

A Study of Factors Causing Delay in Presentation of Patients with Acute Stroke

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ABSTRACT

Background: Early treatment is crucial in maximizing the benefit of stroke intervention. Effective thrombolytic therapy is dependent on timely intervention and guidelines for use of recombinant tissue plasminogen activator recommend therapy within 4.5 hours after onset of stroke symptoms and best results may be attained with administration within 90mins. Thus, early hospital arrival is critical to successful stroke treatment. However, it has been seen that patients with acute stroke are often admitted late. Factors like living alone, referral pattern, contact with local doctors, availability of the transport option, nocturnal onset are responsible for delay in arrival. **Aim:** This study was done to study the factors responsible for delay in presentation of patients with acute stroke. **Methods:** The patients were divided into two groups according to their time of presentation to hospital after onset of symptoms of stroke as early presented group (<4.5 hours) and delayed presented group (>4.5 hours). A standard structured questionnaire was used to assess various factors causing delay in presentation. **Results:** 88 (76.33%) patients presented >4.5 hours after the onset of stroke symptoms to hospital and 32(26.67%) patients presented within 4.5 hours of onset of stroke symptoms. **Conclusion:** Distance from home to nearest road, distance from nearest road to hospital, visit to local doctor, time of first medical contact, time taken by local doctor to refer, low threat perception of symptoms by patients /attendants, less concern about symptoms, perception of symptoms as non-serious and lack of knowledge about availability of thrombolysis in early phase of stroke were the factors responsible for delay in presentation.

Keywords: Stroke, Delayed presentation.

INTRODUCTION

Stroke or cerebrovascular accident is defined as a clinical syndrome characterized by rapidly developing clinical symptoms and /or signs focal and at times global loss of brain function with symptoms lasting greater than 24 hours or leading to earlier death and with no apparent cause other than that of vascular origin.^[1] It is second leading cause of death worldwide, with 6.2 million dying from stroke in 2015, an increase of 8,30,000 since in the year 2000.^[2] Stroke is divided into two broad categories that define its pathophysiology. Ischemic strokes are caused by sudden occlusion of arteries supplying the brain, either due to a thrombus at the site of occlusion or formed in another part of the circulation. It accounts for 50%-85% of all strokes worldwide. Haemorrhagic strokes are caused by

intracerebral haemorrhage –bleeding from one of the brain arteries into the brain tissue or subarachnoid haemorrhage-arterial bleeding in the space between meninges. This category of stroke accounts for 7%-27% and 1%-7% respectively of all strokes worldwide.^[3] Successful outcome is based on early recognition of stroke, transportation to the hospital emergency department immediately after stroke, timely imaging, proper diagnosis and thrombolysis within 4.5 hours.^[4]

Use of IV tPA is considered a central component of primary stroke centers. It represents the first treatment proven to improve clinical outcomes in ischemic stroke and is cost-effective and cost-saving.^[2] Current acute stroke therapy can only aid patients within the first few hours of stroke onset but only 3-8.5% of all stroke patients receive thrombolytic therapy.^[5,6] Studies have reported that patients delay is responsible for 30-70% of stroke patients not arriving soon enough in the ED to receive acute thrombolytic therapy.^[6-9] Shortening this delay could improve number of patients receiving tPA.^[10] The purpose of this study was to

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determine common factors associated with hospital arrival time for stroke patients and their influence in early and late presentation.

MATERIALS AND METHODS

The study was an observational study that was conducted at Govt. Medical College/Guru Nanak Dev Hospital, Amritsar. Total 120 patients who met the inclusion and exclusion criterias of the study were taken for evaluation. They were subjected to focused history taking and examination.

The exact time of arrival at hospital was routinely marked on the indoor file. Prehospital delay was defined as the time taken from symptoms onset to arrival at the hospital. Delay was considered if time of arrival at hospital was >4.5 hours from time of onset of symptoms. The patients were divided into two groups according to their time of presentation to hospital after onset of symptoms of stroke as Early presented group (<4.5 hours) and Delayed presented group (>4.5 hours).

A standard structured questionnaire was used to assess the various factors causing delay in presentation after taking written informed consent. To minimize in hospital stroke education, all subjects were interviewed within 48 hours of admission.

When the patients with stroke were unable to participate because of altered consciousness or having dysphasia, one of the relatives was interviewed. All enrolled patients were subjected to clinical examination, consciousness was assessed by Glasgow coma scale (GCS) and severity of stroke was assessed by National Institute of health stroke scale (NIHSS) score.^[11,12] The study was conducted after approval from institutional thesis and ethical committee.

RESULTS

It was seen that 88 (76.33%) patients presented >4.5 hours after the onset of stroke symptoms to hospital and 32 (26.67%) patients presented within 4.5 hours of onset of stroke symptoms. The mean age in the present study was 57.62±15.39 years with no significant difference in two groups.

In this study of 120 patients, 66 (55%) were males and 54 (45%) were females. There was no significant difference in gender distribution in two groups.

110 (91.70%) patients were living in the joint family and only 10 (8.30%) patients were living alone with no significant difference of living status in two groups. 92 (76.67%) patients were having ischemic stroke and 28 (23.33 %) were having haemorrhagic stroke. It was also noted that among 17 ischemic stroke who presented early, 5 (15.62%) patients underwent thrombolysis.

The mean time since stroke onset till presentation was 10.36±6.75 hours. The minimum time was 45 minutes and maximum time was 27 hours 20 minutes.

Table 1: Initial Reaction to Symptoms

Initial Reaction to symptoms	Total		Delayed		Early	
	No.	%	No.	%	No.	%
Contact with local doctor	83	69.16	70	79.55	13	40.60
Tried some alternative medicine care	7	5.83	6	6.82	1	3.15
Hospital directly	30	25.00	12	13.64	18	56.25
Total	120	100.00	88	100.00	32	100.00

X²: 22.7; df:2; p:0.001

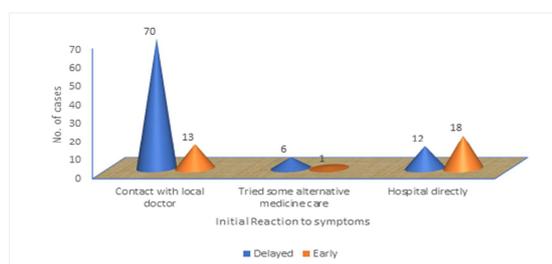


Figure 1: Initial Reaction to Symptoms

Out of total 120 patients, 83 (69.16%) patients contacted local doctor before arriving hospital, 30 (25%) patients came hospital directly while 7 (5.83%) patients tried some alternative medicine. Out of 88 patients who presented late, 70 (79.55%) patients contacted local doctor, 12 (13.64%) patients came hospital directly and 6 (6.82%) patients tried some alternative medicine. In contrast, patients who presented early 13 (40.62%) contacted local doctor and 18 (56.25%) came hospital directly (p value: 0.001), which is highly significant.

Table 2: Distance: Home To Nearest Road

Home nearest road (meters)	Total		Delayed		Early	
	No.	%	No.	%	No.	%
<500	104	86.67	72	81.82	32	100.00
5000-1000	13	10.83	13	14.77	0	0.00
>1000	3	2.50	3	3.41	0	0.00
Total	120	100.00	88	100.00	32	100.00
Mean	369.16±317.69		436.93±343.78		182.81±82.90	
p-value	0.001					

The average distance from home to nearest road was 369.2±317.69m. The minimum distance was 50m and maximum was 2 km. Distance from home to nearest road was 182.81±82.90m in early presented group and 436.93±343.78m in delayed presented group which is significantly more. (p value:0.001).

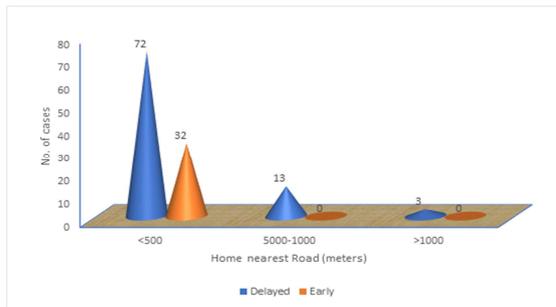


Figure 2: Distance: Home to Nearest Road

Table 3: Distance: Nearest Road to Hospital

Nearest road hospital (km)	Total		Delayed		Early	
	No.	%	No.	%	No.	%
<15	40	33.33	12	13.64	28	87.5
16-30	11	9.17	8	9.09	3	9.375
31-45	46	38.33	46	52.27	0	0
46-60	16	13.33	15	17.05	1	3.125
61-75	7	5.83	7	7.95	0	0
Total	120	100.00	88	100.00	32	100
Mean	32.16±18.02		39.36±15.13		12.37±7.25	
p-value	0.001					

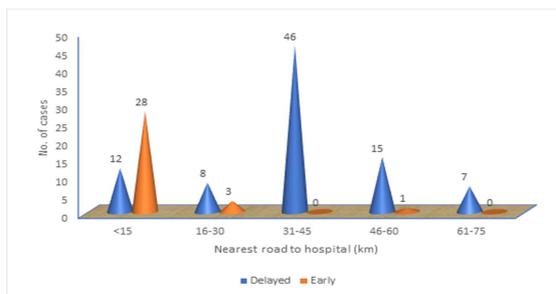


Figure 3: Distance: Nearest Road to Hospital

The mean distance from nearest road to hospital was 32.16±18.02 km. Distance from nearest road to

hospital was 12.37±7.25 km in early presented group and 39.36±15.13 km in delayed presented group which is significantly more. (p value:0.001)

Table 4: Perception of Symptoms as Serious

Did you think your symptoms were serious at first	Total		Delayed		Early	
	No.	%	No.	%	No.	%
Yes	79	65.83	53	60.23	26	81.25
No	41	34.17	35	39.77	6	18.75
Total	120	100.0	88	100.0	32	100.0

X²: 4.61; df:1; p-0.032

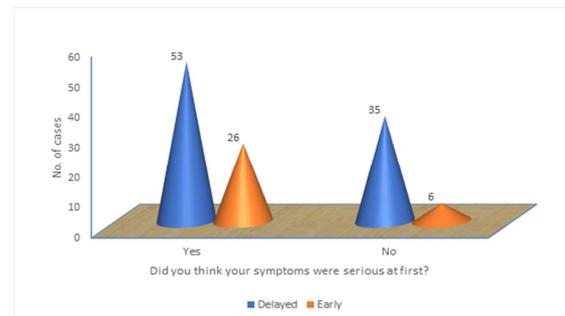


Figure 4: Perception of Symptoms as Serious

79 (65.83%) patients/attendants perceived symptoms to be serious and 41(34.17%) considered stroke symptoms to be non-serious. In patients with delayed presentation 35(39.77%) considered the symptoms as non-serious as compared to 6(18.75%) patients with early presentation (p value:0.03) which is significant.

Table 5: Low Threat Perception of Symptoms

Did you think the symptoms can resolve spontaneously	Total		Delayed		Early	
	No.	%	No.	%	No.	%
Yes	28	23.33	25	28.41	3	9.38
No	92	76.67	63	71.59	29	90.63
Total	120	100.00	88	100.00	32	100.00

X²: 4.75; df:1; p-0.029

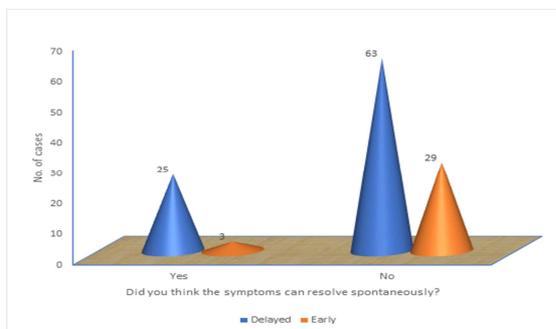


Figure 5: Low Threat Perception Of Symptoms

28 (23.3%) patients/attendants thought the symptoms could resolve spontaneously without

treatment and out of these 25(28.41%) patients were in delayed presented group as compared to 3(9.38%) patients in early presented group which is statistically significant. (p value:0.02)

Table 6: Knowledge about Thrombolysis

Knowledge about availability treatment in early phase	Total		Delayed		Early	
	No.	%	No.	%	No.	%
Yes	5	4.17	0	0.00	5	15.62
No	115	95.83	88	100.00	27	84.38
Total	120	100.00	88	100.00	32	100.00

X²: 14.3; df:1; p-0.001

115 (95.8%) patients didn't had any knowledge regarding availability of thrombolytic therapy in early phase of stroke while 5(4.2%) patients had knowledge about thrombolytic therapy. None of the patients with delayed presentation had knowledge about availability of treatment in early phase whereas 5(15.62%) patients with early presentation had knowledge about thrombolysis which is statistically significant. (p value:0.001).

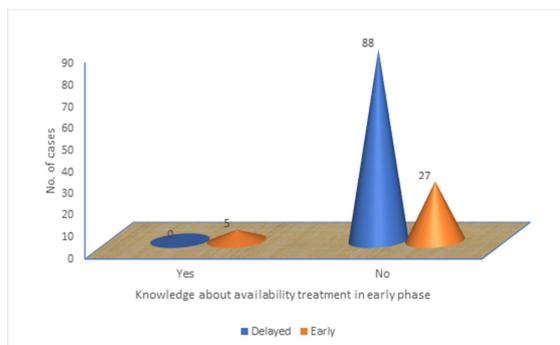


Figure 6: Knowledge about Thrombolysis

Table 7: Time For First Medical Contact (HRS)

Time for first medical Contact (hrs)	Total	Delayed	Early
Mean	3.93±2.17	4.49±1.87	0.97±0.53
p-value	0.001		

The average time taken for first medical contact was 3.93±2.17 hours. It was 0.97±0.53 hours in patients with early presentation and 4.49±1.87 hours in patients with delayed presentation which is significantly more. (p value 0.001).

Table 8: Time Taken By Local Doctor to Refer (HRS)

Time taken by local doctor to refer (hrs)	Total	Delayed	Early
Mean	6.64±5.05	7.56±4.97	1.69±0.59
p-value	0.001		

The average time taken by local doctor to refer to tertiary hospital was 6.64±5.05 hours. It was 1.69±0.59 hours in patients with early presentation and 7.56±4.97 hours in patients with delayed presentation which is significant more. (p value 0.001).

DISCUSSION

The mean age in present study was 57.62±15.39yrs. In other studies from India, by Pandiyan et al¹³ and Shrivastava et al,¹⁴ it was 59.7yrs and 58yrs respectively. Ashraf V et al,¹⁵ from Kerala reported mean age of 61yrs. A study from China by Jin H et al,¹⁶ reported the mean age of stroke patients as 64 yrs. Hence, the mean age was comparable to other studies.

In this study of total 120 patients, 66(55%) were males and 54(45%) were females. In study by Siddiqui M et al,¹⁷ 52% were males and 47.9 % were females. Faiz KW et al¹⁸ reported 66 % male and 44.3% female stroke patients. So, the sex ratio of stroke patients is almost similar to other studies showing predominance of males.

In this study, 88 (73.3%) patients presented >4.5 hours after the onset of stroke and 32 (26.7%) patients arrived within 4.5 hours of onset of stroke. Pandiyan et al,¹³ reported that 29 % patients reached within 3 hours. In study conducted by Shrivastav et al,¹⁴ 25 % patients arrived within 3 hours.

In this study, the mean time since stroke onset till presentation was 10.36+6.75 hours. In other Indian studies by Pandiyan et al¹³ and Shrivastav et al,¹⁴ the median delay was 7.5 hours and 7.66 hours respectively. Ashraf V et al,¹⁵ also found the median delay of 12 hours. Faiz KW et al,¹⁸ and Wester et al,¹⁹ found the mean time since symptoms to presentation as 6 hours and 4.2 hours respectively. In this study, 92 (76.67%) patients were found to have ischemic stroke, while 28 (23.33%) patients had hemorrhagic stroke. Pandiyan et al,¹³ found 65% ischemic, 27% hemorrhagic and 8% TIA. In another Indian study by Shrivastav et al,¹⁴ 62.7% were ischemic and 41% hemorrhagic strokes, while Siddiqui M et al,¹⁷ found 81.2% ischemic stroke and 18.8% hemorrhagic stroke So, the proportion of patients with ischemic or hemorrhagic stroke were similar to other studies.

Distance from nearest road to hospital was found to be 39.36+15.13km in patients with delayed presentation as compared to 12.37+7.25km in patients who presented earlier (p value:0.001). It is a common factor responsible for delay in presentation reported in other studies also.¹³⁻¹⁵

Since in Punjab, most of people reside in rural areas, the factor of distance from home to nearest road was also taken in consideration and was also found to be significantly associated with delay in presentation, which is not taken in other studies. The patients with delayed presentation have mean distance of 436.93+343.78m as compared to 182.81+82.90m in early arrival group (p value 0.001).

Visit to local doctor was found to be a significant factor causing delay in presentation. 70(79.55%) patients with delayed presentation contacted local doctor, in contrast, patients who presented early, only 13(40.62%) visited local doctor (p value:0.001). Similarly, in studies by Shrivastav et al,¹⁴ Siddiqui M et al,¹⁷ Jin H et al,¹⁶ Sankapithilu GB et al,²⁰ visit to local doctor significantly delayed patients presentation to hospital.

It was noted that 35(39.77%) patients with delayed presentation considered the symptoms as non-serious as compared to 6(18.75%) patients with early presentation which is significant (p value 0.03). Yu RF et al,²¹ also reported failure to recognize stroke

symptoms as serious to be associated with delayed presentation.

Low threat perception was significant factor found in this study to cause delay in presentation. 25(28.41%) patients with delayed presentation thought that symptoms would resolve spontaneously as compared to 3(9.38%) patients with early presentation (p value:0.02). It was also found to be responsible for delay by Shrivastav et al,^[14] Siddiqui et al,^[17] Sankapithilu GB et al,^[20] and Mandelzweig et al.^[22]

Lack of knowledge about thrombolysis in early phase of stroke was significant factor found in this study to cause delay in presentation. None of the patients with delayed presentation had knowledge about availability of treatment in early phase whereas 5(15.62%) patients with early presentation had knowledge about thrombolysis which is statistically significant (p value:0.001).

Time taken by patients for first medical contact was 4.49+1.87hrs in patients with delayed arrival and 0.97+0.53hr in patients with early arrival (p value:0.001). It was found not to significantly alter time of presentation in other studies.

Time taken by local doctor to refer was considerably higher i.e. 7.56+ 4.97 hours in patients with delayed arrival as compared to 1.69+0.59 hours in patients who arrived earlier (p value:0.001). This further reflected the crucial role played by local doctor in determining the time of presentation of patients to hospital.

CONCLUSION

The factors which were found responsible for delayed presentation to hospital were: distance from home to nearest road, distance from nearest road to hospital, visit to local doctor, time of first medical contact, time taken by local doctor to refer, low threat perception of symptoms by patients /attendants, less concern about symptoms, perception of symptoms as non -serious and lack of knowledge about availability of thrombolysis in early phase of stroke. Measures to reduce the delay in presentation of acute stroke patients to tertiary care hospital will require careful education among the profession and the public of the importance of prompt transfer. This could have an impact on modifiable factors like low threat perception and local doctor's role. Distance related time factor could also be partially dealt with arranging high-speed, easily available ambulance services.

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