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ORIGINAL ARTICLE

PREDICTING FACTORS FOR DELAYED HOSPITAL ARRIVAL OF ACUTE STROKE PATIENTS

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Abstract:

Background: *Delayed hospital arrival following acute stroke is one of the important influencing factors for morbidity and mortality. The aim of the study was to identify the risk factors associated with hospital-delayed arrival among stroke patients.* ***Methods:*** *This cross-sectional study was carried out in the Department of Medicine, DMCH, for a 12-month period following ethical approval. After giving informed written consent, 311 patients with acute stroke were included in the study. Data were collected using a semi-structured questionnaire and direct interview and analyzed using SPSS-20.* ***Results****: Among 311 stroke patients, 134 were in the early arrival group, and 177 were in the late arrival group. In our cross-sectional study, age did not significantly impact arrival time (p = 0.491). A significant relationship was found between residence and arrival time (p = 0.010), with rural residents more likely to arrive late than semi-urban residents (OR = 0.720). Education level did not significantly affect arrival time (p = 0.576), but those with secondary education had higher odds of delayed arrival than those with higher education (OR = 32.242). Chronic conditions such as cardiac failure (p = 0.523), previous stroke (p = 0.577), diabetes (p = 0.273), hypertension (p = 0.620), and malignancy (p = 0.677) did not significantly influence arrival time. However, chronic obstructive pulmonary disease (COPD) was significantly associated with delayed hospital arrival (p = 0.020, OR = 4.533). Stroke symptoms played a critical role, with patients experiencing aphasia (p = 0.061, OR = 3.759) and dysarthria (p = 0.002, OR = 2.814) more likely to arrive late. At the same time, those with hemiparesis were less likely to arrive late (p = 0.000, OR = 0.113). Patients residing more than 15 km from the hospital were more likely to arrive late, and factors such as traffic jams, indecision about hospitalization, and mode of transportation contributed to delays. Notably, patients with knowledge about stroke were significantly less likely to arrive late (p = 0.000, OR = 0.351), and those living within 5 km from the hospital also had a reduced likelihood of late arrival (p = 0.000, OR = 0.036). Indecision about hospitalization significantly predicted late arrival (p = 0.000, OR = 10.653). Additionally, patients with hemianopia had lower odds of delayed arrival (p = 0.014, OR = 0.074), and those living within 5-15 km had reduced odds compared to those living more than 15 km away (p = 0.010, OR = 0.364).* ***Conclusion****: Symptoms of stroke, as well as sociodemographic factors, significantly affected hospital arrival on time. Proper strategy and planning should be applied to enhance people's knowledge of stroke to decrease the unfavorable outcome.*

Keywords: *predicting factors, delayed hospital arrival, acute stroke patients*

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Introduction:

Stroke is a leading cause of death and disability worldwide. According to GBD 2019 stroke collaborators, stroke costs more than US$891 billion globally (1.12% of global GDP).[1] The incidence of stroke is 11.39 per 1000 people in Bangladesh.[2] Shortening the time between the onset of stroke symptoms and hospital admission can improve the likelihood that patients will get thrombolytic therapy or other critical treatments that can avert complications. Both ischemic and hemorrhagic strokes fall under this category. As a result, early intervention can lower the chance of morbidity and death. Previous research[3-8] has examined the variables that may lead to delayed arrival times for stroke patients in several nations, including Bangladesh, Spain, and Nepal. These include things like living alone, the time the stroke started, age, gender, education, where the patient arrived at the hospital, income, the distance to the hospital, the symptoms of the stroke, risk factors, consciousness level, the method of transportation to the hospital, contacts with nearby medical professionals, and the general public's awareness of stroke.

Understanding and identifying these factors contributing to delayed arrival is important for optimizing pre-hospital and in-hospital stroke care protocols, ultimately improving patient outcomes and reducing the burden of stroke-related morbidity and mortality.

Little research has been done on the effects of delayed arrival variables on hospital outcomes for stroke patients. A new study looked at how stroke patients in Bangladesh responded to their symptoms, how soon they got to the hospital, and what was causing them to come later than expected.

Identifying and understanding the barriers to timely hospital arrival—whether they stem from patient characteristics, socio-economic factors, geographical challenges, or healthcare system inefficiencies—can inform targeted public health interventions, enhance emergency response systems, reduce mortality and morbidity, guide resource allocation, highlight healthcare disparities, and direct future research.

The study's objective was to determine the factors associated with delayed hospital arrival in patients with acute stroke.

Methods:

Study population:

The study was designed as a cross-sectional study conducted at the Department of Medicine, Dhaka Medical College, Dhaka, Bangladesh, from November 2022 to October 2023. The study population included stroke patients who attended the Department of Medicine at Dhaka Medical College Hospital. Consecutive sampling was employed to select participants. Given the lack of prior studies on the prevalence of factors contributing to delayed hospital arrival among acute stroke patients in Bangladesh, the prevalence was estimated at 56.4% based on similar international studies.[8] Using the statistical formula for sample size calculation ($n = Z^2pq/d^2$) with a 95% confidence interval, a sample size of 378 was determined. However, 311 patients were ultimately enrolled during the study period. The study included participants who provided informed consent, were over 18 years of age, and were clinically diagnosed with stroke, confirmed by either Computerized Tomography (CT) or Magnetic Resonance Imaging (MRI). Stroke mimics, intra-cerebral malignancies, and recurrent stroke were excluded from enrollment.

All patients admitted to the Medicine department of Dhaka Medical College Hospital from November 2022 to October 2023 presented with stroke symptoms compatible with neuroimaging and were diagnosed as having stroke were interviewed. Informed Written consent was taken from all patients or their attendants. Patients with in-hospital strokes and those with stroke mimics were excluded. In addition, if patients have communication deficits, a caregiver who resides with the patient has given consent and is interviewed.

Stroke onset time was noted as the time of appearance of stroke symptoms. In the wake-up strokes, the moment when the patient was last seen as healthy was evaluated as the stroke onset time. A questionnaire was filled in by face-to-face interview with each patient or the relative who agreed to participate in the study regarding stroke symptom onset, hospital arrival time, age, gender, level of education and financial status, and stroke severity at arrival.

The distance patients covered during hospital arrival was determined using regional road maps. The educational levels of the patients were classified as Primary, Secondary, Higher Secondary, Graduate, and Post Graduates. Income status was grouped as low income, lower middle income, upper middle income,

and high income according to the patient's perceived economic situation.

Whether the hospital arrival was direct or from another hospital, previous knowledge of the patients and their relatives about stroke was questioned about previous thrombolytic therapy. As part of the neurological examination, the consciousness levels of the patients were determined as Conscious, Semi-Conscious, and Unconscious (somnolence /stupor). Stroke symptoms were recorded as aphasia, dysarthria, hemi anopsia, hemiparesis, and hemi sensory loss. In addition, vascular risk factors, hypertension, diabetes mellitus (DM), hyperlipidemia, coronary artery disease (CAD), atrial fibrillation (AF), smoking, and family history of stroke were determined. Transportation to the hospital by ambulance or other private vehicles was questioned. Hospital arrival time is divided into two groups: early (4.5 hours) and late arrival (> 4.5 hours).

Statistical Package for Social Sciences version 20.0 for Windows was employed to conduct statistical analyses. Qualitative observations were represented in frequencies and percentages, and cross-tabulation was used to analyze the data through the Chi-Square test with Yates correction (95% CI). Logistic regression was utilized to evaluate risk factors. A *statistically significant difference* was defined as $P<0.05$.

Operational Definitions:

Hospital Arrival Time:

The total duration in hours is counted from the onset of stroke symptoms to admission to the emergency department, where the patient is examined by the emergency team (doctor/nurse). Early arrival means admission within 4.5 hours, and late arrival means admission after 4.5 hours.[10]

Hospital Arrival Time:

Total duration in hours counted from onset of stroke symptoms to admission to the emergency department, where the patient is examined by the emergency team (doctor/nurse). Early arrival means admission within 4.5 hours, and late arrival means admission after 4.5 hours.[10]

Results:

Most of the patients were between the ages of 41 and 80, with 39.2% aged 41-60 and 47.3% aged 61-80. A significant number of patients were came from rural areas (59.5%), followed by urban areas (30.5%) and semi-urban areas (10.0%). The education level of the participants was mostly primary education (74.0%), followed by secondary education (24.1%), and very few had education beyond secondary (1.9%). The occupation distribution shows that a significant portion of the participants were housewives (29.9%) and others (36.3%), while fewer participants were engaged in service (12.9%) or business (20.9%). A small proportion of patients reported living alone (8.0%), while the majority did not (92.2%). (Table 1)

Table-1

Socio-demographic factors of the participant (n=311)

Variables	Characteristics	Number (%)
Age	18-40	27 (8.7)
	41-60	122(39.2)
	61-80	147(47.3)
	>80	15 (4.8)
Gender	Male	192 (61.73)
	Female	119(38.27)
Residence	Urban	95 (30.5)
	Rural	185(59.5)
	Semi urban	31 (10.0%)
Education	Primary	230(74.0)
	Secondary	75 (24.1)
	Higher secondary or above	6 (1.9)
Living	Alone	25 (8.0)
	Joined	286(92.2)
Occupation	Service	40 (12.9)
	Business	65 (20.9)
	Housewife	93 (29.9)
	Others	113(36.3)
Distance	<5 km	25(8.03)
from hospital	5-15Km	46(14.8)
	>15Km	240(77.17)
Family type	nuclear	102(32.8)
	Joint	209(67.2)

It was found that Hypertension and Diabetes Mellitus were highly prevalent among the participants, both of which are known risk factors for stroke. A significant majority of participants (80.4%) were diagnosed with hypertension, while 50.2% of them had diabetes mellitus. However, other health conditions such as COPD, chronic cardiac failure, previous cardiovascular disease, and malignancy were less common among the participants. Table II

Table-II
Distribution of participant according to comorbidities (n=311)

Name	Total
Chronic Cardiac Failure	8 (2.6%)
Previous CVD	4 (1.3%)
Chronic Renal Failure	5 (1.6%)
COPD	18 (5.9%)
DM	156 (50.2%)
HTN	250 (80.4%)
Malignancy	2 (0.6%)

Upon arriving at the hospital, the majority of patients were conscious (73.0%), while a significant portion were semi-conscious (24.1%), and a small percentage were unconscious (2.9%). Language impairment, in the form of aphasia, was observed in 19.0% of patients, while 13.9% experienced speech difficulty known as dysarthria. Visual field loss, specifically hemianopia, was present in only 1.9% of patients. However, the most common symptom was weakness on one side of the body, or hemiparesis, which affected most patients (84.2%). In contrast, a small number of patients experienced loss of sensation on one side of the body, or hemisensory loss (1.6%). These clinical findings also give idea about acute stroke patients, which can aid in their diagnosis and effective management. Table 3

Table-III
Participant according to clinical presentation (n=311)

Variables	Total
Conscious	227(73.0%)
Semi-conscious	75 (24.1%)
Unconscious	9 (2.9%)
Aphasia	59 (19.0%)
Dysarthria	43 (13.9%)
Hemianopia	6 (1.9%)
Hemiparesis	262 (84.2%)
Hemisensory loss	5 (1.6%)

Among all, 77% had distance of hospital above 15 km followed by 15% had 5 to 10km and 8% had below 5 km.

Among all the patients, 134 were in Early arrival (within 4.5 hour) group and 177 were in Late arrival (after 4.5 hour) group. Fig 4

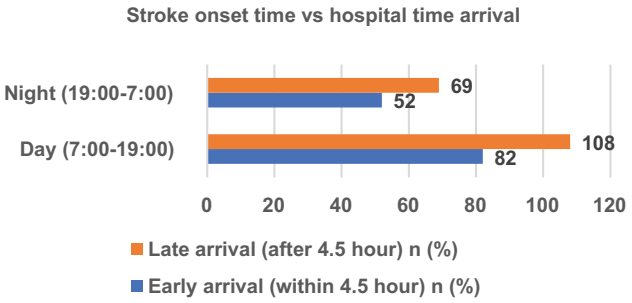

Figure 4: *Distribution of the patients according to time of hospital arrival (n=311*

There was no significant impact of age on arrival time (p=0.491), although patients aged between 41-60 years and 61-80 years had a higher tendency to arrive late compared to those over 80 years (OR=0.785 and OR=0.433, respectively). In terms of residence, there was a clear relationship with arrival time (p=0.010), as rural residents were more likely to arrive late compared to semi-urban residents (OR=0.720). Although education level did not significantly influence arrival time (p=0.576), those with secondary education were more likely to arrive late than those with higher secondary education or above (OR=32.242). Family structure and living alone did not significantly affect arrival time (p=0.378 and p=0.348, respectively). Table 4

Chronic cardiac failure and previous stroke showed no significant association with arrival time (p=0.523 and p=0.577, respectively), with odds ratios of 5.073 and 0.577, respectively. Conversely, chronic obstructive pulmonary disease (COPD) demonstrated a significant association with delayed arrival (p=0.020, OR=4.533), indicating patients with COPD were more likely to arrive late. Diabetes mellitus (DM), hypertension (HTN), and malignancy did not exhibit significant associations with arrival time (p=0.273, p=0.620, and p=0.677, respectively), suggesting no substantial impact on arrival time. Table 5

Table-IV

Association of hospital arrival time with Socio-demographic factors of the study patients (n=311)

Variables	Early arrival (within 4.5 hour) n (%)	Late arrival (after 4.5 hour) n (%)	Total	p-value (*)	OR (95% CI)
Age (in years)				0.491	
18-40	11 (3.5%)	16 (5.1%)	27 (8.7%)		0.785 (0.081-7.584)
41-60	57 (18.3%)	65 (20.9%)	122 (39.2%)		0.740 (0.101-5.425)
61-80	62 (19.9%)	85 (27.3%)	147 (47.3%)		0.433 (0.061-3.056)
Male	77 (24.8%)	113 (36.5%)	190 (61.3%)	0.287	3.660 (0.639-20.950)
Residence				0.010 *	
Urban	52 (16.7%)	43 (13.8%)	95 (30.5%)		0.703 (0.193-2.564)
Rural	67 (21.5%)	118 (37.9%)	185 (59.5%)		0.720 (0.213-2.431)
Education				0.576	
Primary	98 (31.5%)	132 (42.4%)	230 (74.0%)		15.248 (0.599-388.157)
Secondary	32 (10.3%)	43 (13.8%)	75 (24.1%)		32.242 (1.33-779.60)*
Joint family	86 (27.7%)	122 (39.2%)	208 (66.9%)	0.378	1.853 (0.798-4.305)
Living alone	13 (4.2%)	12 (3.9%)	25 (8.0%)	0.348	1.069 (0.279-4.105)
Occupation				0.262	
Service	23 (7.4%)	17 (5.5%)	40 (12.9%)		0.175 (0.046 -0.671)*
Business	27 (8.7%)	38 (12.2%)	65 (20.9%)		0.230 (0.079-0.666)*
Housewife	39 (12.9%)	54 (17.4%)	93 (29.9%)		2.617 (0.676-10.137)

*Chi Square Test

Table-V

Association of hospital arrival with comorbidities (n=311)

Variables	Early arrival (within 4.5 hour) n (%)	Late arrival (after 4.5 hour) n (%)	Total	p-value (chi-square)	OR (95% CI)
Chronic Cardiac Failure	3 (1.0%)	5 (1.6%)	8 (2.6%)	0.523	5.073 (0.325-79.111)
Previous stroke	2 (0.6%)	2 (0.6%)	4 (1.3%)	0.577	0.577 (0.036-9.230)
Chronic renal Failure	1 (0.3%)	4 (1.3%)	5 (1.6%)	0.285	1.865 (0.145-24.053)
COPD	3 (1.0%)	15 (4.9%)	18 (5.9%)	0.020*	4.533 (0.774-26.567)
DM	72 (23.2%)	84 (27.0%)	156 (50.2%)	0.273	0.621 (0.295-1.308)
HTN	106 (34.1%)	144 (46.3%)	250 (80.4%)	0.620	1.586 (0.610-4.123)
Malignancy		1 (0.3%)	2 (0.6%)	0.677	0.722 (0.026-20.336)

*Chi Square Test

The symptoms of stroke were found to play a significant role in the timing of hospital arrival. Patients who experienced aphasia and dysarthria were more likely to arrive late (p=0.061, OR=3.759 and p=0.002, OR=2.814, respectively), while those with hemiparesis were less likely to arrive late (p=0.000, OR=0.113). Interestingly, patients who experienced a loss of chemosensory function were significantly more likely to arrive late (p=0.629, OR=69.256). Table 6

Table-VI

Association of hospital arrival time according to clinical presentation (n=311)

Variables	Early arrival (within 4.5 hour) n (%)	Late arrival (after 4.5 hour) n (%)	Total	p-value (chi-square)	OR (95% CI)
BP				0.768	
90/60-120/80	9 (2.9%)	14 (4.5%)	23 (7.4%)		1.980 (0.443-8.846)
<90/60	1 (0.3%)	3 (1.0%)	4 (1.3%)		0.219 (0.013-3.652)
Consciousness level				0.825	
Conscious	100 (32.2%)	127 (40.8%)	227 (73.0%)		1.626 (0.181-14.593)
Semi-conscious	30 (9.6%)	45 (14.5%)	75 (24.1%)		0.735 (0.084-6.405)
Stroke symptoms					
Aphasia	19 (6.1%)	40 (12.9%)	59 (19.0%)	0.061	**3.759 (1.273-11.097)***
Dysarthria	9 (2.9%)	34 (11.0%)	43 (13.9%)	**0.002***	2.814 (0.877-9.030)
Hemianopia	3 (1.0%)	3 (1.0%)	6 (1.9%)	0.520	**0.041 (0.004-0.475)***
Hemiparesis	124 (39.9%)	138 (44.4%)	262 (84.2%)	**0.000***	**0.113 (0.029-0.446)***
Hemisensory loss	2 (0.6%)	3 (1.0%)	5 (1.6%)	0.629	**69.256 (1.342-3574.072)***

*Chi Square Test

More than 50% of stroke patients lived more than 15km away from a hospital, faced traffic jams, and experienced indecision about hospitalization. Most patients chose to use an ambulance and directly admitted themselves to the hospital. Late arrival at the hospital was significantly associated with various factors, including lack of knowledge about stroke, indecision about hospitalization, traffic congestion, choice of transportation, and method of admission.

Patients with knowledge about stroke were significantly less likely to arrive late to the hospital than those who lacked knowledge (OR = 0.351, 95% CI: 0.134-0.916), and this result was statistically significant (p = 0.000). Patients less than 5km from the hospital were also significantly less likely to arrive late (OR = 0.036, 95% CI: 0.006-0.224), with a statistically significant result (p = 0.000).

Patients who experienced indecision about hospitalization had significantly higher odds of arriving late (OR = 10.653, 95% CI: 3.953-28.708), and this result was statistically significant (p = 0.000). Patients directly admitted to the hospital had slightly higher odds of arriving late than those referred (OR = 1.148, 95% CI: 0.519-2.539), but the result was not significant statistically (p = 0.000).). table 7

Table-VII

Risk factors for late hospital arrival time of acute stroke patients (n=311)

Variables	Early arrival (within 4.5 hour) n (%)	Late arrival (after 4.5 hour) n (%)	Total	p-value (*)	OR (95% CI)
Knowledge about stroke	54 (17.4%)	33 (10.6%)	87 (28.0%)	**0.000***	**0.351 (0.134-0.916)***
Low income	72 (23.2%)	107 (34.4%)	179 (57.6%)	0.235	0.508 (0.241-1.068)
Distance from hospital				**0.000***	
<5 km	22 (7.1%)	3 (1.0%)	25 (8.0%)		**0.036 (0.006-0.224)***
5-10 km	32 (10.3%)	16 (5.1%)	48 (15.4%)		0.479 (0.172-1.338)
Indecision regarding hospitalization	65 (21.0%)	151 (48.7%)	216 (69.7%)	**0.000***	**10.653 (3.953-28.708)***
Traffic jam	79 (25.5%)	139 (44.8%)	218 (70.3%)		**0.000***
Private Transport	51 (16.4%)	40 (12.9%)	91 (29.3%)	**0.004***	0.634 (0.179-2.241)
Ambulance	73 (23.5%)	109 (35.0%)	182 (58.5%)		0.434 (0.148-1.276)
Direct admission	86 (27.8%)	76 (24.6%)	162 (52.4%)	**0.000***	1.148 (0.519-2.539)

*Chi Square Test

Patients with hemianopia (partial blindness in half of the visual field of one or both eyes) are less prone to arriving late at the hospital following a stroke onset compared to those without this condition. (OR = 0.074, 95% CI 0.009- 0.584, p = 0.014),

Patients residing within 5-15 km from the hospital also display lowered odds (OR = 0.364) of delayed arrival when compared to those residing more than 15 km away. This result is statistically significant as well (p = 0.010). Tabe VIII.

Table-VIII

Final logistic regression model results for relative odds of late arrival to the hospital after onset of stroke (n=311)

Variables	OR	95% CI	p-value(*)
COPD	4.201	0.990-17.826	0.052
Hemianopia	0.074	0.009-0.584	0.014
Hemiparesis Distance	0.123	0.039-0.390	<0.001
Distance from hospital			
<5km	0.081	0.019-0.350	0.001
5-15km	0.364	0.168-0.788	0.010
Indecision regarding hospitalization	5.319	2.845-9.942	<0.001

*Step wise Logistics Regression.
*Chi Square Test.

Discussion:

Prehospital delays are a significant variable that can influence the hospital's outcome as well as long-term morbidity for stroke patients.

The current study enrolled 311 stroke patients, of which 134 arrived early (within 4.5 hours) and 177 arrived late (after 4.5 hours). The study found that only facial deviation or weakness and speech abnormalities were associated with a lower prehospital delay among all the primary stroke symptoms. Other symptoms like headaches, limb weakness, and sensory abnormalities can be confused with other illnesses or mental disorders, leading to delays in seeking treatment.

In this study, age did not significantly affect arrival time, although patients aged 41-60 and 61-80 tended to arrive late more than those above 80. Males tended to arrive later than females, but this was not statistically significant. Rural people were more likely to arrive late than semi-urban residents. Education level did not significantly influence arrival time, although patients with secondary education tended to arrive late more than those with higher secondary education or above. Family structure and living alone were not associated with arrival time. However, the patient's occupation was associated significantly with arrival time, as patients in the service and business sectors were less likely to arrive late than others.

A previous study[8] found that Patients from rural areas were more hesitant to seek help, whereas age and gender were similar in both groups. On the other hand, the previous study[9] Found that age was significantly associated with late hospital arrival and living alone at home. However, one study found no significant association of sociodemographic factors with hospital arrival except for residence.[10]

Lack of knowledge and indecision about hospitalization of stroke symptoms is one of the most common factors causing delay in hospitalization. Previous studies have suggested that early detection of stroke, knowledge of stroke treatment, education beyond high school, and prompt visits to the emergency room upon onset of symptoms can help reduce prehospital delays (7 A previous study by Fladt et al. also revealed that the main factors causing a delay were not knowing the signs of a stroke, visiting a family doctor before being admitted to the hospital, and not using emergency medical services (Fladt et al., 2019). Another study found that 32% of patients experienced a delay due to their attendant's inability to comprehend stroke symptoms.[10]

Bangladesh has a diverse population with varying socio-demographic, educational, and cultural backgrounds. A patient's ability to access and choose between different levels of hospital care is determined by their socio-economic status, which ultimately affects where they seek consultation, whether a tertiary care hospital or an underqualified healthcare provider. A previous study found that rural patients tend to delay hospitalizations more frequently. This may be because underqualified healthcare professionals provide primary care for rural residents, leading to management delays.[12] Additionally, low levels of education, unemployment, and unfavorable economic conditions are significant predictors of longer prehospital delays.[13]

The study investigated the relationship between various comorbidities and the arrival time of acute stroke patients at Dhaka Medical College Hospital. The study found that chronic cardiac failure and previous stroke were not significantly associated with arrival time (p=0.523 and p=0.577, respectively). However, chronic obstructive pulmonary disease (COPD) showed a significant association with delayed arrival (p=0.020, OR=4.533), indicating that patients with COPD were more likely to arrive late.

The comorbidities such as diabetes mellitus (DM), hypertension (HTN), and malignancy did not show any significant associations with arrival time (p=0.273, p=0.620, and p=0.677, respectively), suggesting that they did not have a substantial impact on arrival time. However, Fladt et al., 2019 found no significant association between HTN, DM, and other comorbidities with hospital arrival. Nepal et al. (2019) also observed no significant difference between HTN and hospital arrival besides DM and history of stroke, which are significantly associated with late arrival at the hospital.

On the other hand, study observed that all comorbidities are statistically similar in both groups.[13]

Acute ischemic stroke can be treated effectively with tissue plasminogen activator within 4.5 hours of onset. However, more than half of the patients miss the optimal treatment window period due to delayed presentation. According to a recent study, the delay was due to a long distance from the hospital, indecision regarding hospitalization, and traffic jams. In particular, more than 50% of the patients lived more than 15km from the hospital. Most of them chose ambulance transportation and were directly admitted to the hospital.

The study found that patients with hemianopia (a visual impairment affecting half the visual field) were less likely to arrive on time (OR=0.074, 95% CI 0.009-0.584, p=0.014). This could be due to the need for more awareness about sight loss and the fear of bringing patients to the hospital. However, the level of consciousness did not significantly affect arrival time (p=0.825). Patients with aphasia and dysarthria (speech and language impairments) were more likely to arrive late (p=0.061, OR=3.759 and p=0.002, OR=2.814, respectively). At the same time, those with hemiparesis (weakness on one side of the body) were less likely to arrive late (p=0.000, OR=0.113). Interestingly, patients with chemosensory loss (loss of smell or taste) were significantly more likely to arrive late (p=0.629, OR=69.256).

A previous study also found that several factors contributed to the delayed arrival of patients with acute ischemic stroke. According to multiple regression analysis, dysarthria, hemianopia, and hemiparesis were significantly associated with late arrival in the hospital.[14]

Patients with knowledge about stroke have significantly lower odds of late arrival compared to those without expertise (OR = 0.351, 95% CI: 0.134-0.916), and this result is statistically significant (p = 0.000).

Patients living less than 5 km from the hospital have significantly lower odds of late arrival compared to those living more than 15 km away (OR = 0.036, 95% CI: 0.006-0.224), and this result is statistically significant (p = 0.000). Furthermore, individuals residing within proximity of less than 5 km from the hospital demonstrate substantially decreased odds (OR = 0.081, CI 0.019 to 0.350) of delayed arrival in comparison to those living over 15 km away. This finding holds statistical significance (p = 0.001).

A study by Ahsan et al. showed that patients who experience indecision about going to the hospital are significantly more likely to arrive late (delayed) than those who do not. The odds of delayed arrival are increased by a factor of 5.319 for patients indecisive about hospitalization. This outcome is highly statistically significant (p < 0.001). The study found that, on average, only 12% of patients arrive at the hospital within three hours. Of the causes of delayed arrival, indecision was the most significant factor, accounting for 40% of cases. Other factors included lack of transportation (22%), lack of resources (30%), traffic jams (10%), and consultation with rural doctors (30%).

Another study by Chowdhury and Chakraborty found that indecision and distance to the hospital were associated significantly with late arrival. Lack of public health measures, supply of ambulances, and low financial conditions were also contributing factors. Heavy traffic, which is common in densely populated areas, also plays a role in causing delays. The lack of awareness about stroke symptoms and their consequence was another reason for the delayed arrival. Some patients had not been taken to the hospital in an ambulance, had been alone when the stroke occurred, or were unaware that they had suffered a stroke, as also revealed by previous studies[15].

Conclusion:

Prehospital delay is a major concern for stroke patients. In our study, there was a significant correlation found between late arrival at the hospital and residence, dysarthria, hemiparesis, hemianopia, indecision about hospitalization, and hospital distance. A person's knowledge of stroke, uncertainty about being admitted to the hospital, traffic congestion, mode of conveyance, and admission preference were all strongly linked to delay.

Conflict of Interest:

The authors stated that there is no conflict of interest in this study

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Ethical consideration:

The research protocol was presented to the Research

Review Committee (RRC) of the Department of Medicine, Dhaka Medical College. Subsequently, the protocol was submitted to the Ethical Review Board (ERB) for clearance. Before the commencement of the study, the Ethical Review Board of DMCH approved the thesis protocol.

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