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EPIDEMIOLOGICAL PROFILE AND ISSUES OF ACUTE STROKE MANAGEMENT IN A TERTIARY CARE HOSPITAL - A PROSPECTIVE LONGITUDINAL STUDY OF SOUTHERN COASTAL INDIA.

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ABSTRACT

Objective: The World Health Organization (WHO) estimates that nearly 15 million patients worldwide suffer from stroke annually. Diverse demography and limited national health resources contribute to the difficulty in neuro-epidemiological studies, which will effectively guide health care professionals to treat patients of that particular region. In this study we tried to explore the epidemiological parameters and deficits of acute stroke management. **Materials And Methods:** Current study is a prospective longitudinal study of 653 acute stroke patients presenting to the departments of Neurology, Emergency medicine of Narayana Medical College, over a period of 2 years (April 2018 to March 2020). **Statistical Analysis:** Demographic parameters were considered as Primary observed variables. Descriptive analysis was performed by the mean and standard deviation for quantitative variables, frequency, and proportion for categorical variables. **Results:** Of the 653 patients, 317 (49%) were males and 336(51%) were females. Mean age for stroke was 61.6 years. Majority of them were from rural background, have nil education status, married, house wives and from low socioeconomic status. 69% were not aware of any vascular risk factors for stroke/ CAD. Awareness of other vascular risk factors like diabetes, hypertension was in 34% while that of treatment options like thrombolysis was in 12% patients only. Alcohol consumption was present in 41% and smoking in 38% patients. Most common time of symptom onset was 6-12 hours. Majority of the first evaluated areas was emergency department. 49% patients consulted health care facility after window period, most common reason for delay being inability to recognize symptoms followed by lack of transportation **Conclusion:** Assessment of patient's socio economic and educational status, knowing the patient's awareness of vascular risk factors and management aspects of stroke with early recognition of symptoms and signs help us in strengthening the health care system, there by reducing morbidity and mortality of stroke in countries like India, where the major population is from rural background.

INTRODUCTION:

WHO defines the clinical syndrome of "stroke "as, rapidly developing clinical signs of focal (or global) disturbance of cerebral function with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than vascular origin. Recent study identified that 7% of medical and 45% of neurological admissions were due to stroke with a fatality of 20% at 28 days[1].India like other developing countries is in the midst of a stroke epidemic. Pooled analysis has shown that estimated prevalence rates of stroke for years 2000 and 2015 are 108 and 133 per 1,00,000 population, indicating a dramatic rise in prevalence over 15 years. Considering demographic changes, a further increase in stroke rates is expected.

India with more than 1 billion inhabitants, has a unique demographic with a large multicultural profile and overall lower socioeconomic indices, lower income and higher unemployment. It is undergoing remarkable economic and demographic changes in recent years resulting in a transition from poverty-related infectious and nutritional deficiency diseases to life style-related cardiovascular and cerebro vascular diseases[2,3].Given the anticipated increase in burden of stroke in coming years and limited availability of organized stroke care services to majority of people, it would be logical to place greater emphasis on stroke prevention strategies. However, very little reliable information is currently available regarding epidemiology of stroke in India. Hence the present study was undertaken to evaluate the epidemiological profile of acute stroke among population of southern coastal India..

MATERIALS AND METHODS

The present study was done at the Department of Neurology, Narayana medical college, Nellore for a period of 18 months from December 2018 to May 2020. The current study was prospective longitudinal hospital based study and was approved by the Institute Ethics committee. The study was done on 653 patients with acute stroke of outpatients and inpatients of Neurology and emergency departments.

A proforma was prepared, including a detailed history at Narayana hospital. Patients were interviewed at the time of admission regarding the awareness of stroke and vascular risk factors attributable to stroke, and patients who could not participate in the interview due to speech/language involvement or altered sensorium, the bystanders were interviewed. The questions were asked as a one-to-one interview in local vernacular language. All the patients were

assessed clinically through a detailed history. From the history, various demographic variables were collected, including age, sex, history of transient ischemic attack/stroke, hypertension, diabetes mellitus, coronary artery disease, pre-stroke disability, smoking, and family history of stroke. As the registry hospital, receives numerous patients from the sea coast- port area, which is a habitat for diverse people from the rural population of various states like Tamilnadu, Orissa, Andhra and Telangana, it may represent the population of south India.

Statistical Methods:

Demographic parameters were considered as primary observed variables. Descriptive analysis was performed by the mean and standard deviation for quantitative variables, frequency, and proportion for categorical variables. Non-normally distributed quantitative variables were summarized by the mean or median and inter quartile range (IQR).

RESULTS:

A total of 653 acute stroke patients were included in the study; among them, the ischemic group comprises 86% (n-564), and hemorrhagic stroke group 12% (n-79), and the cortical venous thrombosis group1% (n-10).

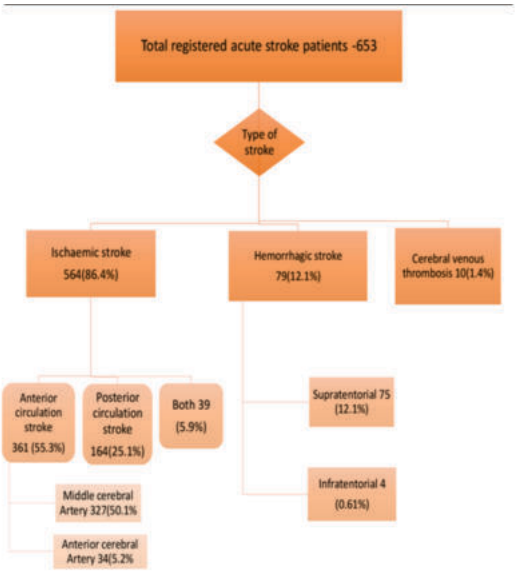

Figure 1: Showing percentage distribution of types of strokes and subgrouping based on arterial territory involved

Among 564 ischemic stroke patients, anterior circulation stroke was seen in 361(55%) and posterior circulation stroke was seen in 164 patients (25%), and multi vascular stroke was seen in 39(6%). In anterior circulation strokes, 34(5%) patients had an anterior cerebral artery, and 327(50%) had middle cerebral artery pathology. Among 79 hemorrhagic stroke patients, the supratentorial bleed was seen in 75 patients (95%) and infratentorial bleed in 4 patients (5%). Stroke was more prevalent in the age group between 61-80 years with a frequency of n-328 (50%), followed by 41-60 years age group with 268 (41%), which constitute a majority of stroke in our study group.

Table 1: Demographic variables wise distribution.

VARIABLE		FREQUENCY	PERCENTAGE
Age group	<20 years	1	1%
	20-40 years	34	5%
	41-60 years	268	41%
	61-80 years	**328**	**50%**
	>80 years	22	3%
Gender	Male	317	49%
	Female	**336**	**51%**
Stroke in young	Yes	46	7%
	No	607	93%
Residence	Urban	126	19%
	Semi-urban	84	13%
	Rural	**443**	**68%**
Education	Primary	166	26%
	Secondary	80	12%
	Tertiary	12	2%
	Nil	**387**	**59%**
	Unknown	8	1%
Marital status	Single	11	2%
	Married	**572**	**88%**
	Widowed	62	9%
	Divorced	0	0%
	Unknown	8	1%
Employment	Professional	3	1%
	Trained	40	6%
	Skilled	108	17%
	Semi-skilled	88	13%
	Unskilled	94	14%
	Housewife	**160**	**25%**
	Unemployed	125	19%
	Retired	35	5%
Religion	Hindu	566	87%
	Muslim	71	11%
	Christian	16	2%
Economic State	7533 & Above	75	12%
	3766-7532	142	22%
	2260-3765	46	7%
	1130-2259	36	5%
	1129 & below	**354**	**54%**

As illustrated in table **1**; the total number of males in the study group was 317 (49%), and females were 336 (51%). Stroke in young, i.e., individuals who had a stroke between 15-45 years, were 46 (7%), though etiology could not be evaluated in all these cases.In our study, 443 (68%) individuals who presented with stroke were residing in rural areas, 84 (13%) from semi-urban, and 126(19%) from urban areas. Among the people with education, 387 patients (59%) were uneducated, 166 (26%) were studied up to primary education, 80 (12%) were studied up to secondary education, 12(2%) were finished tertiary education, and 8 (1%) individual's education status was not known. Among the people with marital status, the majority of 572 (88%) patients were married, followed by 62 (9%) were widows, 11(2%) were single, and 8 individuals (1%) marital status was unknown. In our group, out of 653 patients presented with stroke, 160 (25%) patients were house wives, 125(19%) patients were unemployed, 108 (17%) patients were performing skilled work, 94 (14%) patients were doing unskilled works, 88 (13%) individuals were doing semiskilled works, and 40 (6%) were doing trained works, 35 (5%) people retired from government services and 3(1%) individuals were professionals among stroke patients. Out of 653 stroke patients, 566 (87%) patients belong to the Hindu religion, 71(11%) Muslim, and 16 (2%) Christian religion. According to modified Prasad's scale of socio-economic class 2020, 354 (54%) patients belong to the lower class,142 (22%) patients in the upper-middle class,75(12%) belong to the upper class, 46 (7%) patients in the middle class and 36(5%)in the lower middle class.

Table 2: Percentage distribution regarding awareness of vascular risk factors and management details of stroke

VARIABLE		FREQUENCY	PERCENTAGE
Awareness of vascular risk factors	Absent	429	66%
	Present	224	34%
Awareness of stroke/CAD	Absent	452	69%
	Present	201	31%

Awareness of thrombolytics	Absent	572	88%
	Present	81	12%
Awareness of antiplatelets	Absent	592	91%
	Present	61	9%
Awareness of physiotherapy	Absent	265	41%
	Present	**388**	**59%**
Awareness of speech therapy	Absent	560	86%
	Present	93	14%
Awareness of botox therapy	Absent	639	98%
	Present	14	2%

As illustrated in table **2;** awareness of Risk factors for stroke like coronary artery disease or cerebro vascular accidents was known for 201(31%) patients. The remaining 452(69%) individuals were not aware of any risk factors for stroke/ CAD. Awareness of other vascular risk factors like diabetes, hypertension, dyslipidemia was known only for 224(34%) patients. Awareness of treatment modalities like availing thrombolytic agents was present in 81 (12%), anti thrombotic agents were present in 61 (9%) in our study. Awareness of rehabilitative measures for stroke-like physiotherapy, speech therapy was present in 388 (59%) and 93 (14%). Moreover, Post stroke Botox therapy is known in14 (2%) individuals.

Table 3: Risk factors of Stroke wise distribution

VARIABLE		FREQUENCY	PERCENTAGE
Stroke in young	Yes	46	7%
	No	607	93%
Past Stroke	> 1 Year	105	16%
	< 1 Year	44	7%
	No	504	77%
CAD	> 1 Year	118	18%
	< 1 Year	16	3%
	No	519	79%
Obesity	Yes	75	12%
	No	578	88%
TIA	Unknown	7	1%
	Yes	36	6%
	No	610	93%
Other Cardiovascular risk factors	Yes	19	3%
	No	634	97%
Family h/o CAD/Stroke	Unknown	11	2%
	Yes	146	22%
	No	496	76%
CKD	> 1 Year	5	1%
	< 1 Year	3	1%
	No	645	98%
Hormone replacement therapy	Unknown	643	98%
	Yes	2	1%
	No	8	1%
Dyslipidemia	Unknown	11	2%
	Yes	60	9%
	No	582	89%
HTN	>1 year	257	40%
	< 1 year	44	7%
	Unknown	9	1%
	No	343	52%
Diabetes	>1 year	250	38%
	< 1 year	31	5%
	Unknown	6	1%
	No	366	56.%
Migraine	> 1 Year	56	8%
	< 1 Year	5	1%
	No	592	91%
Alcohol	> 1 Year	252	39%
	< 1 Year	13	2%
	No	388	59%
Smoking status	Current	204	31%
	Past	46	7%
	No	403	62%

Table 4: Symptom & admission details- time line wise distribution (categorical variables).

VARIABLE		FREQUENCY	PERCENTA
The most common month of symptoms	January	51	8%
	February	**66**	**10%**
	March	49	7%
	April	56	9%
	May	60	9%
	June	64	10%
	July	59	9.%
	August	45	7%
	September	56	8%
	October	59	9%
	November	50	8%
	December	38	6%
Most common time of symptom onset	0-6 Hours	143	22%
	6-12 Hours	**265**	**41%**
	12-18 Hours	160	24%
	18-24 Hours	85	13%
Most common time of arrival to registry hospital	**6-12 Hours**	**285**	**44%**
	12-18 Hours	208	32%
	18-24 Hours	108	16%
Most common time of admissions	0-6 Hours	54	8%
	6-12 Hours	285	44%
	12-18 Hours	204	31%
	18-24 Hours	110	17%
First evaluated area	**ED**	**382**	**58%**
	OPD`	252	39%
	Direct Imaging	13	2%
	Not Determined	6	1%
Ambulatory status at ictus	Unable to ambulate	14	2%
	With assistance from another person/with a device	127	20%
	Able to ambulate independently	**512**	**78%**
> 4.5hours delay (door to needle time)	**Yes**	**317**	**49%**
	No	336	5%
First contact with medical professional	NMCH	192	29%
	Outside	461	71%
Mode of transport to first medical professional	Ambulance	59	9%
	Private	**529**	**81%**
	Private & Public	4	1%
	Public	47	7%
	Other	14	2%
Mode of transport to registry hospital	Ambulance	98	15%
	Private	**435**	**67%**
	Private & Public	16	2%
	Public	100	15%
	Other	4	1%

As illustrated in table 3&4 **;** History of Alcohol consumption was present in 265 patients (41%) with, mean duration of 18.46±12.25years, predominant in male sex, some female patients residing in rural area gave history of alcohol consumption. Smoking history was present in 250 individuals (38%), with a mean duration of 21.9±14.49 years. Among them, 204 (31%) patients were current smokers, and 46 (7%)

patients were past smokers, mean duration of 10.4+5.5years. Among the study population, 265 (41%) presented symptoms onset between 6 am to12 pm. In the time of arrival, 285 (44%) presented to the medical facility is between 6am and 12pm.

As illustrated in table **5;** 58% (382) of stroke patients were first evaluated in the emergency department, 252(39%) were evaluated in opd, 13 patients (2%) under went imaging directly and 6 (1%) of patients first evaluated area was not determined. Presumptive hospital diagnosis at admission based on history and clinical information, before imaging was intracerebral hemorrhage in 61(9%), a subarachnoid hemorrhage in 17 (3%) ischemic strokes in 462 (71%), stroke not specified in 113(17%).

Among 653patients, 512(78%) were able to ambulate independently before admission, 127 patients (20%) were using assistance for walking, and 14 patients(2%) were not able to walk before the onset of the present illness. Out of 653 patients, 336 patients (51%) consulted the health care facility with in 4.5 hours and 317 patients (49%) after 4.5hours. Though a majority of the patients are seeking medical help in the window period, only 85 patients (13%) arrived to the registry hospital in the window period, but only 7 patients received thrombolytic therapy due to logistic reasons. Mode of transport to first medical contact-ambulance in 59 (9%), private transport in 529 (81%), public transport in 47 (7%), both public and private in 4 (1%), others in 14 (2%).

Mode of transport to registry hospital was an ambulance in 98(15%), public transport facility in 100(15%), private transportation in 435(67%), 16 (2)% of patients had to use two modes of transportation to reach the registry hospital; 1%, of patients, used other modalities like walking or brought by attendants.

Table 5: Timeline wise distribution (continuous variables)

VARIABLE	N	Minimum	Maximum	Mean	Std. Deviation
Duration between last known normal to symptom onset (hours)	653	.00	720.00	6.0894	43.84303
Duration between last known normal to hospital arrival (hours)	653	.58	720.00	44.5671	62.08665
Duration from arrival to admission(hours)	653	.00	189.38	7.8738	15.75259
Duration from ictus to first medical contact (hours)	653	.08	236.00	15.8222	26.93211

DISCUSSION

The present study is an longitudinal study conducted in a tertiary care teaching hospital. In the present study, all the patients with acute stroke, who satisfied all the inclusion and exclusion criteria, admitted to the department of Neurology were followed up throughout the course in the hospital were analyzed to describe the epidemiology of stroke, risk factors involved and awareness of vascular risk factors.

Baseline socio-demographic characteristics:

The present study included 653 acute stroke patients comprising Outpatient and in-patients of the Neurology and Emergency departments of a tertiary care center in Nellore. The objectives of the present study are partly similar to that done by GadisaDA et al. [4](2021), Kaur G et al. [5](2020), Kefale B et al. [6](2020), Fekadu G et al. [12](2019), and Dhiman D et al.[10](2018) These studies focused on the type of stroke, clinical profile, demographic profile, outcome, and risk factors. In addition, the present study also investigated the awareness about various risk factors, treatment, and rehabilitative services. The present study included a total of 653 acute stroke patients. The sample size of the present study was higher compared to other similar studies conducted across India and the world.[4-6,9-11]Similar to other studies, there was a fairly equal distribution of males and females in the present study[4-6,9-11]Majority(50.2%) of the patients were aged more than 60 years in the present study. Although stroke can occur at any age, elderly persons are more commonly affected. The phenomenon of Young stroke defined by the occurrence of stroke in patients aged between 15-45 years was 7% in the present study. It was similar to the studies done by Kaur G et al. (6%)[5],and Kefale B et al. [6](8.2%). However, Sarkar D et al. [9], in their study, reported a higher prevalence of young stroke at 18%.This could be due to the variations in socio-demographic profile across the populations and also their co-morbid status. This could be due to the difference in the proportion of subjects with co-morbidities. Only 46.1%were hypertensive in the present study compared to 86.8% in the study by Sarkar D et al.[9]47.1% were aged more than 60 years in their study compared to 50.2% in the present study. The young population in developing countries is at increased risk of non-communicable diseases due to lifestyle and eating habits. Also, the majority of the patients in the present study were from rural areas (67.84%), had no education (59.26%), were married (87.6%), and were mainly from lower socio economic status (54.21%). Illiteracy and lack of awareness about the risk factors, economic and family burden could be some of the contributing socio-demographic risk factors for stroke. In the present study, 59.26% were uneducated, 54.21% were from lower socio economic status, and 67.84% were from rural areas. Similar to the present study, Gadisa DA et al. [4](2021), in their study observed that 61.3% of the study subjects were unable to read and write, and 64% were from rural areas. Kefale B et al.[6], in their study, also observed a higher proportion of study subjects from rural areas (53.4%). The access to healthcare services, especially services related to stroke prevention, treatment, and rehabilitation, may be limited in rural compared to urban areas.

Awareness of risk factors, treatment, and rehabilitative measures

Increasing public awareness of stroke symptoms will decrease the pre-hospital delay, there by allowing the patients to receive thrombolysis within the specified window period. There is a lack of literature on awareness of vascular risk factors for stroke in studies that have evaluated the socio-demographic and clinical profile of stroke. Stroke subjects were interviewed regarding the awareness of stroke and vascular risk factors. Bystanders were interviewed in case participants could not be interviewed due to altered sensorium /other reasons. Only 30.8% of the patients in the present study were aware that coronary artery disease is a risk factor for stroke. Awareness of other vascular risk factors like diabetes, hypertension, dyslipidemia was seen in 34.3% of patients. There was very low awareness of treatment modalities like thrombolytic agents (12.4%), anti thrombotic agents (9.3%), and rehabilitative measures like physiotherapy (59.4%) and speech therapy (14.2%) in the study population. In subjects with stroke, functional independence to do daily normal activities is the ultimate aim.[7]The awareness about these risk factors, comorbid conditions leading to stroke, treatment, rehabilitative services, and rushing to the emergency after the symptom onset can help in achieving better functional outcomes.

Cognitive and motor impairments may influence the recovery of functional status in stroke patients during rehabilitation. They extend the duration of rehabilitation and negatively affect the independence in daily activities and quality of life.[18] Hence education and motivations play a key role in their rehabilitation.

Personal and past medical history

Good clinical history plays a key role in the diagnosis of stroke. Common risk factors associated with stroke are hypertension, diabetes mellitus, dyslipidemia, and smoking.[5]In hemorrhagic stroke, increased blood pressure is more common. Besides, hyperglycemia has also been observed in the early phases of hemorrhagic stroke. Assessment of co-morbid conditions like diabetes mellitus and hypertension and keeping them under control can help in improving the outcome in subjects with stroke. In the present study, 46.1% had Hypertension. 43.03% had Diabetes mellitus. Kefale B et al. [6], in their study, also observed that hypertension was the most commonly associated co-morbid condition (64.9%). In the present study, 22.82% of the patients had a past history of stroke. 6.74% of the total 653 patients had a recent stroke (within the past one year). Age, sex, family history, ethnicity are non-modifiable risk factors of stroke, while hypertension, smoking, diet, and physical inactivity are among the identified modifiable risk factors. 22.36% had a positive family history of CAD / Stroke. 9.19% had Dyslipidemia. 31.24% were current smokers, while 7% were past smokers in the present study. 40.58% had a history of alcohol intake. Fekadu et al.[12],in their study, also observed that the most common risk factor was hypertension (75.9%) followed by family history (33.6%), alcohol intake (22.4%), smoking (17.2%),and heart failure (17.2%). Similarly, Hypertension and atrial fibrillation were the two most frequently identified comorbidity / antecedent risk factors in the study by Gadisa DA et al.[4].They also observed that 33.3% of their patients had a history of substance abuse. Kaur G et al. [5], in their study, also observed that 52.5% of their subjects had Diabetes Mellitus while 25.8% had Dyslipidaemia. The nature of the deficit prevents the stroke patients them selves from giving a reliable history. Hence collateral history from witnesses or family members is essential.

Symptom timeline and issues and challenges of acute stroke management

In stroke, the clinical course is very variable and is altered by a variety of factors. Each subtype of stroke has a characteristic course. Early stroke symptoms are hemiparesis/hemiplegia, aphasia, altered sensorium, facial palsy, vertigo, and headache. The symptoms were progressive in 41.81% of patients, while they were static in 53.29% of the patients. The symptoms were improving only in 4.9% of the patients. In the present study, weakness was the major symptom in 54.82% of the patients, followed by deviation of mouth (47.17%), Hoarseness of voice (45.79%), and difficulty in speech/slurring of speech (42.88%).

Patients with acute stroke need urgent evaluation and management as with each passing minute, and more neurons become non-salvageable in ischemia. The majority (40.58%) of the patients had the onset of stroke symptoms during the morning, 6 am to12pm in the present study. The majority (43.64%) arrived at the hospital between 6am to 12 pm, followed by 12 pm to 6 pm (31.85%). In case of stroke, "Time is Brain." In patients with acute ischemic stroke, revascularization of the ischemic brain at the earliest is the approved and recommended treatment.[16,17]Prehospital delay, the time from the onset of stroke to the hospital visit, is the greatest contributor to the delay from the onset of acute stroke to starting treatment.[11]

Out of 653 patients in the present study, 58.5% were first evaluated in the emergency department, while 38.59% were evaluated in the OPD. 78.41% of the subjects were able to ambulate independently on arrival. Before reaching the present registry hospital, 70.6% of patients had the first contact with a medical professional outside.The preferred mode of transport used for reaching the registry hospital was private transport in 66.62% of the subjects. 317(48.55%) patients arrived late (>=4.5hours) to the first medical contact. In the present study, out of 317 (48.55%) patients, 212 (66.88%) individuals did not recognize symptoms, 66 (20.82%) lack of transportation, 62 (19.56%) financial constraints, 41 (12.93%) had longer travel time, events occurred at odd hours in 14 (4.4%), 9 patients (2.84%) went to an alternative system of medicine, 5 (1.58%) patients confused symptoms with generalized weakness, 23 (7.26%) had other reasons for delayed presentation, compared to study by Iyer R et al. [13],where 70% of acute stroke patients arrived late for thrombolysis, reasons being residing in rural areas, lack of education, lack of stroke awareness, no knowledge of the importance of timely thrombolysis, no access to ambulance services were the major reasons. In the present study, 51.45% reached the hospital within thewindow period. Even if the patients reach the health care facilities with in the window period, thrombolysis was done in significantly low percentage of patients. The thrombolytic agents needed to treat ischemic stroke are very expensive, creating major hurdles in the effective management of acute ischemic stroke. Pandian J et al.[14], intheir study, observed that 51.7% of patients reached healthcare facilities ≤4.5 hours, but 40% of them had approached unqualified practitioners. In the study by Nepal G etal.[15], Only 20.17% of patients arrived within the time frame for thrombolysis. There is an urgent necessity to establish more number of hospitals able to treat stroke patients within reach of a majority of the population. Not all hospitals have the required imaging facilities. Hence the knowledge about various symptoms of stroke and the awareness to reach appropriate medical facilities and get medical care as early as possible is necessary to prevent poorer outcomes.

CONCLUSIONS:

Rural population is the major contributing population for our study (67.8%). Majority of the patients are elderly between the ages 61-80 yrs (50.2%), uneducated (59.2%), with low economic status (54.2%), with a mild female preponderance. (51.4%)

Only few patients were aware of the vascular risk factors for stroke (34.3%), thus hindering the advantage of primary prevention of stroke. There is lesser awareness about the recognition of stroke symptoms (30.7%), available immediate treatment options for stroke like thrombolysis (12.4%) or anti platelets (9.3%) and post stroke care like speech therapy (14.2%), botox therapy (2.1%) which makes the diagnosis and management of stroke a real time challenge.

Most common risk factors for stroke in our study were HTN (46%), DM (42.9%), alcohol consumption (40.1%) and tobacco smoking (38.2%). Concentrating health care services in these areas will indirectly reduce the stroke burden, especially in the rural areas of India.

48.5% of the total patients couldn't reach the hospital within the window period ,with an average delay of 48 hours from the last known normal, and the most common reason for not reaching hospital in time among them was inability to recognize stroke symptoms in time (66.8%)and lack of transportation.(20.8%). By concentrating on creating awareness on stroke recognition and the importance of timely management, even in the most interior parts of rural India, we can check this rising epidemic of stroke.

Conflict of interest – None

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