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Evaluation of clinical spectrum and risk factors in young stroke patients at a tertiary level hospital, Patna, Bihar

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Abstract--Background: Stroke is the most frequent neurological disorder that results in long-term disability and has significant emotional and socioeconomic effects for patients, their families, and health-care providers. The strongest link between patient and the risk of stroke is age. The age-specific incidence of stroke rises steadily as people get older. Aim: To evaluate clinical spectrum and risk factors in young stroke patients and to study epidemiology and etiology of young stroke patients at a tertiary level hospital, Patna, Bihar. Methods and Materials: Detailed clinical history was taken. Patients were clinically evaluated Laboratory investigations parameters included CBC, RFT, LFT, APTT, PT, VDRL, Lipid profile, FBS, PPBS, HbA1C, viral marker. Autoimmune profile-ANA, APLA profile, vasculitis marker. CXR, ECG, 2D Echo, 24 hr holter. Neuromaging was carried out with the help of NCCT MRI MRA. Results: When there was analysis of prevalence of risk factors in the young stroke patients then the most prevalent risk factors were atherosclerotic changes. However there were other risk factors found in stroke patients like rheumatic heart disease, vasculopathies and connective tissue disorders like SLE. Mitochondrial disorders, genetic disorders, post tubercular infarcts, traumatic heart diseases, chronic and acute disorders of head and neck, risk factors related to post partum. etc. Conclusion: In the young patients, we discovered various risk variables connected to different mechanisms of stroke than in the older patients. This could

be a good place to start when developing an epidemiologic classification system for juvenile stroke patients.

Keywords---stroke, young patient, risk factor.

Introduction

Stroke is a significant public health issue. According to the World Health Organization (WHO), stroke has claimed the lives of around 5.54 million people globally, with two-thirds of these deaths happening in developing nations. Stroke is the most frequent neurological disorder that results in long-term disability and has significant emotional and socioeconomic effects for patients, their families, and health-care providers.¹ The strongest link between patient and the risk of stroke is age. The age-specific incidence of stroke rises steadily as people get older. The risk of total stroke for those aged less than 45 years ranged from 0.1-0.3 per 1000 person years in a systematic analysis of 15 population-based stroke incidence studies, while the rate for those aged 75-84 years ranged from 12-20 per 1000 person years in most studies.²

Smoking (49 percent), dyslipidemia (46 percent), and hypertension (35 percent) were the three most common risk factors identified in India. In young people, smoking is a significant risk factor for cerebral infarction. Young smokers (15-45 years old) had 1.6 times the risk of cerebral infarction as non-smokers.³ Apart from hypertension, dyslipidemia, and diabetes, transient ischemic attack and family history of stroke were substantial risk factors. In a research from north India, the main risk factors were hypertension, hyperglycemia, and cigarette use with low haemoglobin levels. Another key risk factor for stroke in the young is migraine. Migraine with aura was found to have a considerably increased risk of stroke.⁴ When compared to persons who had migraine without aura, migraine with aura, together with other risk factors such as age less than 45 years, smoking, and concurrent oral contraceptive usage, had a compounding effect on the risk of stroke.

Stroke has the greatest influence on an individual's family and society when it occurs in a young person.⁵ Young people's strokes get a lot of attention, perhaps disproportionately so. The age group for stroke in young people has varied between researches, although it may be best to limit it to 15-49 years because this age group has its own set of causes and risk factors. In various sources, the lower age limit ranges from 0 to 25 years, with the majority setting it at 15 years.⁶ The top age restriction varies from 40 to 55 years, with the bulk of people being around 45. Therefore this study was carried out to evaluate clinical spectrum and risk factors in young stroke and to study epidemiology and etiology of young stroke.

Materials and Methods

It was a prospective observational study in which seventy six young stroke patients were included. The study was carried out among admitted patients in department of neurology of our tertiary care institute in Patna .The

study participants were all the patients coming to outpatient department of neurology or emergency of our Institute. The duration of study was thirty six calendar months

Inclusion Criteria

Patients in the age group of 15-45 years admitted in the hospital, which fulfill the ASA / AHA definition of stroke.

Exclusion Criteria

1. Patients in the age group of 15-45 years with previous history of stroke
2. Patients with a history of head trauma preceding admission
3. Secondary cause of intracerebral bleed like bleed in a tumor

Data collection and methodology

Detailed clinical history was taken. Patients were clinically evaluated .Laboratory investigations parameters included CBC, RFT, LFT, APTT, PT, VDRL, Lipid profile, FBS, PPBS, HbA1C, viral marker. Autoimmune profile - ANA, APLA profile vasculitis marker CXR, ECG, 2D Echo, 24 hr holter.

Neuromaging - NCCT MRI MRA.

Case Definition: According to AHA / ASA guidelines 2015, Stroke is defined as brain, spinal cord, or retinal cell death attributable to ischemia, based on neuropathological, neuroimaging, and / or clinical evidence of permanent injury.

Statistics Analysis

IBM SPSS Statistics Version 26 was used for all statistical analyses. The total number of instances was compared using the binomial test, while the chi square test was employed to compare the differences as well as for comparing the proportions. For this study, the Bonferroni correction was used. Comparisons between two groups all tests and p-values mentioned were carried out two-sided. Statistical significance was defined as a p value of less than 0.05.

Results

In this study 76 young stroke patients were included. The mean age of study participants was 40.8 ± 7.7 years. When there was analysis of distribution of age then it was found that most of the study participants (65.8%) were in the age group of 41 to 45 years. While 18.42 % patients were between 35 to 40 years old and 15.78% patients were in the age group of less than 35 years. Men constituted 84.21% of study participants while remaining patients were females.(Table 1) When there was analysis of prevalence of risk factors in the young stroke patients then the most prevalent risk factors were atherosclerotic changes. However there were other risk factors found in stroke patients like rheumatic heart disease, vasculopathies and connective tissue disorders like SLE. Mitochondrial disorders, genetic disorders, post tubercular infarcts, traumatic heart diseases, chronic and acute disorders of head and neck, risk factors related to post partum. etc. (Table 2).

There were presence of other risk factors like chronic systemic diseases like diabetes mellitus, hypertension, obesity, lack of exercise and outdoor activities. Some risk factors related to daily like stress, lack of sleep were also observed. It has been found that addiction of youth towards modern gadgets like mobile also pose a risk for stroke. Another important finding was the prevalence of risk factors like smoking tobacco, chronic alcoholism among the young stroke patients. The prevalence of risk factors according to age and gender distribution has been presented in table 3. The classification of young stroke patients based on TOAST criteria stratified by age has been represented in table 4. There are several cases of stroke among young patients with unknown etiology.

Table 1: Baseline characteristics of young stroke patients

Characteristic	
Mean age at stroke, yrs (SD)	40.8 (7.7)
Age distribution	(%)
<35 years	15.78
35 to 40 years	18.42
41 to 45 years	65.8
Men (%)	84.21
Median NIHSS at admission (IQR)	3 (1-7)
mRS \geq 2 at discharge (%)	21.33462
Etiology based on TOAST	%
Large artery atherotic disease	9.8
Likely large artery atherotic disease	15.5
Cardio-embolic stroke	13.1
Small vessel disease	13.1
Other defined	14.6
Multiple causes	2.6
Unknown cause	34.5

Prevalence of risk factors in young stroke patients

Risk factor	Percentage	P value
Arteriopathy	13.7	
Cardiac disorders	13.0	
Chronic systemic conditions		
Diabetes mellitus	6.71	
Hypertension	7.45	0.005
Lack of sleep	2.23	

Long standing stress	3.12	
Obesity	4.14	
Prothrombotic states	7.9	
Chronic head and neck disorders	6.7	
Acute head and neck disorders	2.9	
Pregnancy related	5.10	
Tobacco smoking	5.67	
Tobacco chewing	3.12	
Chronic alcoholism	6.89	
Connective tissue disorders (SLE)	2.12	
Genetic disorder	1.14	
Mitochondrial disorders	5.87	
Rheumatic heart disease	4.34	
Vasculopathies	2.23	
Traumatic injuries	3.12	
Post tubercular infarcts	3.12	

Prevalence of risk factor categories young stroke patients stratified by age and sex, respectively

Risk factor/Category	<35 years	≥ 35 years	Men	Women	P value
Arteriopathy	13.7	14.1	13.6	14.2	
Cardiac disorders	13.0	13.2	13.1	13.4	
Chronic systemic conditions	23.4	23.8	23.5	23.9	0.07
Prothrombotic states	7.91	8.01	7.92	8.21	
Chronic head and neck disorders	6.76	7.12	6.81	7.34	
Acute head and neck disorders	2.93	3.13	2.56	3.89	
Pregnancy related	5.16	6.12	-	7.19	
More than one risk factors for early atherosclerosis,	89.12	90.13	91.12	90.13	

Classification of young stroke patients based on TOAST criteria stratified by Age

	<35 years	≥ 35 years
Large artery disease	2.9	11.6
Likely large artery disease	5.1	18.3
Cardio-embolic origin	11.6	13.5
Small vessel disease	5.8	11.0
Other defined	23.2	12.4
Multiple causes	2.2	2.7
Unknown etiology	09.3	10.5

Prevalence of risk factor categories in the group of patients classified as “stroke of unknown etiology” using TOAST criteria

Risk factor/ Category	Percentage
Arteriopathy	0
Cardiac disorders	0.4
Chronic Systemic conditions	19.23
Prothrombotic states	6.3
Acute systemic disorders	0
Chronic Head and neck disorders	16.8
Acute head and neck disorders	0.4
Pregnancy related	8.1
More than one risk factors for early atherosclerosis,	

Discussion

The three broad types of ischemic, hemorrhagic, and venous stroke aetiology have been defined. Cardioembolic, vasculitis, genetic, and hereditary disorders are all examples of ischemic causes. The primary causes of juvenile stroke have been identified as central venous thrombosis and rheumatic heart disease. Tuberculosis and bacterial meningitis continue to be major causes of stroke in India.⁷ Classic vascular risk factors such as hypertension, dyslipidemia, and diabetes still pose a risk to younger patients, and their importance grows as they get older. Certain risk factors that are modest in the elderly can have a higher impact on the genesis of strokes in the young. Although the modifiable risk factors are similar in both populations, the prevalence of these risk variables differs.⁸

In this study when there was analysis of distribution of age then it was found that most of the study participants (65.8%) were in the age group of 41 to 45 years. While 18.42 % patients were between 35 to 40 years old and 15.78% patients were in the age group of less than 35 years. Men constituted 84.21% of study participants while remaining patients were females. When there was analysis of prevalence of risk factors in the young stroke patients then the most prevalent risk factors were atherosclerotic changes. However there were other risk factors found in stroke patients like rheumatic heart disease, vasculopathies and connective tissue disorders like SLE. Mitochondrial disorders, genetic disorders,

post tubercular infarcts, traumatic heart diseases, chronic and acute disorders of head and neck, risk factors related to post partum. etc.

There were presence of other risk factors like chronic systemic diseases like diabetes mellitus, hypertension, obesity, lack of exercise and outdoor activities. India is considered as the diabetic capital of world because of large number of diabetes patients in this country. Therefore increasing number of in young patients can be a dangerous risk factor for stroke. Some risk factors related to daily like stress, lack of sleep were also observed. It has been found that addiction of youth towards modern gazettes like mobile also pose a risk for stroke. Another important finding was the prevalence of risk factors like smoking tobacco, chronic alcoholism among the young stroke patients.

Sridharan et al. (1992) investigated the risk variables for ischemic stroke in patients of all ages. Stroke was linked to hypertension, ECG abnormalities, any sort of cardiac disease, diabetes, smoking, and drinking. The ratio of low density lipoprotein (LDL) to HDL was shown to be low in stroke patients.⁹ Hypertension, smoking, and dyslipidemia with high total cholesterol revealed as substantial risk factors in the Helsinki Young Stroke Registry (2009), which comprised 1008 first-ever cases with ischemic stroke in the age category of 15-49 years.¹⁰

During pregnancy and puerperium, there is an increased risk of stroke. Hypercoagulable condition, which causes alterations in vessel wall function, is commonly observed in pregnancy, according to many theories and studies. It's more common in pregnant women with eclampsia, a common pregnancy-related condition, and the pathophysiology has been connected to non-hemorrhagic stroke-like episodes and cerebral vasoconstriction syndrome. The use of oral contraceptives as a risk factor for stroke in young people is still debatable and poorly understood. Women who took estrogen-rich tablets had a fourfold increased risk of stroke, whereas those who took estrogen-deficient pills had a twofold increase. There appears to be a dose-dependent rise in dangers, with lower oestrogen doses being linked to decreased risk.¹¹

Intravenous use of substances like cocaine or amphetamines causes vasoconstriction, platelet aggregation, cardiac arrhythmias, and embolism, which can lead to stroke. Infectious infections, particularly in developing nations, are also significant risk factors. Arteritis of the major brain vessels, such as the middle cerebral artery or the deep perforating vessels (Nills - Alzheimer's arteritis) or cardiac problems can cause stroke in late-stage syphilis. Acute bacterial meningitis, tuberculous meningitis, varicella zoster virus (VZV), Cytomegalovirus, AIDS, cysticercosis, and Chagas disease caused by *Trypanosoma cruzi* have all been linked to stroke in young people. Hematological diseases associated with risk of stroke in the young are paroxysmal nocturnal hemoglobinuria, thrombotic thrombocytopenic purpura, Erythrocytosis, Leukemias, intravascular lymphoma strongest association has been observed for sickle cell disease (SCD). Congenital cardiac anomalies also constitute significant percentage of stroke in young. Patent foramen ovale (PFO) is found in 15 % -25 % of the general population. PFO combined with atrial septal aneurysms (ASA) has been identified as an important etiology of stroke in young. Ischemic stroke is caused by a combination of multiple genetic and environmental factors. Stroke is a heterogeneous

multifactorial disorder Studies have been conducted in twins, families, and animal models which provide evidence for a genetic contribution to stroke .¹²

Conclusion

In the young patients, we discovered various risk variables connected to different mechanisms of stroke than in the older patients. This could be a good place to start when developing an epidemiologic classification system for juvenile stroke patients.

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