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Factors affecting the presentation time of patients with acute stroke to hospital and level of awareness of thrombolytic therapy

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ABSTRACT

Aim:In this study, it was aimed to reveal the factors affecting the time of presentation of patients with acute stroke to the hospital, determine the rates of benefiting from thrombolytic therapy and assess the thrombolytic therapy awareness of patients.

Material and Method: 276 patients with acute stroke were included in our study. Standard structured questionnaire was administered to the patients. Patients were asked about the time of onset of stroke, age, place of residence, level of education, whether they received thrombolytic therapy, what was done as the first intervention, and whether they had information about thrombolytic therapy. Stroke severity was also evaluated by applying the National Institutes of Health Stroke Scale (NIHSS) to the patients.

Results: Of the patients included in the study, 218 (79%) had ischemic stroke, 26 (9.4%) had intracerebral hemorrhage and 32 (11.6%) had TIA. The mean NIHH score of the patients was 6.7±6.2. Stroke onset time was mainly between 18.00-24.00 with a rate of 28.3%. It was understood that 83.1% of the patients came to the emergency department by ambulance and 16.9% came by their own vehicle. When the groups of patients who received and did not receive thrombolytic therapy were compared, no significant difference was found between who the patient lived with at home and the groups of the level of education. Statistical significance was found with symptom onset time ($p<0.05$). Significant differences were found when the time of presentation to the hospital was compared with the place of residence, type of stroke and symptom onset time ($p<0.05$).

Conclusion: When the results are evaluated, it is necessary to reduce the delay time of patients with acute stroke, especially outside the hospital. Increasing the awareness of the patients about the symptoms of stroke and early treatment techniques will help to reduce mortality and morbidity.

Keywords: Cerebrovascular disease, thrombolytic therapy, delayed treatment

INTRODUCTION

Stroke refers to a focal neurological syndrome temporarily or permanently located in a region of the brain that develops due to cerebrovascular disease (CVD) (1). Stroke is an important health problem in the world that causes death and disability and ranks second among the causes of death in developing countries and third among the disabilities caused by disease in developed countries. It also has an important place due to its preventability and treatability (2,3).

Stroke can occur in two forms as hemorrhagic and ischemic, 80-85% of which are ischemic and 15-20% are hemorrhagic (4).

Stroke is the second-ranking cause of death after ischemic heart diseases in the world and developing countries, and the third-ranking cause of the disabilities in developed countries (3). According to the 2018 data of the Turkish Statistical Institute, stroke is reported to be in the second place with 22.4% among the causes of death in our country after ischemic heart diseases (5).

In ischemic stroke, irreversible damage occurs in the cells at the center of the affected area in the brain tissue. However, the damage to the cells in the region called penumbra which is located in the periphery of this area can be reversed. The main goal of stroke treatment is to restore the blood circulation of the penumbra and to minimize the loss of functioning (6). Therefore, early presentation to the emergency department is of great importance from the onset of symptoms. Recognizing the symptoms of stroke and taking immediate actions are vital in the management of acute stroke.

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With the emergence of treatment types such as thrombolytic and thrombectomy, the importance of rapid presentation of patients to the emergency department has increased due to the fact that these treatments have to be performed immediately and the benefit decreases as the treatment are delayed. In order to be able to administer thrombolytic and/or thrombectomy treatments, patients need to be delivered to the emergency department urgently and the pre-hospital delay should be minimized(7, 8).

The aim of this study is to show the factors affecting the time of presentation to the hospital in acute strokes, to determine the rate of patients' benefit from thrombolytic therapy and to investigate the thrombolytic therapy awareness of patients and their relatives.

MATERIAL AND METHOD

The study was carried out with the permission of Hatay Mustafa Kemal University Clinical Researches Ethics Committee (Date: 27.06.2022, Decision No: 02). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This study included 276 patients over the age of 18 who presented to Hatay Mustafa Kemal University Hospital with a stroke clinic, were diagnosed with stroke with a neurological examination and radiological imaging method, and followed up in the neurology clinic.After the necessary clarification was made about the evaluation test to be performed and informed consent was obtained, the patient (if possible) and his/her companion/relative were interviewed and the standard structured questionnaire was filled in for each patient.

All patients who came to the emergency department with stroke symptoms were evaluated by the on-call neurologist. A comprehensive clinical examination was performed. Cranial tomography, diffusion MRI and computed tomography angiography were performed in all patients. Stroke onset time was accepted as the time when the patient or an observer first noticed a neurological deficit. If symptoms were present during awakening, stroke was assumed to occur at night, and the onset time was considered to be when the patient last had no symptoms. Patients who needed thrombectomy were referred to the stroke center and were not included in the study.

The time of access to the hospital was marked on the questionnaire. Questions such as age, gender, place of residence, level of education, number of attacks, at what time the patients presented to the hospital after the onset of symptoms, whether they received thrombolytic therapy, what they did as the first intervention, type of stroke and symptom onset time were asked in the questionnaire. Thrombolytic therapy awareness of the patients was also questioned. Information was also obtained about the way of access to the hospital, the place of residence, whether the patients lived alone or if not with whom they lived at home, and the presence of any relatives or friends at the onset of the stroke. Neurological findings and stroke type were documented.

Stroke severity was documented using the National Institutes of Health Stroke Scale (NIHSS). Patients were divided into subgroups as those who came early (<4 hours) and those who came late (>4 hours) according to the duration of presentation to the hospital after the onset of stroke symptoms. Stroke start times were recorded according to four time intervals which are (6:00 - 12:00), (12:00 - 18:00), (18: 00-24:00) and (24: 00-06:00).

Statistical analyses were performed in IBM SPSS for Windows Version 22.0 package program. Numerical variables were summarized with mean±standard deviation and median [Min-Max] values, and categorical variables were summarized with numbers and percentages. The normality of the numerical variables was analyzed with the Kolmogorov Smirnov test; in the comparison of two groups, results were compared with t-test when the parametric test conditions were met, and the Mann Whitney U test was compared when they were not met. Significance level was taken as $p<0.05$.

RESULTS

276 patients were included in the study. 39.9% of the patients included in the study were female and 60.1% were male. The mean age of the patients was 72.4±12.6 years. The distribution of CVD was 218 (79%) ischemic stroke, 26 (9.4%) intracerebral hemorrhage and 32 (11.6%) TIA. The mean NIHHS score of the patients was 6.7±6.2. Of the patients who participated in the study, 43.5% had DM, 63% had HT, 12.3% had hyperlipidemia and 22.5% had coronary artery disease. Stroke onset time was mainly between 18.00-24.00 with a rate of 28.3%. When the way of access of the patients to the emergency department was evaluated, 83.1% came by ambulance and 16.9% came by their own vehicle.

As the first intervention of the patients, 37.7% waited to recover, 3.6% poured water on the patient's head and 58.7% called 112. 22.5% of the patients came to the hospital within the first 4.5 hours and 10.1% of the patients received thrombolytic therapy (**Table 1**).

When the patients who underwent and did not undergo thrombolytic therapy were compared, no significant difference was found between the watershed area, who they lived with at home and the level of education. Statistical significance was found with symptom onset time (**Table 2**).

Table 1. General Information

	Number (n=276)	%
Gender		
F/M	110/166	39.9/60.1
Place of Residence		
Village	26	9.4
District	36	13
Center	214	77.5
Presentation Center		
In Province	240	87
Out of Province	36	13
The time interval he/she presented after the stroke		
0-4.5	62	22.5
4.5-6	48	17.4
6-24	122	44.2
Over 24 hours	44	15.9
Presentation to another hospital	54	19.6
Waiting period		
0-4/hours	50	92.6
4 and over/hours	4	7.4
Presentation Department		
Emergency Department	248	89.9
Polyclinic (Not an Emergency Department)	28	11.1
Thrombolytic therapy recipient	28	10.1
Those Who Know Thrombolytic Therapy	26	9.4
First Action?		
I did not understand my disorder/Waited to Recover?	114	41.3
I called 112	162	58.7

Table 2. Comparison of groups with and without thrombolytic therapy

	Groups with thrombolytic therapy (n=28)	Groups without thrombolytic therapy (n=248)	p
Age	78.4±3.1	72.1±12.9	<0.001
Gender (F/M)	16/12 (57.1%-42.9%)	94/154 (37.9%-62.1%)	0.436
Watershed Area			0.601
Anterior	24 (85.8%)	210 (84.6%)	
Posterior	4(14.2%)	38 (15.4%)	
Who he/she lives with at home			0.494
Alone	8 (28.6%)	26 (10.4%)	
Spouse	12 (42.9%)	130 (52.4%)	
Extended Family	8 (28.6%)	92 (37.2%)	
Level of Education			0.055
Literate	24 (85.7%)	86 (34.6%)	
Primary School	4 (14.3%)	100 (40.3%)	
Secondary school	-	32 (12.9%)	
Highschool	-	30 (12.09%)	
Symptom Start Time			0.030
06-12	10(35.8%)	56(22.5%)	
12-18	12(42.8%)	49 (19.7%)	
18-24	6 (21.4%)	58 (25.8%)	
24-06	-	79 (31.8%)	

(p<0,05 statistically significant)

Significant differences were found when the time of presentation to the hospital was compared with the place of residence, type of stroke and symptom onset time (p<0,05) (**Tablo 3**). In addition, a significant difference was found between thrombolytic awareness and time of presentation to hospital.

Table 3: Time of presentation to the hospital

	0-4.5 (n=62)	4.5 -6 (n=48)	6-24 (n=122)	>24 (n=44)	p
Place of Residence					<0.001
Village	6 (9.7%)	-	8 (6.6%)	12 (27.3%)	
District	-	4 (8.3%)	14 (23%)	2 (9.1%)	
Center	56 (90.3%)	44 (91.7%)	86 (70.5%)	28 (63.6%)	
Type of the Stroke					<0.001
Minor (NIHSS 0-6)	18 (29%)	24 (50%)	48 (39.3%)	34 (77.3%)	
Major (NIHSS 7-24)	24 (38.7%)	22 (45.8%)	64 (52.5%)	10 (22.7%)	
TIA	20 (32.3%)	2 (4.2%)	10 (8.2%)	-	
Symptom Start Time					<0.001
06-12	30 (48.4%)	4 (8.3%)	12 (9.8%)	12 (27.3%)	
12-18	22 (35.5%)	8 (16.7%)	22 (18%)	14 (31.8%)	
18-24	6 (9.7%)	18 (37.5%)	44 (36.1%)	10 (22.7%)	
24-06	4 (6.5%)	18 (37.5%)	44 (36.1%)	8 (18.2%)	
Watershed Area					0.012
Anterior	60 (96.8%)	44 (91.7%)	96 (78.7%)	30 (68.2%)	
Posterior	2 (3.2%)	4 (8.3%)	26 (21.3%)	14 (31.8%)	
IV-TPA awareness	14 (22.6%)	4 (8.3%)	8 (6.6%)	-	0.021

(NIHSS: National Institutes of Health Stroke Scale, p<0,05 statistically significant)

DISCUSSION

In our study evaluating the factors affecting the hospital presentation times of patients receiving inpatient treatment in the Neurology clinic due to acute stroke, 28 (10.1%) patients received thrombolytic therapy. In a study conducted with 182 patients, 17% of the patients received thrombolytic therapy (9), while 25.3% of 301 patients received thrombolytic therapy in another study conducted in 2017, (10). In another study, only 36 of 469 patients were able to receive thrombolytic therapy (11).

In a survey investigating the thrombolytic therapy awareness of the patients conducted by telephone interview, 26.2% of the patients had information about thrombolytic therapy (12). In another study evaluating 173 patients, it was found that 11.5% of the patients were aware of thrombolytic, clot-busting treatment. Similarly, 9.4% of the patients had information about thrombolytic therapy in our study. Without awareness of treatment techniques and time sensitivity, it is unlikely that patients will rapidly take action despite they know the symptoms. In our study, although the patients realized that they had symptoms, 37.7% of them waited to recover and 3.6% poured water on their heads.

In the studies conducted, the duration of presentation of patients with a stroke to the emergency department in the first 3 hours varies between 21% and 48% (13,14). Similarly, in our study, 22.5% of the patients presented to the emergency department in the first 4.5 hours.

In the study conducted with 517 patients in Turkey, when it was evaluated whether the health institution to which the patients applied was the first center, it was determined that 26.9% of the patients had already presented to another health institution before (15). In our study, the rate of presentation to another hospital was 19.6%, and 92.6% of the patients were late between 0-4 hours after presentation to another hospital, while 7.4% of the patients were late for more than 4 hours. In order to increase the effectiveness of thrombolytic therapy, it will be beneficial to have emergency departments as the first place of presentation and to accelerate possible referrals.

In the study in which NIHSS scores were calculated when patients presented to the hospital according to their neurological dysfunction degrees, patients with NIHSS scores of 16 and below were found to be 82.92%, while 16 and above were found to be 17.08% (16). In a different study, the NIHSS total score ranged from 1-8 and the median value was found to be 4 (11). Studies have shown that patients with high NIHSS scores apply to the hospital earlier than others (17,18). In our study, similar to other studies, NIHSS total scores were between 2-9 and the median value was found to be 4. It was found that patients with low NIHSS scores presented to the emergency department less in the first 24 hours than patients with high NIHSS scores.

In a study evaluating stroke onset times, it was revealed that it started mainly between 12.00-18.00 with a rate of 31.6%, and in another study with 47.2% between 06.00-14.00(16, 19). In our study, the most frequent presentation hours were found to be between 18.00-24.00 with 28.3%.

The longest delay in the treatment of acute stroke occurs outside the hospital (20). In a study comparing the means of transportation to the hospital, 68.63% of the patients and in another study, 62% of the patients used ambulance more than other means (16,21). In our study, it was found that a higher rate (83.1%) came to the hospital by ambulance compared to other studies. It has been revealed that the use of ambulance services is effective in early access to treatment (22) .

Known risk factors causing stroke include diabetes, hypertension, and high cholesterol (23,24). In our study, similar to other studies, these increased risk factors were observed and DM was detected in 43%, HT in 63%, and hyperlipidemia in 12.3% of the patients.

The study had some limitations. First of all, it is a single-center study with a small sample size. The stroke symptoms of the patients were not questioned. Multicenter studies involving larger patient groups are needed.

CONCLUSION

The major factors causing delays of the patients to the hospital were investigated in our study. Thrombolytic therapy awareness levels of the patients were evaluated. It has been concluded that patients need to be informed about the treatment and the importance of early presentation to the hospital. Reducing mortality and morbidity through raising awareness of society on stroke symptoms and early treatment benefits will lead to a decrease in social and economic burden.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Hatay Mustafa Kemal University Clinical Researches Ethics Committee (Date: 27.06.2022, Decision No: 02).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The author has no conflicts of interest to declare.

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Author Contributions: Author declare that he participated in the design, execution, and analysis of the paper and that has approved the final version.

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