Original Article

Study of Stroke Subtypes and Risk Factors in a Tertiary Care Hospital

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ABSTRACT

Stroke is the second commonest cause of death according to WHO. Classification of subtypes of ischemic stroke based on etiology has been developed for the Trial of Org 10172 in Acute Stroke Treatment (TOAST)2. Subtypes include 1) Large-artery atherosclerosis (LAA) 2) Cardio embolism (CE) 3) Small-artery occlusion (SAO) 4) Stroke of other determined etiology (SOC) 5) Stroke of undetermined etiology (SUC). Risk factor identification and subtype classification helps in prognosis and prevention of stroke. All patients more than 18 years with stroke are included in this study. Large artery atherosclerosis was the most common subtype of stroke. Most prevalent risk factor common to all subtypes of stroke was hypertension.

Keywords: Ischemic stroke, Trial of Org 10172 in Acute Stroke Treatment (TOAST), Hypertension, stroke subtypes, Large artery atherosclerosis (LAA).

INTRODUCTION

Stroke is the second commonest cause of death according to WHO. It is the fourth leading cause of disability world-wide. WHO clinically defines stroke as "The rapid development of clinical signs and symptoms of a focal or global neurological disturbance lasting more than 24 hours or leading to death with no apparent cause other than vascular origin". Ischemic stroke is responsible for 50 – 85% of all strokes worldwide[1]. Non modifiable risk factors for stroke include age, sex, race and genetic factors. Modifiable risk factors include systemic hypertension, alcoholism, smoking, hyperlipidemia, diabetes etc. By targeting various modifiable risk factors, incidence of stroke can be reduced. Study of non-modifiable risk factors also helps in identifying high risk population. Since the etiology of ischemic stroke affects prognosis, outcome and management, a system for categorization of subtypes of ischemic stroke based on etiology has been developed for the Trial of Org 10172 in Acute Stroke Treatment (TOAST)[2]. Subtypes include 1) Large-artery atherosclerosis (LAA) 2) Cardio embolism (CE) 3) Small-artery occlusion (SAO) 4) Stroke of other determined etiology (SOC) 5) Stroke of undetermined etiology (SUC). This study focuses on various subtypes of stroke and risk factors that influence the occurrence of stroke in patients admitted in a tertiary care hospital.

Aims and Objectives:

The aim of this study was to identify ischemic stroke and classify it into various subtypes and determine underlying risk factors.

METHODS

All patients more than 18 years, presenting to the hospital with ischemic stroke were included in the study. Clinical history, examination and relevant laboratory investigations were done.

RESULTS

A total of 541 patients with ischemic stroke were included in the study. Most common stroke subtype was Large Artery Atherosclerosis (LAA), followed by Small Vessel Disease (SVD). Stroke was common in age group of 41-65 years, as compared to 66-90 and 31-40 years. Men accounted for 66.5% of the total patients. 63% of the patients were hypertensive whereas 50% were diabetic. Other risk factors included smoking (56%), dyslipidemia (32%) and positive family history (14%). 35% had abnormalities on ElectroCardioGram (ECG) and 14% of the patients had previous Stroke. Computed Tomography (CT) of the brain was abnormal in 88% of the study population whereas Magnetic Resonance Imaging (MRI) brain was abnormal in 100% of the patients. Carotid doppler showed significant stenosis (70-99%) in 27% of the patients whereas 2D Echocardiogram was abnormal in 60% of the population.

DISCUSSION

Out of the 541 patients of stroke admitted, 66.7% were men and 33.3% were women reflecting a male preponderance which is similar to most previous studies in literature[3,4]. This is in contrast to the findings in study by Y Bejot[5] et al in which a slight female preponderance is seen. Large artery atherosclerosis (LAA) was the most predominant subtype (33.5%) followed by small vessel disease (20.5%) and Intracerebral hemorrhage (15.7%). This is similar to most of the previous studies[6]. This is in contrast with study by Faleha zafar[7] et al, in which Cardio embolic stroke was the predominant subtype (40%) followed by Stroke of unknown etiology. In another landmark study by Martin J O'Donnell[8] et al, across 22

countries the INTERSTROKE study, the most common stroke subtype was small vessel disease (44%) followed by Intracerebral hemorrhage (22%). Out of the risk factors studied, HTN was the most prevalent which was present in 341 patients (63%) followed by smoking and DM. This finding was similar to most of the previous studies. In contrast, in the study by Siddharth Raghuvanshi[9], Dyslipidemia was found to be the most prevalent risk factor (63%). 77% of patients with LAA had hypertension indicating a strong association.

Out of the 29 patients (6%) who had cardio embolic stroke, 16 patients had non valvular atrial fibrillation, 7 patients had Mitral stenosis with atrial fibrillation, two patients had Left ventricular thrombus, two patients had recent Myocardial infarction, one patient had a mechanical prosthetic valve and one patient had dilated cardiomyopathy. Atrial Fibrillation was responsible for stroke in 5% of patients with ischemic stroke, which was much less compared to the Framingham study[10]. 20% of ischemic stroke was caused by cardio embolism according to pooled data[11], which is much higher than that found in our study (5%). Various reasons for these findings could be – non-evaluation, missing data or incomplete evaluation or inclusion under TOAST V (multiple etiologies).

Among the subtypes of stroke, stroke of other determined etiology constituted 11 cases in the present study. Among the 11 patients, 7 patients had a hypercoagulable state. 3 patients were found to have Moya Moya disease and 1 patient was diagnosed with Reversible cerebral vasoconstriction syndrome. Venous stroke was seen in 80 patients in the present study. Sixty-two patients had deep venous infarcts and 18 patients had cortical venous infarcts.

Only 7% (31 patients) of population had stroke of unknown etiology. These patients had either incomplete evaluation or no cause found on evaluation or had two or more etiologies for stroke. According to study by Chih-Ying Wu, Hung-Ming Wu et al[12], 32.5% had stroke of unknown etiology. This smaller percentage in our study could be due to lesser size of population and thorough evaluation of patients with stroke.

CONCLUSION

Large artery atherosclerosis was the most common subtype of stroke. Most prevalent risk factor common to all subtypes of stroke was hypertension. No significant association was found between subtypes of stroke with either of the sex. Hypertension is significantly associated with large artery atherosclerosis.

REFERENCES

1. Feigin V, Lawes C, Bennet D, Barker-Cello S, Parag V. Worldwide stroke incidence and early case fatality in 56 population based studies: a systematic review. Lancet neurology. 2009; 8(4): 355-69.

2. H P Adams Jr, B H Bendixen et al Classification of subtype of acute ischemic stroke Definitions for use in a multicentre clinical trial. TOAST. Trial of Org 10172 in Acute Stroke Treatment Stroke doi:10.1161/01.STR.24.1.35

3. Ya-fu TAN†, Li-xuan ZHAN, Xiao-hui CHEN Risk Factors, Clinical Features and Prognosis for Subtypes of Ischemic Stroke in a Chinese Population Current Medical Science DOI https://doi.org/10.1007/s11596 108-1878-1

4. Salim Harris, Saleha Sungkar, Al Rasyid, Mohammad Kurniawan,Taufik Mesiano, and Rakhmad Hidayat TOAST Subtypes of Ischemic Stroke and Its Risk Factors: A Hospital-Based Study at Cipto Mangunkusumo Hospital, Indonesia. Hindawi Stroke Research and Treatment Volume 2018 doi.org/10.1155/2018/9589831

5. Y Bejot, M Caillier, D Ben Salem, G Couvreur, O Rouaud, G-V Osseby, JDurier, C Marie, T Moreau, M Giroud Ischaemic stroke subtypes and associated risk factors: a French population based study J Neurology Neurosurgery Psychiatry 2008 79doi: 10.1136/jnnp.2008.150318

6. P.N. Sylaja, MD, DM; JeyarajDurai Pandian, MD, DM et al Ischemic Stroke Profile, Risk Factors, and Outcomes in India The Indo-US Collaborative Stroke Project Stroke. 10.1161/STROKEAHA.117.018700

7. Zafar F, Tariq W, Shoaib RF, Shah A, Siddique M, Zaki A, et al. Frequency of ischemic stroke subtypes based on toast classification at a tertiary care center in Pakistan. Asian J Neurosurg 2018; 13:984-9.

8. Martin J O'Donnell, Denis Xavier, Lisheng Liu, Hongye Zhang, Siu Lim Chin, Purnima Rao-Melacini, Sumathy Rangarajan, Shofiqul Islam, PremPais, Matthew J McQueen, Charles Mondo, Albertino Damasceno Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study)

9. Raghuvanshi S. A Study of Clinical Profile and Subtypes of Acute Ischemic Stroke in a Tertiary Care Center. Int J Sci Stud 2016; 4(5):128 131.

10. Wolf PA, Abbott RD, Kannel WB. Atrial fibrillation as an independent risk factor for stroke: the Framingham Study. Stroke. 1991; 22: 983–8.

11. The Atrial Fibrillation Investigators. Risk factors for stroke and efficacy of antithrombotic therapy in atrial fibrillation: analysis of pooled data from five randomized controlled trials. Arch Intern Med. 1994; 154: 1449–57.

12. Chih-Ying Wu, Hung-Ming Wu, Jiann-Der Lee, Hsu-HueiWeng. Stroke risk factors and subtypes in different age groups: A hospital-based study J Neurology India. DOI: 10.4103/0028-3886.73747.