Original Research Article

Correlation of clinical profile with neuro imaging in patients with stroke

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Abstract

Introduction: The cerebrovascular stroke is one of the leading causes of morbidity & mortality in adult life. After coronary heart disease & cancer of all types, stroke is the third commonest cause of death worldwide. Indian studies have shown a stroke prevalence of 471.58/100000 population. **Objective:** Primary objectives of the study were to study clinical profile, risk factors and to correlate clinical profile with neuroimaging in patients with stroke. Secondary objectives were to study the incidence of stroke in various socio-economic strata, the complications during the stay in hospital and also to determine the average length of hospital stay. **Methods:** This prospective hospital-based study was done of 50 consecutive patients with provisional clinical diagnosis of fresh stroke who underwent neuroimaging (CT/MRI) of brain. Patients with possible cause other than stroke were excluded from study. Imaging findings were evaluated and tabulated and subsequently correlated with the clinical findings of the patients. **Results:** There were 50 patients with stroke (32 males and 18 females). The study showed that cerebrovascular strokes are more common in males (64%) than females (36%), most common age group was 70-80 years (38%), most common clinical feature was hemiplegia (70%), most common risk factor was Hypertension (34%) followed by diabetes mellitus (38%), alcohol (20%), tobacco chewer (20%), smoking (18%), past h/o IHD (14%), past h/o cerebrovascular stroke (10%) dyslipidemia (4%). Most common type of stroke was ischemic (88%) and hemorrhagic was (12%). In ischemic stroke, most common involved areas were parietal (28%), frontal (28%). In hemorrhagic stroke most common site was thalamus (6%), basal ganglia (6%) followed by lentiform nucleus (4%). Provisional clinical diagnosis of infarct/ischemic stroke was given in 38 cases, and of hemorrhagic stroke in 12 cases out of total 50 cases. On neuroimaging infarcts/ ischemic stroke were diagnosed in 44 cases and hemorrhage in 6 cases. Clinical diagnosis in cases of ischemic stroke had Sensitivity of 84.1% and Specificity of 83.3%. While in cases of hemorrhagic stroke, the clinical diagnosis had Sensitivity of 83.3%, Specificity of 84.1%. Most commonly involved blood vessel was MCA territory (78%). The maximum number of days in hospital with either type of stroke was 6-10 days on an average. Most common associated complication was urinary tract infection 18.37 %(N=9) followed respiratory tract infection 6.12 %(N=3). Outcome of stroke patients, majority were discharged with variable residual disability while 4.5% (N=2) died during the hospital stay. **Conclusion:** In our study of 50 patients, hypertension was the most common risk factor and most common type of stroke was ischemic. Clinical diagnosis of stroke was accurate in a significant number of cases. In-hospital medical complications (vascular, urinary, and infectious) are relevant factors influencing duration of hospitalization after acute stroke. Therefore, prevention of potentially modifiable risk factors for medical complications is an important aspect of the early management of patients with stroke.

Keywords: clinical profile,Neuroimaging,Computed Tomography, Magnetic Resonance Imaging.

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Introduction

Stroke is the one of leading cause of mortality worldwide and the leading cause of adult physical disability.[1] Developing countries like India, are facing the burden of non-communicable diseases, the estimated prevalence of cerebrovascular accident, range from 84-262/100,000 in rural, and 334-424/100,000 in urban area. Stroke is a highly heterogeneous disorder with distinct subtypes, each presenting specific, clinical and epidemiological aspects.[2,3] Risk factors for stroke includes systolic and diastolic hypertension, diabetes, atrial fibrillation hypercholesterolemia, cigarette smoking, alcohol consumption and oral contraceptive use by definition stroke is defined as neurological deficit that persist for at least more than 24hrs.[4] Rehabilitation is not well developed in India due to lack of personnel[5].Stroke is a global health problem. It is the second commonest cause of death and fourth leading cause of disability worldwide[6]. Approximately 20 million people each year will suffer from stroke and of these 5 million will not survive[7]. In developed countries, stroke is the first leading cause for disability, second leading cause of dementia and third leading cause of death. Stroke is also a predisposing factor for epilepsy, falls and depression in developed countries[8] and is a leading cause of functional impairments, with 20% of survivors requiring institutional care after 3 months and 15% - 30% being permanently disabled[9]. Stroke is no longer a disease of the developed world: Low and middle-income countries account for 85.5% of total stroke deaths worldwide and the number of disability-adjusted life years in these countries was approximately seven times that in high-income countries[10].

Stroke is a life-changing event that affects
not only the person who may be disabled, but their family and caregivers. Utility analyses show that a major stroke is viewed by more than half of those at risk as being worse than death[11]. In many high-income countries, stroke management has changed substantially in the past two decades. Impressive developments through structured clinical pathways for thrombolysis and secondary prevention have been made[12]. Organized provision of care in a stroke unit have been found to increase the number of patients who survive, return home, and regain functional independence in their everyday activities[13]. However, implementation of such organized care for stroke is limited and inadequate in low and middle income countries, especially in a country like India where resources for rehabilitation are scarce[14].

Stroke Morbidity and Mortality in India

- Prevalence 90-222 per 100,000 [7]
- 102, 620 million deaths (15)1.44-1.64 million cases of new acute strokes every year [16,17]
- 6,398,000 DALYs [18]
- 12% of strokes occur in the population aged <40 years[19]
- 28-30 day case fatality ranges from 18-41%.[7]

Epidemiology of stroke in India

Reliable morbidity and mortality estimates for stroke in India are limited due to incomplete death certification, incorrect death classification, and uncertainty of etiology in cases of sudden death or multiple co-morbidities[20]. In India, although a system for recording cause of death was introduced in 1998; only 14% of deaths are ever classified[21].World-wide over the past four decades, the annual age-standardized stroke incidence rate has decreased by 1.1% in high-income countries but has increased by 5.3% in low to middle income counties[22].In India, the ICMR estimates in 2004 indicated that stroke contributed 41% of deaths and 72% of disability adjusted life years amongst the non-communicable diseases[23]. The Indian National Commission on Macro-economic and Health estimated that the number of strokes will increase from 1,081,480 in 2000 to 1,667,372 in 2015[24]. The Global Burden of Disease Study projects that total deaths from stroke in India will surpass established market economies by year 2020.The cost of stroke is all but impossible to calculate because so much is absorbed by the patients and their families, and much of is also buried in overall social services budgets.

Various diagnostic modalities have been applied to the radiological evaluation of cerebral infarction. With the introduction of Computed Tomography (CT scan) of brain a noninvasive technique has been made available to precisely demarcate the area of cerebral infarction/hemorrhage. CT scan helps to differentiate between infarction and hemorrhage. Magnetic Resonance Imaging (MRI) is more sensitive than CT scan. However, the multiplicity and the continuous advances of neuroimaging techniques available for the evaluation of stroke patients has helped for accurate diagnosis because the time period for treatment is narrow. Neuroimaging can provide information about salvageable tissue and vessel occlusion in the hyperactive phase of ischemic stroke. Thus, neuroimaging criteria have been used for patient selection and outcomes in different trails.

Material & Methods

This is a prospective study carried out in BARC Hospital at Anushakti Nagar in Mumbai in the

department of medicine. The patients with clinical diagnosis of cerebrovascular stroke were subjected to thorough clinical evaluation routine and specific investigations including CT/MRI scan as per the guidelines.

Study site: BARC Hospital, Anushakti Nagar, Mumbai.

Study population

50 consecutive patients with clinical diagnosis of stroke, who were admitted in medical ward of BARC hospital at Anushakti Nagar in Mumbai. Patient were included in the study after applying strict inclusion and exclusion criteria, these patients were monitored in medical ward in dept. of medicine at BARC hospital Mumbai.

Study design: This is a cross-sectional study of cerebrovascular stroke.

Sample size:

Sample size was decided using following standard formula

Sample size (n) $=z^2 X P (1-P)/e^2$

Where -n is sample size

z-is confidence interval taken as 95%, so value of z=1.96

P-prevalence obtained from previous study

e- Maximum tolerable error for prevalence i.e., + and- 0.1

Prevalence of stroke taken as 133/100000 (81)

So, substituting the value in above formula

n=1.96*1.96*0.13(1-0.13)/0.1*0.1

n=43.44 so sample was taken 50

Time frame

Duration of study is for 2 years from September 2014 to September 2016.

Selection of cases

Inclusion criteria

1. All patients having clinical and radiologic confirmed diagnosis of stroke were included.
2. Age of 14 years or above were include in this study
3. Diagnosis in all patients was confirmed by brain imaging study either by CT/MRI scans of the brain.

Exclusion criteria

1. Age less than 14 years.
2. Head injury/ trauma.
3. Transient ischemic attack (TIA) and patients having normal CT/MRI brain normal.
4. Patients in whom CT/MRI scan could not be done.

Data analysis and statistics:

Statistical analysis of data was performed with software SPSS Version 21.0. Continuous variables were analyzed using the student's t – test and proportions with the chi- square test as appropriate. P values of less than 0.05 were considered significant.

Methodology: The study protocol was approved by the ethical and scientific committee of BARC. All patients who presented with clinical diagnosis of acute stroke, an informed consent in the language known to them was taken from every conscious patient and attendants from unconscious patient after full explanation of research work and were subjected to a detailed history, physical examination, serial neurological examinations, and were subjected for biochemical and radiological evaluation in form of CT/MRI scan of the brain. The clinical diagnosis of ischemic stroke was made on the basis of neurological history and clinical signs. Since CT/MRI scan of brain is not available in our hospital, so it was done at the earliest when the patient was clinically stable enough to be sent to the nearest imaging centre. All patients had Computed Tomography scan of brain (CT Scan) done with onset of signs and symptoms of stroke. MRI Scan of brain was performed in selected patients where CT Scan brain was inconclusive, or a diagnosis other than stroke was considered. The results of the scan were matched with clinical diagnosis on case-to-case basis and precision of clinical diagnosis was ascertained. The patients were separated on a clinical basis and placed into one of the following categories of cerebrovascular disease: ischemic stroke and hemorrhagic stroke. Thus, applying strict inclusion/ exclusion criteria, patient presenting with CVA were subjected to complete clinical, biochemical and radiological evaluation.

Results

The present study was conducted in B.A.R.C. Hospital, Mumbai over a period of 2 years from September 2014 to September 2016. 50 patients with stroke were studied & evaluated for clinical profile, risk factors and correlation with neuro imaging.

Distribution of population according to age

Minimum age noted among the population studied was 42 years, whereas Maximum age was 85 years and Mean age of 65.84 ±12.47 years in our study group. The most commonly affected age group was 70-80 years which comprised 38% (N=19) of total patients. Young stroke was 10%. (Table-1).

Table 1: Distribution of population according to age

Age groups (years)	Frequency (N)	Percentage
41-50	10	20
51-60	6	12
61-70	12	24
71-80	19	38
81-90	3	6
91-100	0	0
Total	50	100

Distribution of study population according to Gender

The cerebrovascular strokes are more common in males than females, in present study, 64% (N=32) patients were males and 36% (N=18) patients were females. (Table-2)

Table 2: Distribution of study population according to Gender

Sex	numbers (N)	Percent
Male	32	64
Female	18	36
Total	50	100

Distribution of Study Population According To Socio-Economic Status

Socio-economic strata, high prevalence of ischemic stroke was seen in Middle Class group while in hemorrhagic stroke were in Middle Class and Upper Class (Table-3)

Table 3: Distribution of Study Population According To Socio-Economic Status

	Frequency(N)	Percentage
Upper Class	7	14
Upper Middle Class	18	36
Lower Middle Class	18	36
Upper Lower Class	7	14
Lower Class	0	0
Total	50	100

Distribution of study Population according to Risk Factors

Among the risk factors for stroke, hypertension and diabetes mellitus were detected as most common risk factor, Hypertension was found in 68% (N=34) patients, diabetes mellitus was 38% (N=19), alcohol 20% (N=10), smoking 18% (N=9), past of cad14% (N=7), past history of stroke10% (N=5), tobacco chewer 8% (N=4), dyslipidemia 4% (N=2) whereas there were no cases with risk factor of RHD with valvular disease in the study population. (Table-4)

Table 4: Distribution of study Population according to Risk Factors

Risk factors	Frequency (N)	Percent
Hypertension	34	68
Diabetes mellitus	19	38
Alcohol	10	20
Smoking	9	18
Past H/o CAD	7	14
Past H/o stroke/ Tia	5	10
Tobacco	4	8
Dyslipidaemia	2	4
RHD with valvular disease	0	0

Distribution of Study Population According To Clinical Features

70% (N=35) patients presented with hemiplegia/ hemiparesis, 62 % (N= 31) cases presented with speech involvement that is dysarthria as most common presentation ,40%(N=20) cases presented with facial weakness, 22%(N=11) cases presented with headache, 16% (N=8) cases presented with instability of gait, 8%(N=4) cases presented with altered sensorium whereas only 2% (N=1) cases presented with vomiting, no stroke patients presented with Convulsions. (Table-5)

Table 5: Distribution of Study Population According To Clinical Features

Clinical features	Frequency (N)	Percent
Hemiplegia /hemiparesis	35	70
Speech involvement	31	62
Facial Weakness	20	40
Headache	11	24
Instability of gait	8	16
Altered sensorium	4	8
Vomiting	1	2
Convulsions	0	0

Distribution of Study Population According To Clinical Diagnosis

Among the cerebrovascular strokes most common etiology was ischemic due to thromboembolism which comprised of 88% of patients followed by hemorrhagic stroke which comprised of 12% patients. (Table-6)

Table 6: Distribution Of Study Population According To Clinical Diagnosis

Clinical diagnosis	Frequency(N)	Percent
Ischemic stroke	38	76
Haemorrhagic stroke	12	24
Normal study	0	0
Total	50	100

Distribution of Study Population According To Neuro Imaging With Type of Stroke

Out of total 50 cases neuro-imaging shows that 44 cases (88%) had Ischemic stroke and 6 cases (12%) had Hemorrhagic stroke proven on neuro-imaging. (Table-7)

Table 7: Distribution of Study Population According to Neuro Imaging with Type of Stroke

CT scan/MRI Diagnosis	Frequency(N)	Percent
Ischemic stroke	44	88
Hemorrhagic stroke	6	12
Total	50	100

Clinical and Neuro- Imaging Correlation

Provisional clinical diagnosis of infarct/ischemic stroke was given in 38 cases, and of hemorrhagic stroke in 12 cases out of total 50 cases. On neuroimaging infarcts/ ischemic stroke were diagnosed in 44 cases and hemorrhage in 6 cases.

Out of 38 clinically suspected cases of ischemic stroke, in 37 cases clinical diagnosis was confirmed on imaging, while in 1 cases of hemorrhage on neuroimaging. Sensitivity of clinical diagnosis was 84.1% and Specificity was 83.3 %. Positive Predictive Value was 97.3 % and Negative Predictive Value was 58.3 %.

Out of 12 clinically suspected cases of hemorrhagic stroke, 5 cases were confirmed on imaging while in 7 cases of hemorrhagic stroke on imaging clinical diagnosis was contrary. Sensitivity of clinical diagnosis was 83.3%, Specificity was 84.1%, Positive Predictive Value was 41.67% and Negative Predictive Value was 2.63 %.

Distribution According to CT Scan / MRI Of Brain with Type of Stroke and Area of Involvement

In our study topographic distribution amongst Ischemic stroke, frontal (28%) and parietal (28%) were most common and next common was temporal (18%) and basal ganglia (18%). Whereas amongst hemorrhagic stroke thalamus (6%) and basal ganglia (6%) were most common and next common was lentiform nucleus (4%) in our study. (Table-8)

Distribution of Study Population According to Type and Area of Blood Vessel Involvement:

Our study shows that 74.3% (N=29) cases had Right middle cerebral artery involved ,25.6% (N=10) cases had left middle cerebral artery involved,33.33%(N=2) left posterior cerebral artery and 66.67%(N=4) right posterior cerebral artery and 10% cases(N=5) had basilar artery/pica, while none of the cases had anterior cerebral artery involved. In our study predominantly anterior circulation was involved as compared to posterior circulation and most common blood vessel involved was the middle cerebral artery (MCA) 78% and next common was posterior cerebral artery (PCA) 12%. (Table-9)

Impact of stroke on length of stay and associated complication

The maximum number of days in hospital with either type of stroke was 6-10 days on an average.

Prolong stay was seen more common with ischemic stroke than hemorrhagic stroke. While most common associated complication was urinary tract infection followed respiratory tract infection. Out of 50 cases,18.37%(N=9) had urinary tract infection, 6.12%(N=3) had respiratory tract infection, 6%(N=3) cases had bed sore, none had deep vein thrombosis.

Table 8: Distribution According to CT Scan / MRI Of Brain with Type of Stroke and Area of Involvement

Affected areas of brain on CT scan /MRI brain	Ischemic stroke		Haemorrhagic stroke	
	Frequency (N)	Percent	Frequency (N)	Percent
Pons	8	16	0	0
Midbrain	0	0	0	0
Thalamus	6	12	3	6
Basal ganglia	9	18	3	6
Centrum semiovale	2	4	0	0
Paraventricular	5	10	0	0
Ventricular	0	0	0	00
External capsule	8	16	1	2
Internal capsule	1	2	0	0
Lentiform nucleus	4	8	2	4
Cerebellar	2	4	0	0
Frontal	14	28	1	2
Parietal	14	28	0	0
Temporal	9	18	1	2
Occipital	6	12	0	0
Caudate nucleus	3	6	0	0
Medulla oblongata	0	0	0	0

Table 9: Distribution of Study Population According To Type And Area of Blood Vessel Involvement

LEFT	Fr (N)	%	Right	Fr (N)	%	TOTAL
ACA	0	0	ACA	0	0	0
MCA	10	25.64	MCA	29	74.36	39(78%)
PCA	2	33.33	PCA	4	66.67	6(12%)
						45(90%)
Basilar artery/ PICA	5	10%				5(10%)
Total	FREQUENCY /NUMBERS (N) = 45+5 =50 PERCENT = 78+12+10= 100					

Distribution of Patients According to Outcome of Stroke

Amongst the ischemic stroke patients 95.45% (N=42) were discharged with variable residual disability while 4.5% (N=2) died during the hospital stay. While 100% (N=6) were hemorrhagic stroke patients, who were discharged with variable residual disability and no case fatalities was noted. Overall mortality was 4%, mortality was seen with ischemic stroke. (Table-10)

Table 10: Distribution of Patients According to Outcome Of Stroke

Types of Stroke	No. of Patient Discha-rged	Morta-lity Rate	Total
Ischemic	42 (95.45%)	2 (4.5%)	44 (100%)
Hemorrh-age	6 (100%)	0 (0)	6(100%)
Total	48 (96%)	2(4%)	50 (100%)

Discussion

All patients who presented with clinical diagnosis of acute stroke were subjected to a detailed history (particular for alcohol, smoking, hypertension, and diabetes: diabetic taking statin) from all patients or relatives of patients, physical examination and serial neurological examinations was done according to the predesigned proforma after taking informed consent. The patients were separated on a clinical basis and placed into one of the following three categories of cerebrovascular disease: ischemic stroke and hemorrhagic stroke. Thus, applying strict inclusion/ exclusion criteria, Patient presenting with stroke were subjected to complete clinical, biochemical and radiological evaluation. Results were analyzed and correlated with various demographic factors, associated co-morbid conditions for risk assessment and Neuro imaging.

The study group represented the urban Mumbai population representing all species of Indian population comprising of males and females. The mean age observation of stroke patients was 65.84±12.47 years in our study which correlates with study done by Maskey et al[25]. (mean age 63) & Awad SM et al. [26] (mean age 63.66). The common age group involved was between 70-80 years which closely correlates with study done by Ukoha Ob et al.[27] & Maskey et al.[25] Young stroke (age ≤50 years) comprised of 10 % of all patients witch closely correlates with study done by Abdu Sallam et al. [28](13.6%), Gauri et al. [29](19%), P. Chitrambalam et al.[30] (20%).

In our study population out of 50, 64% (N=32) of stroke cases were observed in male and 36% (N=18) in females. The male to female ratio was 1.7:1. Which correlates with study of Aiyar et al.[31] (1.9:1).

From above observation we can conclude that the incidence of stroke is more common in male sex. This finding also correlate with the study done by Aiyar et al'[31] and Pinhero et al''[32] who found the incidence of stroke is more common in males than females.

Studies of general populations in developed countries show a high prevalence of many of the classic stroke risk factors in the low socioeconomic groups[33,34]. In developing countries a direct relation has been observed between socioeconomic status and risk factors such as high blood pressure and obesity[35]. A recent WHO report [36] indicates that this pattern is changing with the risk-factor burden shifting towards low socioeconomic groups as the gross national product of the country increases. In India, for example, low education and income are now associated with high rates of tobacco use and high prevalence of diabetes, particularly in urban areas[37].

In our study maximum number of cases were in Upper and Lower middle class of 36% each (N=18), while 14 % (N=7) in Upper class and 14 % (N=7) in upper lower class, whereas there were no cases in lower class out of total 50 study population ,44 patients were with ischemic stroke proven on Neuro-imaging, amongst which 40%(N=18) were in Lower Middle Class, 36.4 % (N=16) were in Upper Middle Class and 11.4 % (N=5) were in Upper Class,11.4 % (N=5) were in Upper Lower Class, NO patients were in Lower Class.Even though higher prevalence of

ischemic stroke were in Middle Class in our study group, this correlation was found to be statistically not significant (P=0.106).Out of total 50 study population 6 patients were with hemorrhagic stroke proven on neuro-imaging, amongst which 33.3% (N=2) were in Lower Middle Class, 33.3% (N=13) were in Upper Middle Class and 33.3 % (N=2) were in Upper Class, NO patients in Upper Lower Class, and Lower Class. Even though higher prevalence of hemorrhagic stroke was in Middle Class and Upper Class in our study group, this correlation was found to be statistically not significant (P=0.106).

Out of total 50 patients in our study 34 (68%) patients were hypertensive. In our study most common risk factor was hypertension was the commonest risk factor which correlates with the study done by Eapen et al.,[38] (40%), Abdu-Alrhaman Sallam et al.[28] (67%). Out of which 65.9% (N=29) presented with ischemic stroke, while 83.3% (N=5) were with hemorrhagic stroke. Out of total 44 patients who presented with ischemic stroke on neuro-imaging only 65.9 % (N=29) were hypertensive and 34.1% (N=15) were non hypertensive. Out of total 6 patients who presented with hemorrhagic stroke on neuro-imaging only 83.3% (N=5) were hypertensive and 16.7% (N=1) were non hypertensive. There seems to be positive association but the correlation was statistically not significant (P=0.932) High blood pressure is a chief risk element for coronary artery disease and ischemic stroke and is related with foremost health risk factors such as diabetes and high cholesterol level[39,40]. In this research study, hypertension was observed as a major risk factor i.e., 65.9% (n = 29) in ischemic stroke. High blood pressure was also found as major and vital risk factor in ischemic stroke in the study of Atif MA et al.[41] who revealed 72% high blood pressure in his research study. Kamal A et al.[42] also reported that high blood pressure was major and important risk element in his research study

Out of total 50 patients in our study 38% (N= 19) patients were diabetic. Out of which 89.5% (N=17) presented with ischemic stroke, while 10.5 % (N=2) were with hemorrhagic stroke. And it closely correlates with the study by I Kaul S et al[43] in 2000, where diabetes mellitus as risk factor was 38%. This observation stressing the role of diabetes mellitus as a risk factor for an infarct (or thrombotic stroke); Particularly in males this is also correlates with the conclusion of Goplani et al[44]. who concluded that diabetes is an important risk factor for stroke especially thrombotic and associated with high morbidity and mortality.

In our study dyslipidemia was 4% which was not correlating with study done by Eapen et al [38] (17%),[39]Abdu-Alrhaman Sallam et al.(28) (13.9%). Out of total 50 patients in our study 4% (N= 2) patients were with dyslipidemia

Out of total 50 patients in our study 18% (N=9) patients were smoker. Out of which 15.9% (N=7) presented with ischemic stroke, while 33.33% (N=2) were with hemorrhagic stroke. This is comparable to study by Kaul et al [43] smoking in 28% of cases [41]. This brings us to the conclusion that smoking is an undisputable risk factor for patients having a stroke.

Out of total 50 patients in our study 20% (N=10) patients were alcoholic. Out of which 15.9% (N=7) presented with ischemic stroke, while 50% (N=3) were with hemorrhagic stroke. Among 44 patients with an infarct 15.9% (N=7) and 6 patients with hemorrhage 50% (N=3) were alcoholics. Thus, we can conclude that alcoholism is most significant as a risk factor in case of hemorrhage followed by with thromboembolic stroke.

Which correlates with the study done by Jose Luis Ruiz-Sandoval et al [45] in 1999 retrospectively who evaluated 200 patients of stroke. They reported alcohol use in 10%.

Jose Luis Ruiz-Sandoval et al. [45] in 1999 retrospectively evaluated 200 patients of stroke. They reported common risk factors for stroke as tobacco use in 20%. In our study out of 50 patients in the study, 8% (N=4) were tobacco addicted among which 4% (N=2) were having ischemic stroke and 4% (N=2) were having hemorrhagic stroke

In our study 7 patients (14%) had a past history suggestive of Ischemic heart disease and/or myocardial infarction which correlates with studies in stroke patients' cardiovascular illnesses are frequent. It increases the estimated danger of stroke by 2 to 4 times(46). The frequency of Ischemic heart disease found in our populace was 14%. Almani SA et al.[47] and Kamal A et al.[42] demonstrated the 16% frequency of Ischemic cardiac disease respectively which is comparable to this study, while Western series had much higher frequency (35% to 72%)[48]. It was additionally noticed that ischemic heart disease is an independent indicator of ischemic stroke. Thus, history of IHD and/or MI is a significant risk factor in patients with a thromboembolic stroke

A total of 10% (N=5) patients had a past history of TIA stroke in our study , which is very closely correlated with study by Kaur et al.[49] who found history of TIA in 9% cases. Thus, it brings a conclusion that past h/o TIA and/ or stroke was moderately significant in patients with a thrombotic stroke.

In our study out of 50 patients, 70% (N=35) cases presented with hemiplegia/ hemiparesis, 62 % (N= 31) cases presented with speech involvement that is dysarthria as most common presentation ,40% (N=20) cases presented with facial weakness,22% (N=11) cases presented with headache,16% (N=8) cases presented with instability of gait, 8 % (N=4) cases presented with altered sensorium whereas only 2% (N=1) cases presented with vomiting, no stroke patients presented with convulsions. This closely correlates with the study done by Vaidya CV et al.[19] in which most common clinical presentation was hemiplegia which was 48% followed by speech involvement (25.1%), altered sensorium (13.1%), convulsions (5%), instability of gait (3.9%), vomiting (3.1%) & headache (3.1%).

Thus, we can see that in our study most common clinical presentation was hemiplegia which was followed by speech involvement. This observation also closely correlates with the study done by P. Chitrambalam et al.[30] in which most common was hemiplegia (in <45 years 93.3%, in >45 years 89.2%) followed by speech involvement (in <45 years 43.3%, in >45 years 30.8%).

In our study out of 50 patients who presented with clinical features of stroke were classified into ischemic or hemorrhagic stroke, amongst which 38 patients were diagnosed with ischemic stroke and 12 patients with hemorrhagic stroke clinically at the time of presentation. These patients were subjected to neuro-imaging.

Neuro- imaging diagnosis

In our study 88% (N=44) suffered ischemic stroke and 12 % (N=6) suffered hemorrhagic stroke, no patients had primary brain malignancy. So most common type of stroke was ischemic that is cerebral infarction. Out of 44 ischemic stroke patients 61.4% (N=27) were males and 38.6% (N=17) were females, while out of 6 patients with hemorrhagic stroke 83.3% (N=5) were males and 16.7% (N=1) were females.

This is nearly comparable with the study done by Aiyar et al.(31) who found clinical diagnosis of ischemic stroke in 70% cases and 30% with hemorrhagic stroke. Also similar study done by Sotaniemi K.A.et.al [50] who found 66.2% infarcts and 33.8% hemorrhages.

Provisional clinical diagnosis of infarct/ischemic stroke was given in 38 cases, and of hemorrhagic stroke in 12 cases out of total 50 cases. On neuroimaging infarcts/ ischemic stroke were diagnosed in 44 cases and hemorrhage in 6 cases.

Out of 38 clinically suspected cases of ischemic stroke, in 37 cases clinical diagnosis was confirmed on imaging, while in 1 cases of hemorrhage on neuroimaging. Sensitivity of clinical diagnosis was 84.1% and Specificity was 83.3 %. Positive Predictive Value was 97.3 % and Negative Predictive Value was 58.3 %.

Out of 12 clinically suspected cases of hemorrhagic stroke, 5 cases were confirmed on imaging while in 7 cases of hemorrhagic stroke on imaging clinical diagnosis was contrary. Sensitivity of clinical diagnosis was 83.3%, Specificity was 84.1%, Positive Predictive Value was 41.67% and Negative Predictive Value was 2.63 %.

In a similar study done by Sirajee Shafiq et al[51], sensitivity, specificity, positive predictive value, negative predictive value and accuracy of clinical diagnosis of hemorrhagic stroke were 90.32%, 92.03%, 83.58%, 92.02% and 91.5% respectively and The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of clinical diagnosis of ischemic stroke were 95.96%, 81.58%, 89.47%, 92.53% and 90.5% respectively[51].

Similar study also done by Mehta Kanika et al.[52], the Sensitivity of clinical diagnosis in cases of ischemic stroke was 68%, Specificity was 93%, Positive Predictive Value was 96 % and Negative Predictive Value was 56 %. Sensitivity of clinical diagnosis in cases of hemorrhagic stroke was 90.8% and Specificity was 80.5%, Positive Predictive Value was 67% Negative Predictive Value was 95.2 %.

In our study amongst Ischemic stroke, frontal (28%) and parietal (28%) were most common and next common was temporal (18%) and basal ganglia (18%). Whereas amongst hemorrhagic stroke thalamus (6%) and basal ganglia (6%) were most common and next common was lentiform nucleus (4%) in our study

Similar study done Vaidya CV et al [19] most common site of infarct was parietal (33.7%), followed by frontal (16.7%) followed by basal ganglia (10.5%), whereas most common site of hemorrhage was thalamus (24.7%) followed by ventricular (17.5%) & basal ganglia (13.4%)

Our study shows 74.3% (N=29) cases had Right middle cerebral artery involved, 25.6% (N=10) cases had left middle cerebral artery involved, 33.33% (N=2) left posterior cerebral artery and 66.67% (N=4) right posterior cerebral artery and 10% cases (N=5) had basilar artery/ pica, while none of the cases had anterior cerebral artery involved. In our study most common blood vessel involved was middle cerebral artery and next common was posterior cerebral artery.

Similar study done by Mehta Kanika et al[52]. Showed the commonest vascular territory involved was the MCA territory (40.9 %) followed by PCA territory (9

%) followed by Vertebrobasilar circulation (0.05 %) and ACA territory (0.04 %).

So from above observations, we can conclude that the most common site for infarct is MCA territory and this also correlates with the similar study done by Devichand and karoli et al[53]at Delhi who also found the MCA as a most common territory, which involved 98% patients in their study

The analysis of prolonged length of hospital stay can provide valuable data for planning and policy in the health care system. The average length of stay for stroke patients varies among different countries, and may reflect the impact of the differences in health care organization. The length of stay in USA for acute ischemic stroke ranges from 6 to 11 days[54] compared with much longer hospitalization (17 to 26 days) in Canada[55], Europe[56], and Asia[57]. In the study done by Adrià Arboix, et .al [58].

The mean length of stay for patients with prolonged hospitalization was 27.7 days, significantly longer than patients discharged from the hospital after less than 12 days of admission in our study out of total 50 patients ,44 patients had ischemic stroke on neuro-imaging, out of these patients maximum 52.3% (N=23) were in hospital for 6-10 days, while 20.5%(N=9) were for 1-5 days, followed by 13.6% (N=6) for 11-15 days, 6.8%(N=3)for 16-20 days, 2.3%(N=1) for 26-30 days , 4.5%(N=2) for more than 30 days ,NONE for 21-25 days. While 6 patients had hemorrhagic stroke out of which all 6 patients had a stay between 6-10 days. According to our study maximum patients with stroke had a stay between 6-10 days approximately, this correlation was found to be statistically not significant (p=0.511)

Medical Complications After Stroke ,A Multicenter Study done by P. Langhorne et.al 59] showed associated complication in 265 (85%) of stroke patients during the stay in hospital . Specific complications were as follows: infections— urinary tract infection (24%), chest infection (22%), pressure sores (21%); thromboembolism—deep venous thrombosis (2%)

In our study maximum stroke patients did not show any associated complication, while most common associated complication was urinary tract infection followed respiratory tract infection. out of total 50 patients ,44 patients had ischemic stroke on neuro-imaging.

Among Ischemic stroke 65.31% (N=32) had no complication,18.37%(N=9) had urinary tract infection,6.12%(N=3) had respiratory tract infection, 6.12%(N=3) had bed sore, while 4.08%(N=2) died and none of the cases showed deep vein Thrombosis during the stay in hospital. Maximum patients amongst ischemic stroke did not have any complication. 6 patients were with hemorrhagic stroke.

NO complication was seen with hemorrhagic stroke. This correlation was found to be statistically not significant.

An important finding of our study was the dominant relevance of medical complications developed during in-patient care for predicting prolonged length of stay in acute stroke victims. Vascular complications, urinary infection and other infectious complications were independent factors associated with prolonged hospital stay. The presence of infections of any type or source is a cause of acute neurological deterioration, a situation that increases both mortality and morbidity in acute stroke patients[60]. It has been shown that stroke-associated infection, in particular pneumonia, is independently associated with poor functional outcome after ischemic stroke[61]

In our study among the stroke patients, maximum patients who had urinary tract infection had stay in hospital more than 15 days, maximum respiratory tract infection was seen in patient who stayed for more than one month, maximum patients who had bed sores were seen after 15 days, while 4.08% (N=2) had died during their stay and none of the cases showed deep vein Thrombosis during the stay in hospital

In a similar study done by Adrià Arboix et.al.[58] showed respiratory tract infection 13%(n=200) with stay less than 12 days and 6.2% (n=98) more than 12 days stay in hospital, urinary tract infection 14.5% (n=222) with stay less than 12 days and 3.5% (n=55) more than 12 days stay in hospital, deep vein thrombosis 1.8%(n=39) with stay less than 12 days and 0.6% (n=10) more than 12 days stay in hospital, NO complication 9.8%(N=151) less than 12 days stay and 23% (N=23) had stay more than 12 days

In our study out of the total 50 patients who were the study population, 88% (N= 44) were total ischemic stroke patients and 12% (N=6) were hemorrhagic stroke patients according to the diagnosis on neuro-imaging. Amongst the ischemic stroke patients 95.45% (N=42) were discharged with variable residual disability while 4.5% (N=2) died during the hospital stay. While 100% (N=6) were hemorrhagic stroke patients, who were discharged with variable residual disability and no case fatalities was noted. The mortality rate was similar to study done by Rana .et.al [3] in which 4% mortality rate was seen with ischemic stroke. But did not correlate well as hemorrhagic stroke was more common cause for mortality than ischemic stroke, where as in our study mortality was seen only with ischemic stroke.

We also observed that patients are extremely delayed in coming to the hospital and this was consistent with other studies on stroke in sub-Saharan Africa[10,27]. It is recommended that stroke patients arrive at the hospital within 3 h of symptom onset in order to receive treatments such as TPA, to minimize long-term effects and even prevent death. Although thrombolytic treatments are currently unavailable in our hospital, the delay of several days creates management difficulties

Conclusion

To conclude stroke in our county is on rise. The occurrence rises with age with peak between 60 to 70 years. Young patients. (Age ≤45 years) were 10% of patients. which is more dangerous in view of productive year lost. The most commonly affected age group was 70-80 years which comprised 38% of total patients and the mean age was 65.84+12.47 years. The cerebrovascular strokes are more common in males than females, in present study. Socio-economic strata, high prevalence of ischemic stroke was seen in Middle Class group while in hemorrhagic stroke were in Middle Class and Upper Class. Among the risk factors for stroke, hypertension and diabetes mellitus were detected as most common risk factor. Hypertension was amongst leading risk factors for both types. After hypertension diabetes mellitus, smoking, dyslipidaemia, & alcohol intake & previous history of CVA were amongst leading risk factors, they were more prevalent in ischemic stroke. Most common clinical presentation was hemiplegia followed by speech involvement dysarthria. Among the cerebrovascular strokes most common etiology was ischemic due to thromboembolism followed by hemorrhagic stroke. In our study topographic distribution amongst Ischemic stroke, frontal and parietal were most common and next common was temporal and basal ganglia. Whereas amongst hemorrhagic stroke thalamus and basal ganglia were most common and next common was lentiform nucleus. Among patients with strokes, the most commonly involved blood vessel was MCA territory. The maximum number of days in hospital with either type of stroke was 6-10 days on an average. Prolong stay was seen more common with ischemic stroke than hemorrhagic stroke maximum stroke patients did not show any associated complication, while most common associated complication was urinary tract infection followed respiratory tract infection. Overall mortality was 4%, mortality was seen with ischemic stroke.

Recommendations

1-It is recommended that stroke patients arrive at the hospital within 3 h of symptom onset in order to receive treatments such as TPA, to minimize long-term effects and even prevent death [20]. Although thrombolytic treatments are currently unavailable in our hospital, the delay of several days creates management difficult.

2-We need holistic approach & more research to combat this deadly & disabling disease. Prevalence of stroke is high and this might be because of unawareness related with these risk elements, unaffordability of medications or proper follow up. By early and rapid recognition and control of modifiable risk components we can decrease the illness and death of stroke related patients, which will decrease the financial load on our populace and across the globe.

3. The analysis of prolonged length of hospital stay can provide valuable data for planning and policy in the health care system. The average length of stay for stroke patients varies among different countries, and may reflect the impact of the differences in health care organization.

4-In addition, the health system needs to be reoriented to encourage health education on NCDs (NON-COMMUNICABLE DISEASE) for the general public,

5- To promote identification of lifestyle related risk factors through proper history taking, to include regular screening for NCD risk factors at all levels of care, and to facilitate consistent and continuous follow up of chronic conditions.

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