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RESEARCH ARTICLE

STUDY OF CLINICAL PROFILE AND RISK FACTORS FOR ISCHEMIC STROKE IN YOUNG ADULTS

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Abstract

Background: Stroke in young adults has become a rising concern in developing countries as it leads to large economic impact by causing disability in the most economically productive years. Although stroke is uncommon in young age group, we are facing patients with ischemic stroke in young adults in daily practice.

Objective: To study the clinical profile and risk factors for ischemic stroke in young adults (15-49 years).

Method: It is a prospective study in which patients with ischemic stroke fulfilling the inclusion criteria were evaluated for risk factors and clinical profile was assessed.

Results: In this study 73 patients with ischemic stroke between 15-49 years were evaluated. Most of the patients were male (63%). The most common risk factors were dyslipidemia (67.1%), metabolic syndrome (64.3%), hyperhomocysteinemia (58.9%), smoking (52%) and hypertension (44.2%). Patients were further divided into two age groups (16-32 years and 33-49 years) for comparison. Metabolic syndrome and hypertension were significantly more frequent in age group of 33-49 years with p value of <0.05 but we could not find difference between two age groups for rest of the risk factors.

Conclusion: Most of these are traditional risk factors which were previously seen in older age group, but now we are encountering these risk factors in younger age group also. As most of them are modifiable risk factors health education regarding lifestyle modification, health programs for preventing and treating these risk factors should be started to reduce the mortality and morbidity of stroke among socioeconomically active age group.

Introduction:-

Stroke is one of the major cause of disability and death worldwide as per as per global burden of disease (GBD) study in 1990[1] . Although it is traditionally a disease of elderly people, it is becoming a significant health problem in young adults also. Stroke in young adults has become a rising concern in both developing and developed countries as it leads to large economic impact by causing disability in the most economically productive years[2]. Although stroke is uncommon in young age group, we are facing patients with ischemic stroke in young adults in

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daily practice. The purpose of this study was to evaluate the risk factors and to study the clinical profile of the ischemic stroke in young adults.

Objective:-

To study the clinical profile and risk factors for ischemic stroke in young adults (15-49 years).

Methods:-

This is a prospective observational study carried out from January 2020 to August 2021 in Department of Medicine of Netaji Subash Chandra Bose Medical College and Hospital, Jabalpur (M.P). At the time of admission ischemic stroke was diagnosed based on clinical findings and brain imaging. Young adults meeting the inclusion criteria were included in the study after getting the informed consent.

Inclusion Criteria

Patient between 15 to 49 years old admitted in General Medicine ward with abrupt onset of a focal neurological deficit of vascular origin (ischemic) and persisted for more than 24 hours.

Exclusion criteria:

Age less than 15 years or more than 49 years.
Venous strokes
Hemorrhagic strokes
Neuro-infection and tumours causing weakness

A detailed patient pro-forma was taken that included detailed clinical history of symptoms and risk factors, clinical examination, routine blood investigations (complete haemogram, blood sugar, blood urea, serum creatinine, serum electrolytes, lipid profile, serum homocysteine), electrocardiogram, echocardiogram, CT or MRI brain, and carotid artery doppler was done in all the patients.

Data were collected and tabulated using Microsoft excel. Data was reported as mean ± SD or median, depending on their distribution. Unpaired t-test and chi square test were used to assess the differences in quantitative variable groups and categoric variable groups respectively. A p value of <0.05 was considered significant for all statistical analyses.

Results:-

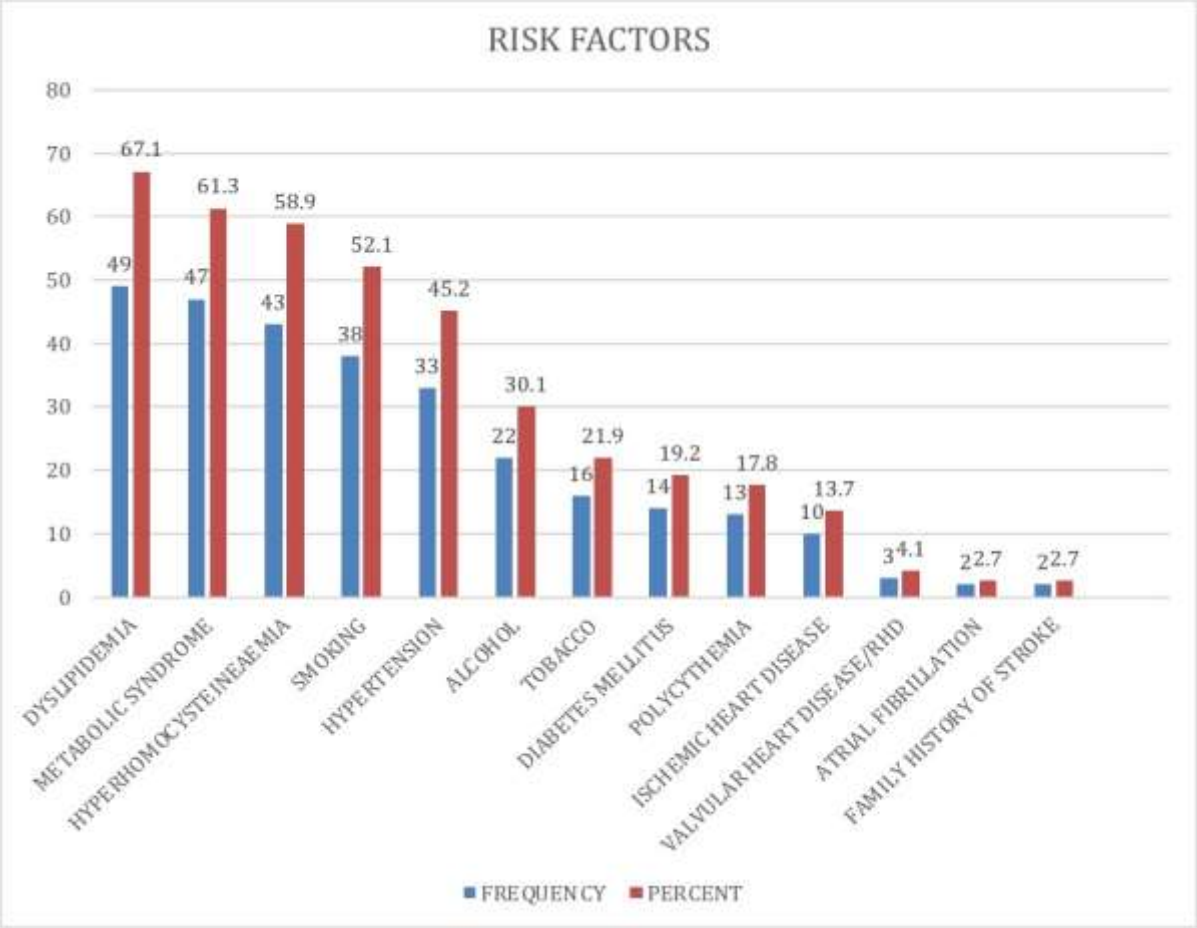
In the present study 73 patients of ischemic stroke between 15-49 year fulfilling the inclusion criteria were evaluated for risk factors and clinical profile. Out of 73 participants 63%(n=46) were males and 37%(n=27) were females. Most of the patients belongs to age group between 33-49 years (n=58, 79.5%) followed by 16-32 years (n=15, 20.5%), with mean (SD) age of 38.05 (8.03) years. Hemiparesis was the most common presentation (n=61, 83.6%). Out of 73 patients 38 (52%) were having smoking history, 27 (37%) were having cannabis smoking history and 22 (30.1%) were having alcohol abuse history. Previous history of hypertension and diabetes mellitus was seen in 33 (45.2%) and 14 (19.2%) respectively. Family history was seen on in 2 (2.7%) of patients. polycythemia was seen in 13 patients (17.8%). 23 patients (31.5%) were having raised fasting blood sugar, out of which 11 were previously known diabetes cases and 12 were non-diabetic. 16 patients (21.9%) were having raised total serum cholesterol, 49 (67.1%) were having low HDL levels, 21 (28.8%) were having raised LDL and 33 (45.2%) were having raised triglyceride levels. Hyperhomocysteinemia was seen in 43(58.9%) patients. Abnormal ECG findings was seen in 27(37%) patients out of which sinus tachycardia (12.3%) and LVH (7.1%) were most common findings. Out of 73 patients 63(86.3%) of them had anterior circulation stroke and 10(13.7%) of them had posterior circulation stroke. 16 patients (22%) had an abnormal 2D echo findings out of which RWMA (8.2%) and LVH (6.8%) were most common findings. 29 patients (40%) were having abnormal carotid artery doppler findings out of which common carotid artery plaque 25(34.2%) was most common finding. 43 patients (64.3%) were having metabolic syndrome as determined by IDF definition and it was more significant in females (p=0.000809). Overall dyslipidemia (67.1%), metabolic syndrome (64.3%), hyperhomocysteinemia (58.9%), smoking (52%) and hypertension (44.3%) were the most common risk factors as shown in **Table 1**.

In addition, the patients were divided into two age groups (16-32years and 33-49 years), as done in other stroke studies. Risk factors such as metabolic syndrome(p=0.0048) and hypertension (0.00076) were significantly more

frequent in older age group, but we could not find any difference between two age groups for smoking, alcohol abuse, Hyperhomocysteinemia, diabetes mellitus, polycythemia, family history of stroke and cardioembolic risk factors as shown in **Table 1**.

Table 1:- Risk factors.

	16-32 years n=15		**33-49 years n=58**		**Total n=73**		**P value**
	frequency	percent	frequency	percent	frequency	percent	
Dyslipidemia	12	16.4	37	50.7	49	67.1	0.233
Metabolic syndrome	5	6.8	42	57.8	47	64.3	0.0048
Hyperhomocysteineaemia	7	9.6	36	49.3	43	58.9	0.279
Smoking	6	8.2	32	43.8	38	52	0.2944
Hypertension	1	1.4	32	43.8	33	44.2	0.00076
Alcohol	3	4.1	19	26	22	30.1	0.3371
Tobacco	2	2.7	14	19.2	16	21.9	0.3672
Diabetes Mellitus	1	1.4	13	17.8	14	19.2	0.1673
Polycythemia	2	2.7	11	15.1	13	17.8	0.6113
Ischemic Heart disease	0	0	10	13.7	10	13.7	0.083
Valvular heart disease/RHD	0	0	3	4.1	3	4.1	0.3211
Atrial fibrillation	0	0	2	2.7	2	2.7	0.4217
Family history of stroke	0	0	2	2.7	2	2.7	0.4217



Discussion:-

In the present study 73 patients of ischemic stroke fulfilling the inclusion criteria was taken. Majority of the patients encountered in the present study were males (n=46, 63%), followed by females (n=27, 37%). This is similar to study findings by Madhavi Karri et al (2019) [3], Aude Jaffre et al (2014) [4] and J.F. Varona et al (2007) [5] in in which the majority i.e., 73.3%, 61% and 65% were male respectively. In this study we have taken patients between age group of 16-49 years, among them most of the patients belongs to age group between 33 to 49 years (n=58, 79.5%) with mean (SD) age of 38.05(8.03) years, which is similar to study findings by Madhavi Karri et al (2019) [3], J.F. Varona et al (2007) [5] and Tan et al (2012) [6] in which the study group was taken between the age of 19-45,15-45, and 18-49 years with mean (SD) age of 38.9(5.74), 36(7) and 40.8(6.7) years respectively. Hemiparesis (n=61, 83.6%) was the most common presentation, this is similar to study findings by Omkar Prasad Baidya et al (2015) [7] and P. Chandrasekaran et al (2020) [8] in which the most common presentation was hemiparesis (84%) and weakness (93.5%) respectively.

Risk factors such as hypertension, diabetes mellitus, dyslipidemia, smoking, heavy alcohol intake, sedentary lifestyle and kidney disease are known to cause accelerated atherosclerosis which leads to stroke by causing thrombosis of intracranial blood vessels or by causing carotid artery atherosclerosis which leads to embolisation of atherosclerotic plaque.

Cardiac conditions like atrial fibrillation, myocardial infarction, mural thrombus, valvular lesion, dilated cardiomyopathy, mechanical valves, and bacterial endocarditis can cause cardioembolic stroke.

Other conditions like hypercoagulable disorders(APLA, hyperhomocysteinemia, polycythemia Vera, sickle cell disease, SLE, protein C and S deficiency), vasculitis (systemic vasculitis, primary CNS vasculitis, vasculitis secondary to meningitis),non inflammatory vasculopathy (fabry's disease, reversible vasoconstriction syndrome), CADASIL and moya disease are known to cause stroke in younger populations

In this study Dyslipidemia was the most common risk factor (n=49,67.1%), followed by Hyperhomocysteinemia (58.9%), smoking (52.1%) and hypertension (45.2%). Dyslipidemia was also the most common risk factor (56.45%) found in a study Madhavi Karri et al (2019) [3] followed by smoking (49.46%), alcohol abuse (47.32%), and hypertension (37.10%). Smoking (49%) and alcohol abuse (49%) were most common risk factor found in study Yang Si et al (2020) [9] followed by hypertension (36.2%) and dyslipidemia (34.4%). similarly smoking was the most common traditional risk factor found in study Fatam Ebru Algul et al (2019) [10] and Aude Jaffre et al (2014)[4] (47.62% and 54.1% respectively). Hypertension was found to be the most common traditional risk factor in two studies Kemal Balci et al (2011) [11] and Deepa Dash et al (2014) [12] (45% and 44.5% respectively). In this study family history of stroke is present in 2 patients (2.7%). In contrast study findings by Deepa Dash et al (2014) [12] and Fatam Ebru Algul et al (2019) [10] showed family history of stroke in 15.7% and 17.5% respectively.

Table 2:- Comparison table for traditional risk factors for young ischemic stroke all over the world.

Studies	Age Range	Hypertension	Diabetes mellitus	smoking	Alcohol	Dyslipidemia
Present study	16-49	45.2%	19.2%	52.1%	30.1%	67.1%
Yang Si et al (2020)	18-50	36.2%	24.8%	49%	49%	34.4%
Omkar Prasad Baidya et al (2015)	15-45	56%	16%	14%	16%	__
Madhavi Karri et al (2019)	19-49	37.10%	29.57%	49.46%	47.31%	56.45%
Fatam Ebru Algul et al 2019	18-55	32%	23.8%	47.6%	7.6%	36.19%
Aude Jaffre et al (2014)	16-54	25.3%	8.9%	54.1%	__	__
Kemal Balci et al (2011)	18-47	45%	17%	37%	9%	35.4%
Deepa Dash et al (2014)	18-45	44.5%	13.9%	9.5%	9.5%	26.1%

In this study we found ischemic heart disease (13.7%) as most common cardiometabolic risk factor followed by cardiomyopathy (5.5%) and valvular heart disease/RHD (4.1%), this was different from study findings by Deepa Dash et al (2014) [12] and P. Chandrasekaran et al (2020) [8] in which valvular heart disease/RHD was the most common cardio embolic risk factor (12.7% and 14.29% respectively). In this study 13 patients (17.8%) were having haemoglobin >16mg/dl i.e., polycythemia, out of which 11 were smokers. This was different from study findings by Kemal balci et al (2011) [11] in which only 0.5% patients with ischemic stroke were having polycythemia. As we know that Hyperhomocysteinemia is one of the independent risk factor for cardiovascular and cerebrovascular diseases. In this study 43 patients (58.9%) patients were having Hyperhomocysteinemia (>15µmol/L). This is similar to study findings by Farheen Niazi et al 2019 [13] in which 50.7% of patients with young ischemic stroke were having Hyperhomocysteinemia, in contrast Study finding by Arijit Biswas et al (2008) [14] showed only 20% patients with ischemic stroke were having Hyperhomocysteinemia. In this study Anterior circulation stroke was most common finding (n=63, 86.3%). this similar to study conducted by P. Chandrasekaran et al (2020)[8] in which MCA territory involvement (anterior circulation stroke) was seen in 74.6% of patients. In this study 29 patients (40%) were having carotid artery plaque. This is similar to study conducted by U.Oliviero et al (2002) [15] in which 35.41% patients with ischemic stroke had carotid artery atherosclerosis. In this study 37% of patients were having abnormal ECG findings out of which sinus tachycardia was most common finding followed by LVH, this was from study findings by Elly H.H. Chiu et al 2006 [14] and Payman Asadi et al 2019[17] in which LVH (23.9%) and T inversion (21.2%) were the most common findings respectively. In this study 47 patients (61.3%) were having metabolic syndrome as determined by international diabetic federation (IDF) definition which was more significant in female patients (p=0.000809). A study conducted by Margaret Pusateri et al (2016) [18] showed to have metabolic syndrome in 38% patients with ischemic stroke with female predominance.

Conclusion:-

In our study most of the patients were male belonging to age group between 33-49years.Hemiparesis was the most common presentation. Dyslipidemia, metabolic syndrome, hyperhomocysteinemia, smoking and hypertension were found to be the most common risk factors. most of these are traditional risk factors which were previously seen in older age group, but now we are encountering these risk factors in younger age group also. As most of them are modifiable risk factors health education regarding lifestyle modification, health programs for preventing and treating these risk factors should be started to reduce the mortality and morbidity of stroke among socioeconomically active age group.

Limitations

Study period is limited.

As the study population is limited and taken only from the tertiary center it cannot be generalised to whole population.

All the risk factors for young stroke were not evaluated in this study due to lack of facilities and financial issues.

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