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"A Clinico-Radiological Profile Of Acute Ischaemic Stroke As Pertoast Classification In A Tertiary Care Hospital"

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ABSTRACT:

Background:*Stroke is one of the leading causes of death and disability worldwide.[1] Stroke was a direct cause of 1 in 6 cardiovascular disease-related fatalities in 2020[2]. Over 87% of strokes are ischemic strokes, which occurwhen the blood supply to the brain is cut off.[3]The Trial Organization 10172 categorization (TOAST) was utilized in Treatment for Acute Stroke to further classify strokes into those resulting from cardio embolism (CE), large-artery atherosclerosis (LAA), small vessel occlusion (SVO), and stroke of unknown etiology.[1]*

OBJECTIVES:

1. *To study the aetio pathogenesis of acute ischemic stroke.*
2. *To study radiological imageology of various stroke patients.*
3. *Classification of ischemic stroke according to TOAST (Trial of ORG 10172 in Acute Stroke Treatment)*
4. *To evaluate prognosis, outcome and management.*

MATERIAL & METHODS: Study Design: *Hospital-based, cross sectional study.* ***Study area:*** *The study was conducted in the Department of General Medicine,Shadan Institute of Medical Sciences & Hospital, Hyderabad, Telangana from April 2023 to September 2023.****Sample size****: Study consisted a total of 100 subjects.****Sampling Technique:*** *Simple Random technique.****Study tools and Data collection procedure:****All patients who fulfilled the inclusion criteria and giving a written consent for the study were included in the study. A detailed study of the clinical profile of each patient was done based on pre- designed proforma including history, examination and investigations.Relevant investigations like blood glucose, serum lipid profile, electrocardiography, echocardiogram, carotid Doppler, CT scan brain or MRI brain were done for all the patients. All the results were tabulated and analyzed. Outcome studied with reference to Glasgow coma scale at time of admission with special reference to TOAST classifications.*

Results: *The commonest clinical symptom was motor weakness in (82%) cases and the least common was ataxia and vertigo in 1% cases.The most common clinical sign in our study was motor weakness in the form of paresis or plegia in 86% cases and least common was cerebellar signs in 4% cases.Hypertension was the commonest associated risk factor in 52% cases and CAD was the least common associated risk factor in 5% cases.*

Conclusion: *The Trial of Org 10172 in Acute Stroke Treatment (TOAST) system is the most widely used classification system worldwide. It is the most standard etiological classification system for ischemic stroke. This study has revealed significant dependence of ischemic stroke subtype on the vascular territory of the acutely imaged lesions.*

Keywords: *The Trial Organization 10172 categorization (TOAST), Acute Stroke Treatment, motor weakness*

INTRODUCTION:

Stroke is one of the leading causes of death and disability worldwide.[1] Stroke was a direct cause of 1 in 6 cardiovascular disease-related fatalities in 2020[2].Over 87% of strokes are ischemic strokes, which occur when the blood supply to the brain is cut off.[3]The Trial Organization 10172 categorization (TOAST) was utilized in Treatment for Acute Stroke to further classify strokes into those resulting from cardio embolism (CE), large-artery atherosclerosis (LAA), small vessel occlusion (SVO), and stroke of unknown etiology.[1]

Globally, stroke is the third major cause of death and the fourth leading cause of illness burden.[4]Stroke at a young age increases the social and economic cost; thus, these patients require special attention in diagnostic, therapeutic, preventative, and rehabilitative.The incidence, risk factors, and etiology of stroke in young adults differ from those observed in older patients.While the peak age of stroke occurrence is 55-65 years, incidents occurring at a younger age take importance in being occurring in a productive age group and having a different set of factors that have to be looked at in addition to the conventional ones.[5]

OBJECTIVES:

1. To study the aetio pathogenesis of acute ischemic stroke.
2. To study radiological imageology of various stroke patients.
3. Classification of ischemic stroke according to TOAST (Trial of ORG 10172 in Acute Stroke Treatment)
4. To evaluate prognosis, outcome and management.

MATERIAL & METHODS:

Study Design: Hospital-based, cross sectional study.

Study area: The study was conducted in the Department of General Medicine, Shadan Institute of Medical Sciences & Hospital, Hyderabad, Telangana from April 2023 to September 2023.

Sample size: Study consisted a total of 100 subjects. **Sampling Technique:** Simple Random technique. **InclusionCriteria**:

• All the patients above the age of 20 years were included in our study.

• Patients with abrupt onset of focal or global neurological deficit attributable to vascular cause and persisting for more than 24 hours.

Exclusion criteria:

• Haemorrhagic stroke cases were excluded

• Stroke related to head trauma and malignancy were excluded.

• Venous infarct cases were excluded

Study tools and Data collection procedure:

All patients who fulfilled the inclusion criteria and giving a written consent for the study were included in the study. A detailed study of the clinical profile of each patient was done based on pre-designed proforma including history, examination and investigations.Relevant investigations like blood glucose, serum lipid profile, electrocardiography, echocardiogram, carotid Doppler, CT scan brain or MRI brain were done for all the patients. All the results were tabulated and analyzed. Outcome studied with reference to Glasgow coma scale at time of admission with special reference to TOAST classifications.

Statistical analysis:

The data has been entered into MS-Excel and statistical analysis has been done by using IBM SPSS Version 25.0. For categorical variables, the data values are represented in terms of numbers and percentages. The chi-square test was used to assess group association. For continuous variables, mean and standard deviation of the data are displayed. The student's t-test was used to compare the mean differences between the two groups. All p values less than 0.05 are regarded as statistically significant.

OBSERVATIONS & RESULTS:

The present study was carried out in 100 consecutive patients with ischemic stroke in the department of General Medicine. During the study period the total number of stroke cases were 142 and the incidence of ischemic stroke was 70.42 % of all strokes.

Table 1: Sex distribution

Sex	No. Of cases	Percentage
Male	72	72%
Female	28	28%

There were 72 male and 28 female patients in our study group.

Table 2: Age Distribution

Age	No.of cases	Percentage
21-30	4	4%
31-40	7	7%
41-50	12	12%
51-60	32	32%
61-70	32	32%
71-80	11	11%
81-90	2	2%

The eldest patients in our study were 82 years old and the youngest was 25 years. Maximum cases were seen in 51-60 and 61-70 age group.

Table -3: Clinical Symptoms of Ischemic stroke

Clinical Symptoms	No. Of cases	Percentage
Altered sensorium	3	3%
Head ache	56	56%
Vomiting	37	37%
Vertigo	1	1%
Ataxia	1	1%
Speech disturbance	25	25%
Blurring of vision	2	2%
Diplopia	6	6%

Motor disturbance	82	82%
Sensory disturbance	24	24%
Convulsion	17	17%
Bladder & Bowel disturbance	6	6%

The commonest clinical symptom was motor weakness in (82%) cases and the least common was ataxia and vertigo in 1% cases.

Table – 4: Clinical signs in Ischemic stroke

Clinical signs	No. Of cases	Percentage
Impaired consciousness	3	3%
Speech disturbance	25	25%
Cranial N. Involvement	58	58%
Impaired orientation	6	6%
Motor weakness	82	82%
Sensory weakness	12	12%
Cerebellar signs	4	4%

The most common clinical sign in our study was motor weakness in the form of paresis or plegia in 86% cases and least common was cerebellar signs in 4% cases.

Table – 5: Risk factors in ischemic stroke

Predisposing factors	No. Of cases	Percentage
Hypertension	52	52%
Diabetes Mellitus	21	21%

Alcohol	27	27%
Smoking/Tobacco	39	39%
Hyperlipidemia	32	32%
Previous CVA/TIA	17	17%
CAD	5	5%

Hypertension was the commonest associated risk factor in 52% cases and CAD was the least common associated risk factor in 5% cases.

Table – 6: Distribution of lesion in ischemic stroke

Location	No.of cases	Percentage
MCA infarct	37	37%
ACA infarct	4	4%
PCA infarct	3	3%
Lacunar infarct	51	51%
Cerebellar infarct	3	3%
Brain stem infarct	1	1%

The maximum percentage of cases were lacunar infarcts (51%) and the least number of cases were cerebellar infarcts (1%).

Table – 7: TOAST subtype distribution in ischemic stroke

TOAST subtype	No. of cases	Percentage
Large Artery Atherosclerosis	41	41%
Cardioembolism	9	9%
Small vessel Occlusion	41	41%

Stroke of other determined etiology	9	9%
Stroke of undetermined etiology	0	0%

Maximum cases were either small vessel occlusion or large artery atherosclerosis with 41 % of cases each. There were no cases of undetermined etiology in our study.

DISCUSSION:

The present study was conducted in 100 consecutive ischemic stroke cases comprising mostly south Indian population. In the study period total number of stroke cases admitted were 142 out of which 100 cases(70.42%) were ischemic strokes. The incidences of ischemic stroke were around 80% in Uma Sundar et al[6] (77.6%) and kora et al[7] (76%).In the present study 72% patients were male and 28% were female, with male: female ratio 2.57:1.The male female ratio in our study was comparable with other Indian studies, hakim et al[8] (1.44: 1) and Kora et al[7] (3.1: 1). The male female ratio in a recent TOAST study by Sha Tan et al[9] was 1.73 ; 1 (63.45 male), but a study done on stroke patients in Bangladesh showed a gross difference in male femaleratio(4 : 1).

The present study comprised of stroke patients between 25 years to 82 years of age. The mean age of all the patients in our study was 58.65 years.This finding was comparable with other recent TOAST study by Sha Tan et al[9] (64 years) and another TOAST study by Jong-Won chung et al[10] (67.3 years). In our study group most of the patients were in 51-60 and 61-70 age group. Only 2 patients in our study were more than 80 years of age. This finding is contradicting the study conducted by WHO Task Force group in western population where the peak age of incidence for ischemic stroke was 85 years. This discrepancy with the present study may be due to reduced life expectancy in our study, which is much less than the study group population of WHO.

The most clinical symptoms in our study group was motor weakness (82%) and head ache (56%).Cigarette smoking is an important and independent risk factor for cerebro vascular disease in men and women of all age groups After a 26 years follow up, Framingham study by Wolf et al[11]established that smoking was a significant risk factor for stroke independent of age, Hypertension other pertinent cardio vascular disease risk factors. The risk increased in a dose dependent manner. Heavy smokers consuming more than 40 cigarettes per day had a twofold increased risk compared to light smokers consuming less than 10 cigarettes per day. Furthermore, the risk associated was proportional to the duration of smoking. It also established that, 5 years after smoking cessation, former smokers experienced the same risk of stroke as non- smokers.The present study supports the need to target smoking as preventable and modifiable risk factor for cerebro vascular diseases.

Alcohol consumption as a risk factor was noted in 27% of our cases,when compared to few other Indian studies like Mehenderatta et al[12] (18%), Deepa Dash et al[13] (13.2%) our study was showing higher association of alcohol and ischemic stroke may be because of higher incidence of alcohol consumption in this part or small number of study population. Present study supports the need to target alcoholism as a preventable and modifiable risk factor in cerebro vascular diseases.Diabetes with ischemic stroke constituted 21% of our cases, which was comparable to various TOAST studies by Shan et al[9](18%) and Chung et al[10] (29%). In seyed et al[14] also diabetes constituted 16% of their study group.When compared with other Indian studies like Mehenderatta et al[12](16%) and Deepa Dash et al[13] (13.9%), our present study shows higher incidence of diabetes may be due to higher

prevalence of diabetes in this part of India or Diabetes incidence is growing up as over a period of time as the other two studies were almost 2 decades old study.

Hypertension is the single most common and most important risk factor in ischemic stroke. In the present study Hypertension was associated in 52% of cases, which was slightly less than other two TOAST studies, Sha Tan et al[9] (72%) and Chung et al[10] (68%).When compared to other two Indian studies in ischemic stroke Mehenderatta et al[12] (29.25%) and Deepa et al[13](43%), our study had more percentage of cases with associated Hypertension can be explained by growing incidences of hypertension over a period of time as the two other studies were almost 2 decades old.Dyslipidemia as a cause for ischemic stroke was seen in 32% of cases in our study,

which was significantly low compared to the other two TOAST studies by Sha Tan et al[9] (54%) and Chung et al[10] (58%) but very close to study by Seyed et al[14] (28%)

MCA was the most frequently involved territory in our study consisting of 37% of cases, Basilar artery (4%), ACA (4%). When compared to the other two TOAST groups Chung et al had an incidence of 49.6% in MCA territory followed by Basillar artery(11.3%) and PCA(8.5%). Similarly, Sha Tan et al[9] had an incidence of 43% in MCA territory and 18% in Basilar territory.In the present study Large artery atherosclerosis (41%) and Small vessel occlusion (41%) constituted major TOAST subtypes which was comparable to Sha Tan et al[9] where Large artery atherosclerosis constituted 44.4% and Small vessel occlusion constituted 42.8%. Chung et al study was showing majority of cases in Small vessel occlusion (38.4%) followed by Stroke of undetermined etiology(30.3%) and Large artery atherosclerosis(24.7%).

The presence of Hyperlipidemia and Hypertension was more commonly seen in patients with small vessel occlusion and large artery atherosclerosis, whereas hyperlipidaemia was less commonly associated with cardio embolic stroke. In Mehenderatta et al[12] study cardio embolic strokes accounted for 29.35% 0f ischemic stroke cases of which 50% were rheumatic origin and 21% were due to congenital Heart Diseases.

India will face an enormous socioeconomic burden to meet the costs of rehabilitation of stroke victims because the population is now surviving through the peak years of occurrence of stroke(55-65 years). Community surveys for hemiplegia presumed to be Cerebro Vascular Diseases indicate an overall crude prevalence rate of 220 per 1,00,000 populations. Published reports also suggest that cerebro vascular Disease occur at all ages, in both sexes and hypertension, diabetes Melltus,alcoholism and tobacco use(smoking / chewing) being important risk factors. Health awareness and prevention of risk factors are the only solution to avoid the devastating consequences of a stroke for the individual and for the society.

CONCLUSION:

This was one of the few studies done in ischemic stroke in south Indian population. This study will help to better understand the etiological and risk factor profiles of such patients and also emphasizes the importance of the radiological features.The Trial of Org 10172 in Acute Stroke Treatment (TOAST) system is the most widely used classification system worldwide. It is the most standard etiological classification system for ischemic stroke. This study has revealed significant dependence of ischemic stroke subtype on the vascular territory of the acutely imaged lesions.

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