı tanısında ağrı karakterlerinin dikkatle sorgulanmasının, radyolojik görüntüleme endikasyonlarının iyi değerlendirilmesinin gerektiğinde diğer klinikler ile işbirliği içinde çalışılmasının hasta adına daha hızlı ve doğru karar verilmesinde önemli rol oynadığı gözlemlendi.

**Anahtar Kelimeler:** Acil servis, baş ağrısı, ağrı karakterleri, radyolojik bulgular



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## INTRODUCTION

According to studies by the Turkish Neurological Association, headache is one of the most common complaints in society (1). Furthermore, it is shown as one of the leading health problems encountered by approximately 90% of society at some point in their life (1). Although headaches can be seen as mild symptoms, they can also be seen as the first symptoms of a life-threatening disease or organic disorders, as a precursor of malignant conditions. Headaches are classified into two groups, primary and secondary, by the International Headache Society (IHS) (2). In this classification, primary headaches are direct headaches that are not related to any disease and are classified according to their symptoms and findings (2,3). In contrast, secondary headaches are pain that develops secondary to another underlying disease and is classified according to their etiology (2,4). Studies on headache have shown that headaches are detected at a rate of 2% among all emergency department (ED) admissions, and primary-type headaches are detected in 90% of patients (5). Secondary type headaches are 0.5-6% in all these applications. Headaches cause an average of 132 million working days, health expenditures of approximately 8 billion dollars, and job loss, which causes a severe economic problem for countries (6).

While primary headaches present symptoms unrelated to diseases of the central nervous system or other systems, secondary headaches present findings related to diseases involving the central nervous system or other systems (7). In addition, it has the character of a headache that subsides within three months or less after successful treatment of the disorder or its spontaneous resolution (8).

Although studies comparing primary and secondary headaches have been conducted in ED, prospective studies examining the epidemiological and clinical course of headaches and evaluating pain characteristics and imaging methods are scarce (9,10). Therefore, our aim in this study is to examine the socio-demographic and clinical characteristics of patients who applied to our ED with headache complaints and to evaluate

prospectively the relationship between the pain characteristics of the patients and their inter-clinical consultations radiological imaging and hospitalization and the decision to discharge

## MATERIALS AND METHODS

The study was conducted prospectively on patients between the ages of 18 and 70 who applied to the Istanbul Medeniyet University Göztepe Training and Research Hospital ED with a complaint of headache. Approval was obtained from the ethics committee of the Göztepe Training and Research Ethics Committee (25/H). Headaches were accepted as "primary type headache" when a structurally demonstrable cause, a systemic disease, or pain associated with a previous head trauma could be excluded by history, anamnesis, physical examination, and neurological examination. If there was a secondary event such as infection or tumor causing headache, this was accepted as the "secondary type headache criteria". Patients admitted to ED with headaches, had secondary headache criteria, were diagnosed and treated in ED were included in the study. Patients diagnosed with primary headache with additional systemic findings and whose medical records could not be analyzed were excluded from the study. Socio-demographic characteristics of the patients, ED admission examination findings, and examination results were recorded and compared with the pain characteristics.

### *Statistical Analysis:*

For these statistical studies, the data obtained from the patients were uploaded to the SPSS (Statistical Package for Social Science) computer program. The Chi-square test was used for cross-table comparison. When the number of observations was small in 2x2 tables, the Fisher-Exact test was used to evaluate. The student-t-test was used for data with standard variables to compare means, and the Mann-Whitney-U test was used to compare non-normally distributed pairwise means. After analysis of variance, Tukey, and Bonferroni multiple comparison tests were planned to be used for

multiple comparisons of the means. P values <0.05 were considered significant.

## RESULTS

A total of 200 patients who applied to the ED with the complaint of secondary type headache met the current inclusion criteria. Of the patients, 122 (61%) were female, and 78 (39%) were male. When the patients were evaluated according to their age, the mean age of the patients was 40.42±12.83 years and it was seen that the patients between the ages of 31-50 years were the most frequently (47.0%). In occupational groups, the rate of admission of housewives, workers, and officers was higher than in other occupational groups (42.5%, 23.0%, and 14.0%, respectively). On admission vital signs of the patients, 69.5% were normotensive, and 28.5% were hypertensive. Headache was accompanied by fever in 28%, and only one patient tended to sleep. Socio-demographic characteristics of the patients are shown in Table 1.

**Table 1:** Socio-demographic characteristics of the patients

|                      |             |
|----------------------|-------------|
| Age (Mean±Sd ) years | 40.42±12.83 |
| Gender               |             |
| Male n (%)           | 78(39.0)    |
| Female n (%)         | 122 (61.0)  |
| Marital status       |             |
| Married n (%)        | 118 (59.0)  |
| Single n (%)         | 58 (29.0)   |
| Widow n (%)          | 24 (12.0)   |
| Education            |             |
| Housewife n (%)      | 85 (42.5)   |
| Worker n (%)         | 46 (23.0)   |
| Officer n (%)        | 28 (14.0)   |
| Student n (%)        | 20 (10.0)   |
| Others n (%)         | 21 (10.5)   |

According to neurological examination findings, meningeal irritation findings were present in 8 (4%) patients, motor deficits in 6 (3%) patients, and pathological reflex and cranial nerve involvement in 5 patients (2.5%). Light reflex examination was normal in all patients. Radiological imaging was requested in 38.5% of the patients to make a differential diagnosis.

According to the radiological findings, computed tomography (CT) results were normal in 28.5%. In comparison, 3.5% had intracranial hemorrhage (ICH), 2.5% had subarachnoid hemorrhage (SAH), and % 1 had a subdural hematoma. Radiological imaging was not requested from 123 patients (61.5%) .

Patients were evaluated according to their pain characteristics, 50% had throbbing pain, and 29.5% had constrictive pain. Sudden onset pain type (83.0%) was the higher type of pain onset. When evaluated according to the response to analgesic treatment, the rate of patients who did not respond to analgesic treatment was higher (56.5%) than those who responded to analgesic treatment. When evaluated according to the relationship between pain character and radiological imaging, the rate of pathological findings on CT was significantly higher in patients with constrictive pain (p=0.019) (Table 2, Figure 1).

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According to hospitalization and discharge status in ED, 171 (85.5%) patients were discharged, and 29 (14.5%) patients were admitted to the service. When the hospitalization and discharge status, pain characteristics, and clinical consultations of the patients were evaluated, it was seen that the patients were mostly discharged from the hospital with (54.6%) complaints of throbbing pain. In addition, most hospitalized patients had a constrictive type of pain (69.0%), and the hospitalization rate of the patients for whom consultation was requested in the ED department was significantly higher than the others. (p<0.05) (Figure 2).

**Table 2:** Relationship between pain characteristics and computed tomography imaging features

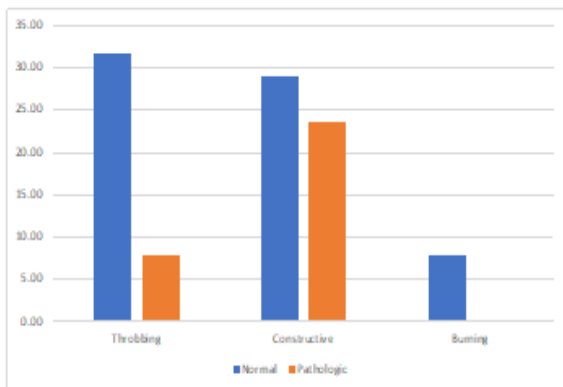
| Computed Tomography            | Pain Characteristics |              |         |
|--------------------------------|----------------------|--------------|---------|
|                                | Throbbing            | Constrictive | Burning |
| Normal n (%)                   | 24 (31.6)            | 22 (28.9)    | 6 (7.9) |
| Pathologic fetatures (+) n (%) | 6 (7.9)              | 18 (23.7)    | -       |
| Chi-square (p)                 | 0.019*               |              |         |

\*p values <0.05 are considered as significant

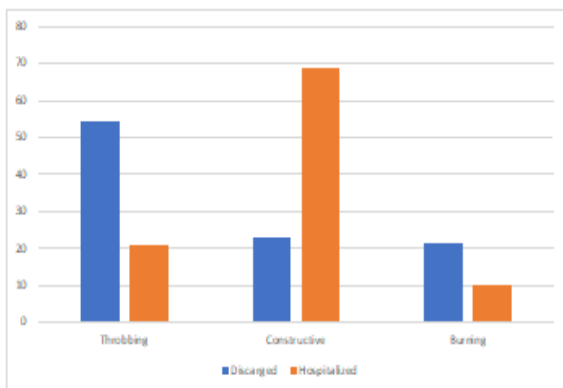
**Table 3:** The relationship between patients' pain characteristics and clinical consultations and hospital discharge

|                    | Pain Characteristics |              |           | Consultation |            |
|--------------------|----------------------|--------------|-----------|--------------|------------|
|                    | Throbbing            | Constrictive | Burning   | Yes          | No         |
| Discharged n (%)   | 94 (54.6)            | 39 (23.1)    | 36 (21.3) | 31 (17.8)    | 140 (81.9) |
| Hospitalized n (%) | 6 (20.7)             | 20 (69)      | 3 (10.3)  | 26 (89.7)    | 3 (10.3)   |
| Chi-square (p)     | <0.001*              |              |           | <0.001*      |            |

\*p values <0.05 are considered as significant.



**Figure 1:** Relationship between pain characteristics and computed tomography imaging features



**Figure 2:** The relationship between patients' pain characteristics and hospital discharge

## DISCUSSION

Headache is among the most common reasons for referral to ED, leading to personal, occupational, and socioeconomic poverty, significantly impacting the quality of life and life performance (11,12). In our study, we aimed to examine the clinical features of patients admitted to ED with secondary headaches and evaluate the relationship between pain characteristics imaging findings and patient outcomes.

In the study by Kelly et al. on the epidemiology, diagnosis, and treatment of 4536 patients with headache, CT imaging was performed in 36.6% of the patients. Pathological findings were detected in 9.9% (13). Again, in the same study, 7.1% of the patients had radiological imaging findings causing secondary headache, and the mortality rate was 0.3%. Similar to the studies performed in our study, CT imaging was applied to 38.5% of the patients, and pathological findings were ICH, SAH, and subdural hematoma. This situation has revealed to us how valuable imaging methods are in recognizing pathological findings with a high mortality rate and the importance of pain type, character, and duration in selecting imaging methods.

Evaluation of pain character and imaging findings reveals its importance for ED in the differential diagnosis of patients at risk of mortality and in the correct evaluation of imaging indications, considering the legal problems that may arise later.

In the study by Aygün et al., cerebrovascular disease was found in 71% of the patients who applied to the ED with sudden onset headache (14). The mortality rate was significantly high, indicating the need for caution in the emergency approach to patients with sudden headache. Similar to the studies conducted in our research, the rate of patients with sudden headache was 83.0%, and the patients who were hospitalized most frequently in ED were followed as ICH patients.

Studies have shown that all patients with focal neurological signs and symptoms have pathological findings on CT, and the coexistence of headache and focal finding positivity is a warning criterion for secondary headache (15). In our study, the association between headache and focal finding was 17%. These patients had pathological findings in their CT scans which showed us that patients with headache with focal positivity in neurological examinations might have a secondary type of headache with a high probability. Therefore, it is necessary to be more careful in approaching these patients.

When the patients were evaluated according to their hospital discharge, the hospitalization rate of the patients who were asked for consultation from the ED was significantly higher ( $p<0.05$ ), showing the importance and necessity of patient evaluation.

The present study has several limitations. First of all, the single-center nature of the study is an important limitation. However, in an emergency department with a high-volume patients were followed, all consecutive patients meeting the criteria were included, thus limiting patient selection bias.

Secondly, the association of infection findings with headache symptoms was found at a high rate, which is another limitation of the study.

In conclusion, headache constitutes an important part of ED applications. It is clear that there are diagnoses with

a high risk of secondary headache-related mortality among headache diagnoses. Accurate and adequate anamnesis, detailed physical examination, and imaging related to the indication remain important in distinguishing such critical patients in ED. For these reasons, we believe that the pain characteristics should be carefully questioned, and imaging indications should be evaluated. Final decisions should be made by cooperating with other clinics when necessary in diagnosing secondary type headache in patients presenting to the ED with headache.

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*Ethics Committee Approval:* The ethics committee approval of the study was obtained from the Göztepe Training and Research Ethics Committee (Decision no:25/H).

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