THE CLINICAL APPROACH TO HEADACHE IN THE EMERGENCY DEPARTMENT AND A COST ANALYSIS OF HEADACHE IN THE EMERGENCY MEDICINE SETTING

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Abstract

Relevance. Headaches are among the most common causes for emergency department (ED) referrals.

The aim of the present study was to analyze and review the costs of the patients who referred to ED due to headache.

Materials and methods. This study was conducted prospectively with patients who have referred because of headache between September, 1, 2017 and December, 31, 2017 (3 months. Age, gender, educational status, characteristics, smoking status and alcohol use, comorbidities, predisposing factors, headache characteristics, additional symptoms, physical examination findings, vital parameters, examinations ordered, and cost analysis were performed. The patients were divided into two groups as primary and secondary headache. The differences between Primary headache (PHA) and Secondary headache (CHA) of these data were evaluated.

Results. The median age of the patients was 40 (IQR:22) years;67.3% of the patients were female. The rate of the patients with PHA was 73.3% whereas 26.7% of the patients were SHA. The median age of the patients with SHA was detected higher than the patients with PHA ($p<0.05$). There was not any difference for gender, occupation, and social habits ($p>0.05$). Coronary artery disease (CAD), malignancy and chronic obstructive pulmonary disease (COPD)/asthma prevalence were significantly higher in patients with SHA ($p<0.05$). The frequency of PHA after stress, fatigue, insomnia, increased mental activity and intake of certain foods was detected higher ($p <0.05$). The prevalence of sudden onset was higher in patients with SHA ($p<0.05$). Location, characteristics, severity, and duration of the pain were detected similar between both groups ($p>0.05$). It was determined that overall condition was better in patients with PHA, and the rate of head & neck and neurological conditions was detected higher in patients with SHA ($p <0.05$). Fever and lower saturation levels were significantly higher in patients with SHA ($p<0.05$). Pathological findings were detected in 50% of hemogram analyses, 66.7% of blood gas analyses, 41.6% of complete blood count analyses, 75% of direct X-rays, 42.8% of CTs, 75% of 4 diffusion MRIs, and 50% of LP analyses. Mean ED cost of patients with PHA was 2.3 USD (IQR: 1.2USD), and mean ED cost of patients with SHA was 13.3 USD (IQR: 17.5 $). ED cost of patients with SHA was significantly higher than those with PHA ($p<0.05$).

Conclusion. It was detected that costs of patients whom SHA was considered are higher than those whom PHA was considered. The most significant cause for this depends on the fact that some symptoms and findings exist both in PHA and SHA. We believe that a comprehensive evaluation of these patients may reduce the number of tests and costs accordingly.

Key words: Headache, emergency department, cost analysis.

Резюме

КЛИНИЧЕСКИЙ ПОДХОД И АНАЛИЗ ЗАТРАТ НА ПАЦИЕНТОВ С ГОЛОВНОЙ БОЛЬЮ В УСЛОВИЯХ ОТДЕЛЕНИЯ НЕОТЛОЖНОЙ МЕДИЦИНЫ

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Актуальность. Головная боль является одной из наиболее частых причин обращения в отделение неотложной медицины.

Целью настоящего исследования было проанализировать затраты на обслуживание пациентов, которые обратились в отделение неотложной медицины из-за головной боли.

Материалы и методы. Исследование было проведено проспективно с включением пациентов, которые обратились за помощью из-за головной боли в период с 1 сентября 2017 г. по 31 декабря 2017 г. (3 месяца).

Учитывались возраст, пол, образовательный статус, характеристики, статус курения и употребления алкоголя, сопутствующие заболевания, предрасполагающие факторы, характеристики головной боли, дополнительные симптомы, результаты физикального обследования, жизненно важные параметры, назначенные обследования и анализ затрат. Пациенты были разделены на две группы с первичной и вторичной головной болью. Были оценены различия данных между первичной головной болью (ПГБ) и вторичной головной болью (ВГБ).

Результаты. Средний возраст пациентов составлял 40 лет (IQR: 22) лет; 67,3% пациентов составляли женщины. Удельный вес пациентов с ПГБ составил 73,3%, тогда как 26,7% пациентов были с ВГБ. Средний возраст пациентов с ВГБ был выше, чем у пациентов с ПГБ (p <0,05). Не было установлено различий по полу, роду занятий и социальным привычкам (p> 0,05). Ишемическая болезнь сердца (ИБС), злокачественные новообразования и хроническая обструктивная болезнь легких (ХОБЛ) / астма встречались значительно выше у пациентов с ВГБ (p <0,05). Частота ПГБ была выше после стресса, переутомления, бессонницы, повышения умственной активности и приема определенных продуктов (p <0,05). Внезапное начало было характерно для пациентов с ВГБ (p <0,05). Локализация, характеристики, тяжесть и продолжительность боли были одинаковыми в обеих группах (p> 0,05). Было определено, что общее состояние было лучше у пациентов с ПГБ, а частота черепно-мозговых, шейных и неврологических состояний была выше у пациентов с SHA (p <0,05). Лихорадка и более низкая сатурация были значительно выше у пациентов с ВГБ (p <0,05). Патологические изменения были обнаружены в 50% анализов гемограммы, 66,7% анализов газов крови, 41,6% общих анализов крови, 75% прямых рентгеновских лучей, 42,8% КТ, 75% 4 диффузионных МРТ и 50% ЛП анализы. Средняя стоимость пребывания для пациентов с ПГБ составила 2,3 доллара США (IQR: 1,2 доллара США), а для пациентов с ВГБ она составила 13,3 доллара США (IQR: 17,5 доллара США) (p <0,05).

Заключение: было установлено, что затраты на пациентов, у которых учитывалась ВГБ, выше, чем у пациентов, у которых учитывалась ПГБ. Наиболее значимая причина этого зависит от того факта, что некоторые симптомы существуют как при ПГБ, так и при ВГБ. Мы считаем, что всестороннее обследование этих пациентов может соответственно сократить количество исследований и расходы.

Ключевые слова: головная боль, отделение неотложной помощи, анализ затрат.

Түйіндеме

ШҰҒЫЛ МЕДИЦИНА БӨЛІМШЕСІ ЖАҒДАЙЫНДА БАС АУРУЫ БАР ПАЦИЕНТТЕРГЕ АРНАЛҒАН КЛИНИКАЛЫҚ ТӘСІЛ ЖӘНЕ ШЫҒЫНДАРДЫ ТАЛДАУ

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Өзектілік. Бас ауруы-шұғыл медициналық көмекке жүгінудің жиі кездесетін себептерінің бірі.

Бұл зерттеудің **мақсаты** бас ауруына байланысты жедел медициналық көмекке жүгінген пациенттерге қызмет көрсету шығындарын талдау болды.

Материалдар мен әдістер. Зерттеу 2017 жылдың 1 қыркүйегі мен 2017 жылдың 31 желтоқсаны (3 ай) аралығында бас ауруы салдарынан көмек сұраған пациенттердің қатысуымен жүргізілді. Жасы, жынысы, білім беру жағдайы, сипаттамалары, темекі шегу және алкогольді тұтыну жағдайы, ілеспе аурулар, алдын-ала болжайтын факторлар, бас ауруының сипаттамалары, қосымша белгілер, физикалық емтихан нәтижелері, өмірлік маңызды параметрлер, тағайындалған емтихандар және шығындарды талдау ескерілді. Науқастар үнемі және қайталама бас ауруы бар екі топқа бөлінді. Үнемі бас ауруы (ҮБА) мен уақытша бас ауруы (УБА) арасындағы мәліметтер арасындағы айырмашылықтар бағаланды.

Нәтижелері. Пациенттердің орташа жасы 40 жасты (IQR: 22) құрады; пациенттердің 67,3% - ын әйелдер құрады. ҮБА бар пациенттердің үлес салмағы 73,3% - ды құрады, ал пациенттердің 26,7% - ы УБА-мен болған. УБА бар пациенттердің орташа жасы ҮБА (p <0,05) бар пациенттерге қарағанда жоғары болды. Жынысы, кәсіби және әлеуметтік әдеттері бойынша айырмашылықтар анықталған жоқ (p> 0,05). Жүректің ишемиялық ауруы (ЖИА), қатерлі ісіктер және өкпенің созылмалы обструктивті ауруы (ӨСОА) / демікпе УБА (p <0,05) бар пациенттерде айтарлықтай жоғары кездескен. PGB жиілігі стресстен, шамадан тыс жұмыстан, ұйқысыздықтан, ақыл-ой белсенділігінің жоғарылауынан және белгілі бір тағамдарды қабылдағаннан кейін жоғары болды (p <0,05). Кенеттен басталуы УБА (p <0,05) бар пациенттерге тән болды. Ауырсыну локализациясы, сипаттамалары, ауырлығы және ұзақтығы екі топта да бірдей болды (p> 0,05). ҮБА-мен ауыратын науқастарда жалпы жағдай жақсырақ екендігі анықталды, ал бас сүйек-ми, жатыр мойны және неврологиялық жағдайлар SHA (p <0,05) пациенттерінде жоғары болды

УБА (p <0,05) бар пациенттерде қызба және төменгі сатурация айтарлықтай жоғары болды. Патологиялық өзгерістер гемограмма талдауларының 50% - ында, қан газдарының талдауларының 66,7% - ында, жалпы қан талдауларының 41,6% - ында, тікелей рентген сәулелерінің 75% - ында, КТ-ның 42,8% - ында, диффузиялық МРТ-ның 75% - ында және ЛП-ның 50% - ында анықталды. УБА бар пациенттер үшін болудың орташа құны 2,3 АҚШ долларын (IQR: 1,2 АҚШ доллары), ал УБА бар пациенттер үшін ол 13,3 АҚШ долларын (IQR: 17,5 АҚШ доллары) (p <0,05) құрады.

Қорытынды: УБА есепке алынған Пациенттерге арналған шығындар УБА есепке алынған пациенттерге қарағанда жоғары екендігі анықталды. Мұның ең маңызды себебі кейбір белгілердің УБА-да да, УБА-да да болатындығына байланысты. Біз бұл науқастарды жан-жақты тексеру сәйкесінше зерттеулер мен шығындарды азайтуы мүмкін деп санаймыз.

Түйінді сөздер: Бас ауруы, Жедел жәрдем бөлімшесі, Шығындарды талдау.

Introduction

Headache (HA) has an important place among referrals to emergency department (ED) with an incidence of 1% to 16% among all ED referrals [10, 22, 21]. Although there are hundreds of causes for headache, 98% of these are benign [22, 6]. Remaining 2% may cause severe mortality and morbidity (2, 4).

HAs are divided into two groups as primary headache (PHA) and secondary headache (SHA). A significant pathology may underlie in SHA (intracranial hemorrhage, stroke, and meningitis/encephalitis). PHAs are the remaining headaches after exclusion of SHAs (migraine, cluster and tension), and they do not require urgent intervention. However, type of PHA should be detected, and treatment should be provided [6].

Costs of advanced tests may cause a dilemma in physicians due to the risk of missing SHAs in the ED. However, exclusion of life threatening SHAs is the actual focus point of evaluation of AS. During the evaluation, detailed questioning of the past, pain characteristics and physical examination are essential [6].

Although the use of brain tomography (CT) and magnetic resonance (MRI) has increased dramatically over the years, it was observed that the follow-up period of patients is shortened [9]. However, majority of SHAs are diagnosed in the ED [2].

The aim of the present study was to analyze and review the costs of the patients who referred to ED due to headache.

Material and method

This study was conducted prospectively with patients who have admitted to emergency department of Bolu Izzet Baysal Faculty of Medicine because of headache between October, 1, 2017 and December, 31, 2017 (3 months).

Patients were classified according to the criteria of the 3rd International Classification of Headache Diseases [28]. Age, gender, educational status, characteristics, smoking status and alcohol use, comorbidities, predisposing factors, headache characteristics, additional symptoms, physical examination findings, vital parameters, examinations ordered, and cost analysis were performed. The patients were divided into two groups including PHA and SHA. Differences of the variables between the groups were evaluated.

The study included adult, non-pregnant patients with GCS >14 whose file information was accessed.

Minor patients, patients with history of trauma within last 3 months or pregnant patients, patients whose files were not accessed or deficient were excluded.

The study data were recorded in the computer and evaluated through SPSS (Statistical Package for Social Sciences) Windows 22.0 program. Median, interquartile range (IQR), number of cases and percentile were used to display descriptive statistics. The distribution of the data was evaluated by Kolmogorov Smirnov test. Analysis of non-parametric data between groups was performed through Mann Whitney-U test and categorical variables analysis was conducted with Pearson chi-square test. Results were evaluated at a p value below 0.05 within a confidence interval of 95%.

Results

The median age of the patients was 40 (IQR:22) years;67.3% of the patients were female. One hundred and ten patients (73.3%) were evaluated as PHA whereas 40 (26.7%) patients were evaluated as SHA. The most common cause for PHA was migraine (68.2%), and the most common cause for SHA was respiratory tract infections (60%) (Table 1).

Headache classification.

	Diagnosis	N	%
Primary headache (n:110)	Migraine	75	68.2
	Tension type headache (TTH)	28	25.5
	Cluster headache (TTH)	5	4.5
	Unclassified	2	1.8
Secondary headache (n:40)	Respiratory Tract infections	24	60.0
	İschemic stroke	6	15.0
	Hypertension	4	10
	Corbonmonoxide poisoning	2	5.0
	Hyponatremia	1	2.5
	Encephalitis	1	2.5
	Hemorrhagic stroke	2	5.0

The median age of the patients with SHA was significantly higher than the patients with PHA (p<0.05) in our study. There was not any difference for gender, occupation, and social habits (p>0.05). Coronary artery disease (CAD), malignancy and chronic obstructive pulmonary disease (COPD)/asthma prevalence were significantly higher in patients with SHA (p<0.05) (Table 2).

Comparison of sociodemographic characteristics and co-morbidities with headache type.

		Total (n:150)	Primary headache (n:110)	Secondary headache (n:42)	p
Age (years), Median (IQR)		40 (27)	38 (26)	47.5 (34)	0.016
Gender, n(%)	Male	49 (32.7)	35 (31.8)	14 (35)	0.713
	Female	101 (67.3)	75 (68.2)	26 (65)	
Profession, n(%)	Working	54 (36)	41 (37.3)	13 (32.5)	0.590
	Not working	96 (64)	69 (62.7)	27 (67.5)	
Education, n(%)	Literate	4 (2.7)	2 (1.8)	2 (5)	0.768
	Elementary school	62 (41.3)	45 (40.9)	17 (42.5)	
	High school	38 (25.3)	28 (25.5)	10 (25)	
	University	46 (30.7)	35 (31.8)	11 (27.5)	
Habits, n(%)	Smoking	37 (24.7)	31 (28.2)	6 (15)	0.098
	Alcohol	4 (2.7)	4 (3.6)	0	0.222
Comorbidities, n(%)	Hypertension	31 (20.7)	21 (19.1)	10 (25)	0.429
	Diabetes mellitus	10 (6.7)	6 (5.5)	4 (10)	0.324
	Collagen tissue disease	21 (14)	14 (12.7)	7 (17.5)	0.456
	Coronary artery disease	9 (6)	3 (2.7)	6 (15)	0.005
	Asthma/COPD	8 (5.3)	3 (2.7)	5 (12.5)	0.018
	Malignancy	4 (2.7)	1 (0.9)	3 (7.5)	0.029
	Hematological diseases	4 (2.7)	2 (1.8)	2 (5)	0.289
	Chronic renal failure	2 (1.3)	1 (0.9)	1 (2.5)	0.453
	Other	17 (11.3)	12 (10.9)	5 (12.5)	0.786

IQR: Interquartile range, COPD: chronic obstructive pulmonary disease

The frequency of PHA after stress, fatigue, insomnia, increased mental activity and intake of certain foods was detected higher (p <0.05). The prevalence of sudden onset was higher in patients with SHA (p<0.05). Location, characteristics, severity, and duration of the pain were detected similar between both groups (p>0.05). There was not any difference for symptoms (p>0.05). It was determined that overall condition was better in patients with PHA, and the rate of head & neck and neurological conditions was detected higher in patients with SHA (p <0.05). Fever and lower saturation levels were significantly higher in patients with SHA (p<0.05). In our study, mean ED cost of patients with PHA was 2.3 USD (IQR: 1.2USD), and mean ED cost of patients with SHA was 13.3 USD (IQR: 17.5 $). ED cost of patients with SHA was significantly higher than those with PHA (p<0.05)   (Table 3).

Table 3.

Comparison of predisposing factors, pain characteristics, additional symptoms, vital signs, physical examination, and cost with pain type.

			Total (n:150)	Primary headache (n:110)	Secondary headache (n:42)	p
Predisposing factors, n(%)	Fasting		41 (27.3)	31 (28.2)	10 (25)	0.699
	Stress		91 (60.7)	73 (66.4)	18 (45)	0.018
	Fatigue		41 (27.3)	35 (31.8)	6 (15)	0.041
	Insomnia		69 (46)	59 (53.6)	10 (25)	0.002
	Menstrual cycle		18 (12)	17 (15.5)	1 (2.5)	0.031
	Increased Physical Activity		27 (18)	22 (20)	5 (12.5)	0.290
	Increased Mental Activity		23 (15.3)	21 (19.1)	2 (5)	0.034
	Foods		11 (7.3)	11 (10)	0	0.038
Pain Characteristics, n(%)	Initial	Sudden	66 (44)	43 (39.1)	23 (57.5)	0.045
		Slow	84 (56)	67 (60.9)	17 (42.5)	
	Location	Nape	33 (22)	26 (23.6)	7 (17.5)	
		Frontal	2 (1.3)	2 (1.8)	0	
		Eyes	13 (8.7)	9 (8.2)	4 (10)	0.827
		Temple	1 (0.7)	1 (0.9)	0	
		Unilateral	42 (28)	31 (28.2)	11 (27.5)	
		Common	59 (39.3)	41 (37.3)	18 (45)	
	Characteristics	Stinging	12 (8)	8 (7.3)	4 (10)	
		Compressing	36 (24)	24 (21.8)	12 (30)	0.618
		Burning	11 (7.3)	9 (8.2)	2 (5)	
		Throbbing	91 (60.7)	69 (62.7)	22 (55)	
	Severity	Mild	9 (6)	7 (6.4)	2 (5)	
		Moderate	50 (33.3)	40 (36.4)	10 (25)	0.366
		Severe	91 (60.7)	63 (57.3)	28 (70)	
	Duration	Minutes	10 (6.7)	10 (9.1)	0	
		Days	56 (37.3)	40 (36.4)	16 (40)	0.143
		Hours	84 (56)	60 (54.5)	24 (60)	
Additional symptoms, n(%)	Nausea		91 (60.7)	66 (60)	25 (62.5)	0.782
	Dizziness		48 (32)	31 (28.2)	17 (42.5)	0.096
	Vomiting		44 (29.3)	33 (30)	11 (27.5)	0.766
	Syncope		5 (3.3)	2 (1.8)	3 (7.5)	0.086
	Fever		24 (16)	16 (14.5)	8 (20)	0.420
	Photophobia		72 (48)	49 (44.5)	23 (57.5)	0.160
	Fonophobia		55 (36.7)	41 (37.3)	14 (35)	0.798
	Ipsilateral myosis		3 (2.7)	3 (2.7)	0	0.291
	Ipsilateral pitosis		5 (3.3)	3 (2.7)	2 (5)	0.493
	Ipsilateral sweating		5 (3.3)	3 (2.7)	2 (5)	0.493
	Eyelid edema		6 (4)	5 (4.5)	1 (2.5)	0.572
	Conjunctival bleeding		1 (0.7)	1 (0.9)	0	0.545
	Lacrimation		11 (7.3)	10 (9.1)	1 (2.5)	0.171
	Nasal Congestion		8 (5.3)	7 (6.4)	1 (2.5)	0.352
Physical examination, n(%)	Overall status	Well	141 (94)	106 (96.4)	35 (87.5)	0.043
		Moderate	9 (6)	4 (3.6)	5 (12.5)	
	Head & Neck		21 (14)	3 (2.7)	18 (45)	<0.001
	Respirator system		18 (12)	11 (10)	7 (17.5)	0.211
	Cardiovascular System		3 (2.0)	3 (2.7)	0	0.291
	central nervous system		3 (2.0)	0	3 (7.5)	<0.001
	Limbs		3 (2.0)	1 (0.9)	2 (5)	0.114
Vital parameters, Median (IQR)	Systolic blood pressure, (mmHg)		128 (23)	128 (22)	128.5 (28)	0.817
	Diastolic blood pressure, (mmHg)		80 (17)	82 (16)	77.5 (13)	0.099
	Pulse (beat/min)		85 (22)	85 (23)	82.5 (22)	0.481
	Saturation, (%)		97 (3)	98 (2)	96 (2)	0.001
	Fever, (^{O}C)		36.7 (0.38)	36.6 (0.3)	36.8 (0.8)	0.022
Cost ($), Median (IQR)			2.4 (3.1)	2.3 (1.2)	13.3 (17.5)	<0.001

Pathology was detected in 50% of 10 hemogram analyses, in 66.7% of 3 blood gas analyses, 41.6% of 12 complete blood count analyses, 75% of 12 direct X-ray analyses, 42.8% of 7 CT scans, 75% of 4 diffusion MRIs, and half of 2 patients who had lumbar puncture (LP).

Discussion

Headache is one of the common reasons for referring to AS, and it is necessary to investigate/exclude the causes of SHA. Failure to detect the actual cause may cause dramatic consequences [8]. Some points detected in anamnesis and physical examination in detecting SBAs was defined as red flags. The presence of advanced age, exertional, positional, sudden, severe (thunder-style), post-traumatic, meningeal irritation findings, fever, neurological abnormalities, and significant comorbidities should suggest the causes of SHA and direct the clinician to investigate [8]. Locker et al. stated that SHA should not be considered in patients below 50 years of age who do not present sudden onset with normal neurological examination [16].

Muron-Ceroz et al. stated that 59.4% of the patients who referred to the emergency department with BA were PHA, and among these PHA causes, the most common cause was migraine, this was followed by tension-type headache (TTH) [21]. Handschin et al. reported that 73% of the patients had PHA; therefore no imaging was performed and the abnormality was significant in two-thirds of those who were imaged. The most common lesion detected was reported as subacute stroke [10]. Mert et al. stated in their study that 27% of the patients who referred to ED had SHA [18]. Acıkgoz et al. reported in their study that 58.5% of HAs were GTB, and 41.5% of them were migraine [1]. Friedman et al. reported that 309 of 480 patients with HA had PHA, 60% of these had migraine, 11% of them had TTH, 1% had trigeminal autonomic HA, and 26% had unclassified HA [7]. Şahin et al. stated that 58.7% of the patients had PHA, the most common cause of PHA was migraine, and the respiratory tract infection was the most common cause for SHA [13]. In the present study, PHA prevalence was detected 73.3%, the most common cause for PHA was migraine, and the most common cause for SHA was respiratory tract infections; ischemia was detected in patients with intracranial lesion. Our data comply with the literature. We believe that all causes of cases with SHA will not be due to intracranial causes. Due to the fact that our study was conducted during the winter period, we think that infections, especially sinusitis, and carbon monoxide poisoning also have caused SHA.

Muron-ceroz et al. expressed in their study that 77.8% of the patients who referred to the emergency department with HA were women and the median age of women was 37.8 years and the median age of men was 40.2 years [21]. It was expressed in the study above that prevalence of SHA increased after 50 years of age [21]. Nevman et al. stated that the risk of SHA is lower in patients who have referred to ED before 55 years of age [22]. Handschin mentioned in their study that the age average of the patients who had significant pathology in patients whom imaging was performed was higher; however, gender is not associated with the severity of the pathology [10]. Mert et al. stated in their study that the average age of patients with SHA was higher in patients who referred to ED and gender was ineffective on the type of HA [18]. In the present study,

prevalence of female patients was detected higher. The age average of patients with PHA was significantly lower; and there was not any difference between the groups for gender. Since prevalence of migraine which is the most common diagnosis group was higher in women, we believe that prevalence of women is higher in our population and the age average is lower due to the lower age average in this group. Furthermore, the fact that stress factors associated with work in the younger population may be related to TTH which is one of the causes of PBA. Higher number of causes for SHA may be associated with advanced age, and the more frequent vascular pathologies such as stroke and intracranial hemorrhage at later ages.

Previous studies stated that social characteristics such as employment status, marriage, smoking and alcohol are not effective on HA [18, 25,11,4]. Davis Martin et al. reported that there is not an exact association between PHA and alcohol use, and alcohol may accelerate HA attacks in some vulnerable individuals [4]. Sirin stated in his study that educational status affects the diagnosis duration in migraine patients [26]. It was expressed that alcohol and smoking are effective on migraine attack [26]. It was detected that education, working status and social habits were ineffective on the type of BA in our study. We believe that although education and work status have an impact on the stress and life of the individual, it does not directly affect the physiology of the pain. We believe that smoking and alcohol do not make a difference between the groups because they are effective on both PHA and SHA.

Although the importance of comorbidity in HA was emphasized by many researchers, it was not used as a classification tool in the differential diagnosis of HA [3,17]. It is expressed that causes of SHA should be focused in case of human immunodeficiency virus (HIV) and malignancy in patients who have referred to ED due to HA [22,6]. Handschin et al. stated in their study that the frequency of malignancy was high in patients with special features in imaging, and other comorbidity and immune system suppression were not associated with the detection of features in imaging [10]. A previous study conducted in our country reported that prevalence of SHA increased by co-morbid factors [18]. It was determined that CAD, malignancy and asthma/COPD increased significantly in patients with SHA, and other comorbid factors were found to be more common in patients with SHA; however, it was not statistically significant. We believe that this condition may be related with the comorbidity that increases with age, and increasing risk factors may lead to intracranial pathologies by increasing vascular pathologies. Furthermore, it should be noted that the comorbidity developing in later ages and the drugs used may have adversely affected the immune system and led to infective causes more frequently.

Stress, fatigue, depression or HAs triggered by hunger are commonly observed in migraine or TTHs [22]. Mert et al. stated in their study that stress factors are lower in patients with SHA [18]. It was stated that stress, mental tension, menstruation, alcohol, climate change, some foods and smoking trigger the attack in migraine patients [13]. Some factors such as hunger and increased physical activity had no effect on the type of HA in our study; however, stress, fatigue, menstrual cycle, increased mental

activity, and some foods were found to be involved in the etiology of PHA prevalence. We believe that stress, fatigue and increased mental activity increase the frequency of TTH whereas stress, menstrual cycle and some foods trigger migraine.

Studies have emphasized that the character of the pain is important for the type of HA. It is stated in aforesaid studies that those with onset, with different severity from previous pain episodes, and with increased frequency and intensity may indicate SBA [22, 6]. Mert et al. reported that the prevalence of unilateral headache is higher in PHA; and SHA is higher on calvarial zone [18]. Handschin et al. stated that the onset, duration and severity of headache were similar between patients with specific and nonspecific features in imaging [10]. Sirin stated in his study that the majority of the patients described the severity of pain as very higher [13]. Migraine is a pathology presenting with attacks of which each attack lasts for 4 to 72 hours [20]. The pain duration in TTH varies between 30 minutes and 7 days. The patient has pain for approximately 15 days in a month and this pain may become continuous over time (11, [14]. In our study, it was found that pain with sudden onset was significantly higher in SBAs; however, but there was not any association between pain type and localization, pain duration, and pain type. We believe that patients who present with PBA may easily describe when and how the pain begins; however, they cannot report the character and localization of the pain. Longer duration of pain (especially migraine) in PHAs and delay in diagnosis of SHA may have caused no difference between the groups. Furthermore, since all individuals with HA defend that their pain is always very severe regardless from the pain type, this might have caused the difference between the groups.

Multiple symptoms such as photophobia, phonophobia or osmophobia in migraine and may be associated with nausea with or without vomiting [22]. Nausea is detected by 90% and vomiting is detected by 30% in migraine patients [27]. Patients with cluster headache experience one or more ipsilateral autonomic symptoms such as lacrimation, conjunctival injection, nasal congestion, ptosis, miosis, eyelid edema and swelling of the forehead [22]. Vomiting is not expected in TTH, and nausea is very rare. It is also known that TTH is associated with stress disorder and this stress is one of the causes of nausea [5]. It was stated that causes of SHA should be considered in patients who have referred to ED due to HA expressing projectile vomiting and systemic pathological findings (fever, neck stiffness, rash) [22, 6]. Munoz-Ceron et al. reported in their study that pain features and other symptoms (diplopia, vertigo and syncope) in PHA and SHA [21]. Handschin et al. stated in their study that there is not any difference between patients with specific and nonspecific imaging characteristics in imaging forfever, cough, exhaustion, fatigue, nausea and vomiting, visual disorder, syncope, headache, physical activity as well as neck stiffness [10]. No association was detected between symptoms and HA type in our study. We believe that there is no significant difference between the groups because some symptoms are observed in both groups (nausea, dizziness, etc.) and some symptoms are rarely observed.

A detailed physical and especially neurological examination should be performed in patients who refer to ED due to HA. Especially focal neurological deficits may indicate structural brain disease and require neuroimaging [22]. It was stated that the abnormality in neurological examination in patients with HA belongs to SHA [22, 6]. Handschin et al. found that patients with specific CT findings had dizziness, the frequency of pathology was high and the Glasgow Coma Scale (GCS) was lower in their neurological examination [10]. It was shown in a study that abnormal neurological examination, sudden and sleep-onset headache were not statistically significant [21]. It was determined in our study that overall condition was better in patients with PHA, and the frequency of pathology found in head-neck and neurological examination was more pathological in patients with SHA. We believe that patients with intracranial pathology present neurological findings and such pathologies cause deterioration in overall condition depending on affecting many systems by causing imbalance in cytokine and neurotransmitter balance in the brain. Furthermore, we believe that the pathology prevalence in head and neck examination is higher, since respiratory system infections, especially sinusitis, are among the secondary causes.

Locker et al. emphasized that body temperature, blood pressure etc. among vital signs are insufficient to exclude secondary headache [10]. Handschin et al. stated in their study that presence of any feature in imaging are not associated with vital signs (1). In our study, it was found that body temperature was higher, saturation was lower in patients with SHA, and other parameters were similar between the groups. We believe that patients with SHA have higher body temperature and lower saturation due to both intracranial infections and respiratory tract infections. We believe that the values were similar due to the other (blood pressure and pulse rate) affecting both groups at a similar rate.

Although no abnormality was found in approximately 95% of all examinations performed under ED conditions, it was stated that it should be investigated [8]. In a previous study, 3-year CT results of patients who referred due to HA were evaluated and it was reported that serious pathology was detected in 10% of the cases [13]. A previous study reported significantly positive CT findings by 2.2% in patients who referred to the emergency department due to HA [23]. Locker et al. stated in their study that 81.2% of the patients had PHA, 21.8% of all patients needed CT and 6.5% of them needed LP. They stated that 80.5% of the patients who had CT scan were normal, and 78.3% of the patients who had LP were normal. [24]. Miller et al. stated that although unnecessary tests were required in cases with HA in ED, these patients were not followed up by increased deaths or missed diagnoses after discharge [19]. Pathological findings were detected in 50% of hemogram analyses, 66.7% of blood gas analyses, 41.6% of complete blood count analyses, 75% of direct X-rays, 42.8% of CTs, 75% of 4 diffusion MRIs, and 50% of LP analyses ordered in our study. Our results show that fewer tests are required and more pathologyis detected compared to the literature. We believe that evaluation of the patients by the emergency specialist, deepening of the anamnesis, complete physical examination and prolonging the patient follow-up period contributed to this result.

There is no need for additional examination in patients with suspected PHA in AS; however; additional tests may be required to find the cause in patients who are suspected to have SHA [19]. It was stated that the cost in cases where imaging to the emergency service was used was approximately 3 times more than the cost of patients who referred to the outpatient clinic with headache; consequently, they emphasized that the examinations requested in ED had limited cost effectiveness [12]. It was stated in a previous study that family physicians also cause an additional financial burden to determine the factors that cause PHA in patients with PHA who are referred to neurology 24]. It was determined in our study that the cost of patients with SHA was higher than patients with PHA. We believe that the cost has increased due to the increase in the frequency of additional examinations in order to determine the etiological factor causing SHA and additional pathologies caused by SHA.

Consequently, it was detected that costs of patients whom SHA was considered are higher than those whom PHA was considered. The most significant cause for this depends on the fact that some symptoms and findings exist both in PHA and SHA. We believe that a comprehensive evaluation of these patients may reduce the number of tests and costs accordingly.

References:

1. *Açıkgöz N.P., İlhan A.* İlimizde Genç Erişkin ve Erişkin Yaş Grubu Bireylerde Baş Ağrısı Karakteristikleri.J Turgut Ozal Med Cent 2013:20(3):232-6.

2. *Bahra A., Evans R.W.* The Secondary Headaches. SAGE Publications Sage UK: London, England; 2021. pp.56-59

3. *Clinch C.R.* Evaluation of acute headaches in adults. American family physician. 2001;63(4):685.

4. *Davis-Martin R.E., Polk A.N., Smitherman T.A.* Alcohol use as a comorbidity and precipitant of primary headache: review and meta-analysis. Current pain and headache reports. 2017;21(10):1-12.

5. *Duran A.* Psikiyatride ilaçla tedavi. İ.Ü. Cerrahpaşa Tıp Fakültesi Sürekli Tıp Eğitimi Etkinlikleri 2008 S:275-302.

6. *Filler L., Akhter M., Nimlos P., editors.* Evaluation and management of the emergency department headache. Seminars in neurology; 2019: Thieme Medical Publishers. p.450

7. *Friedman B.W., Hochberg M.L., Esses D., Grosberg B., Corbo J., Toosi B., et al.* Applying the International Classification of Headache Disorders to the emergency department: an assessment of reproducibility and the frequency with which a unique diagnosis can be assigned to every acute headache presentation. Annals of emergency medicine. 2007;49(4):409-19. e9.

8. *Giamberardino M.A., Affaitati G., Costantini R., Guglielmetti M., Martelletti P.* Acute headache management in emergency department. A narrative review. Internal and emergency medicine. 2020;15(1):109-17.

9. *Gilbert J.W., Johnson K.M., Larkin G.L., Moore C.L.* Atraumatic headache in US emergency departments: recent trends in CT/MRI utilisation and factors associated with severe intracranial pathology. Emergency medicine journal. 2012;29(7):576-81.

10. *Handschin N., Oppliger M., Brehm A., Psychogios M., Bonati L., Nickel C.H., et al.* Nontraumatic Headache in Adult Emergency Patients: Prevalence, Etiologies, and Radiological Findings. Journal of clinical medicine. 2020;9(8):2621.

11. *Johnsen M.B., Winsvold B., Børte S., Vie G.Å., Pedersen L.M., Storheim K., et al.* The causal role of smoking on the risk of headache. A Mendelian randomization analysis in the HUNT study. European journal of neurology. 2018;25(9):1148-e102.

12. J*ordan Y.J., Lightfoote J.B., Jordan J.E.* Computed tomography imaging in the management of headache in the emergency department: cost efficacy and policy implications. Journal of the national medical association. 2009;101(4):331-5.

13. *Kahn C.E., Jr., Sanders G.D., Lyons E.A., Kostelic J.K., MacEwan D.W., Gordon W.L.* Computed tomography for nontraumatic headache: current utilization and cost-effectiveness. Canadian Association of Radiologists journal = Journal l'Association canadienne des radiologistes. 1993;44(3):189-93

14. *Karadaş Ö.* Tension Type Headache: Evaluation of Chronic Type.J Clin Anal Med 2013;4(6): 522-6.

15. *Locker T.E., Thompson C., Rylance J., Mason S.M.* The utility of clinical features in patients presenting with nontraumatic headache: an investigation of adult patients attending an emergency department. Headache: The Journal of Head and Face Pain. 2006;46(6):954-61.

16. *Locker T.E., Thompson C., Rylance J., Mason S.M.* The utility of clinical features in patients presenting with nontraumatic headache: an investigation of adult patients attending an emergency department. Headache: The Journal of Head and Face Pain. 2006;46(6):954-61.

17. *Maizels M.* The patient with daily headaches. American family physician. 2004;70(12):2299-306.

18. *Mert E., Özge A., Taşdelen B., Yılmaz A., Bilgin N.G.* What clues are available for differential diagnosis of headaches in emergency settings? The journal of headache and pain. 2008;9(2):89-97.

19. *Miller D.G., Vakkalanka P., Moubarek M.L., Lee S., Mohr N.M.* Reduced Computed Tomography Use in the Emergency Department Evaluation of Headache Was Not Followed by Increased Death or Missed Diagnosis. The western journal of emergency medicine. 2018;19(2):319-26.

20. *Mu J., Chen T., Quan S., Wang C., Zhao L., Liu J.* Neuroimaging features of whole-brain functional connectivity predict attack frequency of migraine. Human brain mapping. 2020;41(4):984-93.

21. *Munoz-Ceron J., Marin-Careaga V., Peña L., Mutis J., Ortiz G.* Headache at the emergency room: Etiologies,

diagnostic usefulness of the ICHD 3 criteria, red and green flags. PLoS One. 2019;14(1):e0208728.

22. *Newman L.C., Lipton R.B..* Emergency department evaluation of headache. Neurologic clinics. 1998;16(2):285-303.

23. *Quon J.S., Glikstein R., Lim C.S., Schwarz B.A.* Computed tomography for non-traumatic headache in the emergency department and the impact of follow-up testing on altering the initial diagnosis. Emergency radiology. 2015;22(5):521-5.

24. *Rasmussen B.K., Jensen R., Olesen J.* Impact of headache on sickness absence and utilisation of medical services: a Danish population study. Journal of epidemiology and community health. 1992;46(4):443-6.

25. *Roslan M.Z.* Relationship Between The Number of Cigarettes Per Day and Caffeine Intake on Headache Intensity in Faculty of Medicine Student Batch 2016 of Universitas Sumatera Utara. Asian Australasian Neuro and Health Science Journal (AANHS-J). 2020;2(1).

13. *Şahin A., Vildan Ö., Tatli Ö., Karaca Y., Yaman S.Ö., Karahan S.C.* Acil servise izole baş ağrisi şikayetiyle başvuran hastalarin ayirici tanisinda iskemi modifiye albumin seviyesinin değeri. Kırıkkale Üniversitesi Tıp Fakültesi Dergisi. 2018;20(1):1-7.

26. *Şirin T.C.* Ağrı Devlet Hastanesine başvuran migren hastalarının klinik ve sosyodemografik özellikleri. Ege Tıp Dergisi. 2017;56(3):128-34.

27. *Silberstein S.D.* Migraine symptoms: result of a survey of self-reported migraineurs. Headache 1995;35: 387-96.

28. *Society HCCotIH.* The international classification of headache disorders, (beta version). Cephalalgia. 2013;33(9):629-808.

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