

A STUDY OF CLINICAL, ETIOLOGICAL AND RADIOLOGICAL PROFILE OF STROKE IN YOUNG ADULTS

Chethankumar K. L¹, Anikethana G. V², Ravikumar T. N³

HOW TO CITE THIS ARTICLE:

Chethankumar K. L, Anikethana G. V, Ravikumar T. N. "A Study of Clinical Etiological and Radiological Profile of Stroke in Young Adults". Journal of Evidence Based Medicine and Healthcare; Volume 1, Issue 8, October 15, 2014; Page: 817-826.

ABSTRACT: BACKGROUND AND OBJECTIVES: Cerebrovascular disease is the most common life threatening neurological disease and is a concern in young patients especially in developing countries. This study aims to identify clinical profile, risk factors, aetiology, and radiological profile of patients presented with stroke between the ages of 15-45 years. **METHODOLOGY:** 50 patients (27 males and 23 females) were included in the study. Detailed history and clinical examination were done and neurological deficits were identified. Other than routine investigations, fasting blood sugar, serum lipid profile, bleeding time, clotting time, HIV, VDRL, lumbar puncture for CSF analysis, homocysteine levels, ANA, APLA, electrocardiography, echocardiogram, carotid doppler and CT/MRI Brain were done for all the patients. **RESULT:** The sex ratio was 1.17: 1 (M:F), the mean age was 33.12 years and that of male and female patients were 34.74 and 31.22 years respectively. Neurodeficits such as motor deficit was seen in 86% of patients. Decreased in consciousness was seen in 72% of patients. 36% of patients had speech abnormalities. The common cranial nerve involved is VIIth cranial nerve in 24% of patients. Cerebellar deficit was seen in 6% of patients. Risk factors such as smoking was seen in 36%, alcohol consumption in 22%, hypertension in 28%, diabetes mellitus in 16%, overweight in 14%, abnormal LDL in 44% and HDL in 38%, OCP in 4% were associated with stroke in young. CT/MRI brain revealed ischemia in 56%, hemorrhage in 24% and cortical venous thrombosis in 20%. Common aetiology found was cardioemboli 26% followed by hypertension in 20%, atherosclerosis in 16%, postpartum cortical venous thrombosis in 12%, homocystinemia in 8%, SLE, OCP, APLA, AV malformation in 2% and undetermined in 10%. **INTERPRETATION & CONCLUSION:** The major risk factors for stroke in young patients were smoking, alcohol consumption, hypertension and dyslipidemia. Oral contraceptive pill use was associated risk factor in women. Cardioemboli was the most common cause of stroke in young. Cortical vein thrombosis was common among females.

KEYWORDS: Stroke; stroke in young; ischemic stroke; intracerebral hemorrhage.

INTRODUCTION: Stroke was defined by World Health Organization criteria as rapidly developing clinical signs of focal, at times, global disturbance of cerebral function lasting for more than 24 hours or leading to death with no apparent cause other than vascular origin.¹

Stroke is one of the most important causes of high morbidity and mortality all over the world. The diseases of cerebral blood vessels and the related infarcts and haemorrhages, though principally occur in the elderly, the young are not spared.¹

Data from major Indian hospitals show 24 to 35% of stroke in young of all neurological admissions.² The latest available estimates from Indian Council of Medical Research (ICMR)

ORIGINAL ARTICLE

indicate that in 2004 there were 930, 985 cases of stroke in India with 639, 455 deaths and 6.4 million disability adjusted life years (DALY) lost.³

Although various studies on stroke in young included subjects from second to fourth or fifth decade, in general, stroke in young includes subjects falling under the age group of 15-45 years.⁴

The aetiology may vary with different age groups. Though the traditional risk factors of stroke play a significant role in young age group also, the presence of high number of cryptogenic strokes, cardioembolic and venous stroke makes diagnostic evaluation in this age group more challenging. Early life factors like smoking, alcohol consumption, obesity are recognized as important factors to influence stroke risk and hence the determination of risk factors of stroke in young people is very important. The presence of risk factors in young patients seems to be increasing recently, and having those risk factors under control is essential to decrease the burden of stroke especially in young adults. Under such circumstances, primary prevention has to be emphasized to prevent the occurrence of strokes, which can be accomplished by monitoring the modifiable risk factors.³

Stroke affecting the young has potentially devastating consequences on the individual, his family and the society in general. Several studies have analyzed the risk factors of stroke in young, but considering its impact on younger generation, more studies are needed for identification and analysis of risk factors.

AIMS AND OBJECTIVES: Study the clinical profile, risk factors, etiology and radiological profile among stroke in young in our setup.

METHODOLOGY:

Study design: A cross sectional, descriptive and clinical study.

Source of Data: Patients diagnosed to have stroke in young admitted in KIMS, Hubli in the department of medicine from January 2012 to July 2013 and fulfilled the inclusion and exclusion criteria. The sample size was restricted to 50 cases.

Inclusion Criteria:

1. Age 15 - 45 years.
2. Patients with abrupt onset of focal or global neurological deficit attributable to vascular cause and persisting for more than 24 hours.

Exclusion Criteria:

1. Head injury

Method of Collection of Data: All patients who fulfilled the inclusion and exclusion criteria, and giving a written consent for study, were included in this study. Data was collected through a structured proforma, including history, examination and investigations.

Relevant investigations like haemoglobin, total white cell count, erythrocyte sedimentation rate, urine routine, blood glucose, blood urea, serum creatinine, VDRL, serum lipid profile,

ORIGINAL ARTICLE

bleeding time, clotting time, HIV, lumbar puncture for CSF analysis, ANA, APLA, Homocystiene, Chest X-ray, electrocardiography, echocardiogram, CT scan brain/MRI brain, were done for all patients,

The results were analyzed to assess the aetiology, risk factors, and the pattern of clinical and radiological profile.

Statistical Methods: The statistical parameters used were the continuous variable such as age was expressed in terms of average \pm standard deviation. The statistical significance of an observation was determined by calculation of p value using chi-square test or Fisher's exact test as relevant. A p value of <0.05 was taken as statistically significant.

RESULTS: The patients admitted with stroke between age group of 15 to 45 years to our hospital were taken for study and analyzed with the following parameters.

Age groups	Male	Female	Total
<20yrs	1	2	3
21-25yrs	3	7	10
26-30yrs	3	4	7
31-35yrs	5	3	8
36-40yrs	10	3	13
41-45yrs	5	4	9
Total	27	23	50
Mean age \pm standard deviation	34.74 \pm 6.86	31.22 \pm 8.67	33.12 \pm 7.86

Table 1: Age and Sex Distribution

Motor deficit was seen in 86% of the patients. Hemiparesis, hemiplegia and monoparesis were seen in 68%, 12%, 6% of patients respectively and cerebellar symptoms in 6% of the patients. 8% of the patients motor deficit could not assessed as they were comatose.

Patients had a number of clinical features other than motor deficit in our study. 9(18%) patients of the study population presented with seizures. Decrease in consciousness was seen in 36(72%) of patients. 18(36%) of patients had speech abnormalities. 12(24%) patients had facial nerve deficits. Hemi sensory loss was seen in 2(4%) of the study group and 3(6%) of the patients had cerebellar signs.

Risk factors	CVT	%	ICH	%	INFARCTION	%	p-value
Smoking							
Absent	10	31.2	3	9.4	19	59.4	0.0004
Present	0	0.00	9	50.00	9	50.00	
Alcohol							
Absent	10	25.65	4	10.25	25	64.1	0.0003
Present	0	0.00	8	72.73	3	27.27	

ORIGINAL ARTICLE

DM							
Absent	10	23.80	9	21.42	23	54.78	0.2842
Present	0	0.00	3	37.5	5	62.5	
HTN							
Absent	10	27.8	2	5.6	24	66.6	0.0001
Present	0	0.00	10	71.43	4	28.57	
IHD							
Absent	10	21.27	12	25.53	25	53.20	0.2569
Present	0	0.00	0	0.00	3	100.0	
TIA							
Absent	10	20.40	12	24.48	27	55.12	0.6475
Present	0	0.00	0	0.00	1	100.0	
Family h/o stroke							
Absent	9	18.36	12	24.49	28	54.15	0.1299
Present	1	100.0	0	0.0	0	0.0	
BMI							
Under weight	0	0.00	5	41.67	7	58.33	0.0198
Normal	10	32.26	5	16.13	16	51.61	
Over weight	0	0.00	2	28.57	5	71.43	
OCP							
Absent	9	18.75	12	25.0	27	56.25	0.417
Present	1	50.00	0	0.0	1	50.00	

Table 2: Risk factors associated with type of stroke

Lipid profile	CVT	%	ICH	%	INFARCTION	%	Total	p-value
Cholesterol								
Normal	10	34.48	6	20.69	13	44.83	29	0.0108
Elevated	0	0.00	6	28.57	15	71.43	21	
Triglyceride								
Normal	10	25.00	10	25.00	20	50.00	40	0.0495
Elevated	0	0.00	2	20.0	8	80.0	10	
LDL								
Normal	10	35.71	6	21.43	12	42.86	28	0.0073
Elevated	0	0.00	6	27.27	16	72.73	22	
HDL								
Normal	10	32.26	6	19.35	15	48.39	31	0.0216
Decreased	0	0.00	6	31.58	13	68.42	19	

Table 3: Lipid profile associated with type of stroke

ORIGINAL ARTICLE

Echocardiography was abnormal in 13(26%) patients, 5 patients had Mitral Stenosis with Mitral Regurgitation, 4 had Mitral Stenosis with Mitral Regurgitation with Aortic Regurgitation, 3 had severe Mitral Stenosis and 1 had Mitral Stenosis with Mitral Regurgitation with Aortic Regurgitation with Aortic stenosis. 2 patients had left atrial thrombus. Carotid Doppler was abnormal in 8(16%) patients, these patients had cerebral infarction.

Homocysteine was elevated in 4(8%) of patients with stroke in young. Out of 4 patients with elevated homocysteine, 3 patients had CVT and 1 patient had cerebral infarction. ANA was positive in 1(2%) patient with stroke in young, APLA was positive in 1(2%) of patients. Both patients had cerebral infarction.

Aetiology	No of cases	% of cases
Cardioemboli	13	26.00
Hypertension	10	20.00
Atherosclerosis	8	16.00
Postpartum	6	12.00
Homocysteinemia	4	8.00
AV malformation	1	2.00
OCP	1	2.00
APLA syndrome	1	2.00
SLE	1	2.00
Undetermined	5	10.00
Total	50	100.00

Table 4: Summary of etiology of stroke in young

DISCUSSION: Present study included stroke patients between 15-45 years. Sex ratio in our study was 1.17:1 (male: female). Mehndiratta M M et al² showed a ratio of 1.08: 1 in north India whereas Zunni et al⁵ demonstrated a similar ratio of 1.2:1. The mean age of all the patients in our study was 33.12 years, a study in north India by Mehndiratta MM et al² showed a similar mean age of 31.97 years and the mean ages of males and females were 30.66 and 33.28 years.²

In present study motor deficit was seen in 43(86%) patients, decreased level of consciousness in 36(72%) patients, speech abnormality in 18(36%) patients, cranial nerve deficit in 12(24%) patients, seizure in 9(18%) patients, sensory deficit in 2(4%) patients and cerebellar deficits in 3(6%) patients, whereas in the study by Bansal et al study⁶, motor deficit was seen in 79.2%, decreased level of consciousness in 57.2%, Speech abnormality in 30.4%, seizures 28.6%. Clinical features in present study concurred with Bansal et al⁶ study.

ORIGINAL ARTICLE

Risk factors	Present Study		Mehndiratta et al ²		Bevan et al ⁷		Alvarez et al ⁸
	Ischemic (n=38)	ICH (n=12)	Ischemic n=109	ICH n=18	Ischemic n=48	ICH n=46	Ischemic n=386
Smoking	23.68% (n=9)	75.00% (n=9)	21.1%	33.3%	20.83%	-	56.74%
Alcohol	7.89% (n=3)	66.67% (n=8)	2.75%	11.1%	16.7%	28.2%	37.82%
DM	13.15% (n=5)	25.00% (n=3)	4.58%	16.6%	10.41%	-	10.88%
HTN	10.52% (n=4)	83.33% (10)	19.25%	33.3%	31.25%	15.2%	23.32%
IHD	7.89% (n=3)	00.00% (n=0)	7.3%	0.5%	14.58%	-	3.91%
TIA	2.63% (n=1)	00.00% (n=0)	9.25%	00.0%	6.25%	-	-
FH/S*	2.63% (n=1)	00.00% (n=0)	2.77%	00.0%	12.5%	-	-
OCP	5.26% (n=2)	00.00% (n=0)	-	-	47.4%	-	21.17%
Dyslipid-emia	57.14% (n=16)	50.00% (n=6)	26.85%	38.9%	40.00%	36.2%	-
RHD	34.21% (n=13)	0.0% (n=0)	29.4%	-	35.4%	-	13.5%

Table 5: Comparison of risk factors with type of stroke

* Family history of stroke

In present study 2(8.69%) women were using Oral Contraceptive Pill, whereas Oral Contraceptive Pill consumption in other studies by Grindal et al⁹ was 17.9%, Bevan et al⁷ it was 47.4% who presented with cerebral infarction. The difference in the incidence of stroke in women may be due to use of alternative method of contraception and cultural differences.

In the present study smoking was present in 9(23.68%) patients with ischemic stroke and in other studies as Mehndiratta et al² it was 21.1%, Alvarez et al⁸ it was 56.74% and in Bevan et al⁷ it was 20.83%. The incidence of smoking with ischemic stroke was in concordance with studies by Mehndiratta et al² and Bevan et al⁷. The incidence of hemorrhagic strokes among smokers was 9(75%) out of 12 patients and it was 33.3% in hemorrhagic strokes in Mehndiratta et al.² Present study had more number of smokers who had hemorrhagic stroke, as 7 out of 9 patients were also alcoholic as it is also a risk factor for hemorrhagic stroke.

In the present study alcohol consumption was present in 9(7.89%) patients with ischemic strokes and 9(66.66%) patients with hemorrhagic strokes whereas in other studies as

ORIGINAL ARTICLE

Mehndiratta et al² it was 2.75% in ischemic strokes and 11.1% in hemorrhagic strokes, Bevan et al⁷ it was 16.7% in ischemic strokes and 28.26% hemorrhagic strokes and in study by Alvarez et al⁸ 37.82% of ischemic stroke patients were alcoholic. Present study incidence of alcoholic association with ischemic strokes concurred with other studies, whereas in hemorrhagic strokes it was more may be due to small number of study group.

In present study diabetes was present in 5(13.15%) patients with ischemic stroke and 3(25%) patients with hemorrhagic strokes, whereas other studies by Mehndiratta et al² it was in 4.58% ischemic strokes patients and 16.6% of hemorrhagic strokes patients, in study by Bevan et al⁷ incidence of diabetes was 10.41% among ischemic stroke and Alvarez et al⁸ it was present in 10.88% of ischemic strokes. The incidence of ischemic strokes in diabetes in present study concurred with other studies. The incidence of hemorrhagic strokes in diabetes in present study concurred with study by Mehndiratta et al.²

In the present study hypertension was present in 4(10.52%) patients with ischemic stroke and 10(83.33%) patients with hemorrhagic strokes whereas study by Mehndiratta et al² it was 19.25% and 33.3% in ischemic and hemorrhagic strokes respectively, study by Bevan et al⁷ it was 31.25% of ischemic patients and 15.2% of hemorrhagic strokes patients, Alvarez et al⁸ 23.32% of ischemic strokes patients. The incidence of ischemic strokes in patients with hypertension was less compared to other studies by Mehndiratta et al,² Bevan et al,⁷ Alvarez et al⁸. The incidence of hemorrhagic stroke in patients with hypertension in present study was higher compared to other studies may be due to difference in socioeconomic status, alcohol consumption and small number of patients in present study group.

In the present study Ischemic Heart Disease was present in 3(7.89%) patients with ischemic strokes and none among hemorrhagic strokes whereas in other studies by Mehndiratta et al² it was 7.3% among ischemic strokes and 0.5% among hemorrhagic strokes, which is similar to present study, whereas in a study by Bevan et al⁷ it was present in 14.58% and Alverej et al⁸ it was present in 3.91% patients.

In present study 2(5.26%) patients with ischemic stroke women had history of Oral Contraceptive Pill use. In studies by Bevan et al⁷ showed use of Oral Contraceptive Pill in 47.4% of women with cerebral infarction and Alvarez et al⁸ 21.17% of patients with ischemic stroke were using Oral contraceptive pill. Incidence of Oral contraceptive pill use is less in present study may be due to difference in contraceptive methods among our population and also culture.

In Present study, dyslipidemia in the form of elevated LDL was seen in 22(44%) patients, increased total cholesterol was seen in 21(42%) patients, increased triglycerides was seen in 10(20%) patients and decreased HDL was seen in 19(38%) patients. In studies by Mehndiratta MM et al² showed elevated cholesterol in 21.25% and elevated triglycerides levels in 28.34% and in Bevan et al⁷ showed 40% of ischemic patients with dyslipidemia whereas 36.2% of hemorrhagic stroke had dyslipidemia. The incidence of dyslipidemia associated with stroke was similar to other studies.

In present study Rheumatic Heart Disease was seen in 13(34.21%) patients with ischemic stroke, none of them had hemorrhagic stroke whereas other studies by Mehndiratta MM et al² showed 29.4% in ischemic stroke and none in hemorrhagic stroke, K lipska et al¹⁰ showed incidence of 25.2% in ischemic stroke, Bevan et al⁷ the incidence was 35.4% in ischemic stroke

ORIGINAL ARTICLE

and Alvarez et al⁸ it was 13.5% of among ischemic stroke. The incidence of ischemic stroke in rheumatic heart disease is similar compared to other studies.

Cardioembolic stroke was the main aetiological factor responsible for 13(26%) patients. In a study by Mehndiratta MM et al² it was 29.4%, K lipska et al¹⁰ it was 25.2%, Bansal et al⁶ it was 16% and Gulcin Benbir et al¹¹ it was 22.8%. The incidence was similar to our study.

Hypertension is the aetiological factor in 10(20%) patients. Study by Dalal et al¹² it was 24% among young patients. Bevan et al⁷ study it was 15.2%, incidence was similar to other studies.

Atherosclerosis as aetiological factor responsible for 8(16%) patients in present study whereas studies by Bevan et al⁷ it was 31%, Alvarez et al⁸ it was 22.7%. The incidence of atherosclerosis was similar in present study compared to other studies.

Cortical venous thrombosis in postpartum period was seen in 6(12%) patients, whereas other studies by Venkataraman et al¹³ it was 4.3%, Toubin et al¹⁴ it was 9%. The incidence of cortical venous thrombosis was in concordance with other studies.

Hyperhomocysteinemia was present in 4(8%) patients. Whereas in other studies by Mehndiratta MM et al² it was 0.9%, which was not in concordance with the present study probably because the levels of homocysteine can elevate temporarily after stroke, so it should be measured again after 8 weeks.¹⁵ In the present study homocysteine was measured during presentation of stroke and was not repeated after 8 weeks.

Present study 1 patient (2%) aetiology was attributed to Oral contraceptive pill. Bevan et al⁷ 4.16% of stroke patients aetiology was attributed to Oral contraceptive pill.

Present study aetiology was undetermined in 5(10%) cases. In a study by Mehndiratta MM et al² the undetermined cases were 8%. Present study had 4 cases with ischemic stroke and 1 patient with hemorrhagic stroke with undetermined aetiology. In this regard present study coincides with study by Mehndiratta MM et al.²

Special hematological investigations like antithrombin III, protein C, protein S deficiencies and angiographic studies could not be done in the present study due to financial constraints and non-availability of facilities in our hospital. Evaluations of various risk factors of stroke in young are important as they play a major role in secondary prevention and recurrence of stroke. Because young people are working and they are financial and social supporters of the family, by proper approach to a young patient with stroke, number of potential causes for stroke can be detected and the appropriate treatment of these patients will help the patient for early recovery and prevention of further stroke.

CONCLUSION: Smoking and alcohol consumption were important acquired risk factors for stroke among young. In alcoholic patients intracerebral hemorrhage was common. Diabetes mellitus, hypertension and hyperhomocysteinemia were modifiable risk factors commonly seen. Ischemic stroke was common in Diabetic patients. Intracerebral hemorrhage was common in hypertensive patients. Dyslipidemia like elevated LDL, total cholesterol, triglycerides and decreased HDL were common. Rare risk factors like Systemic lupus erythematosus, Antiphospholipid antibody syndrome should be considered during evaluation.

ORIGINAL ARTICLE

Cardioembolism was the most common aetiology for stroke in young. Cortical Venous thrombosis was common among young females. Extensive investigations are necessary in arriving at the etiological diagnosis, so as to prevent recurrence of stroke.

BIBLIOGRAPHY:

1. Aho K, Harmen P, Hatano S, Marquardsen J, Smirnov VE, Strasser T. Cerebrovascular diseases in the community. Results of WHO collaborative study. Bull. WHO 1980; 58: 113-30.
2. Mehndiratta MM, Agarwal P, Sen K, Sharma B. Stroke in young adults. A study from a university hospital in North India. Med Sci Monit 2004; 10(9): CR535-541.
3. Kameshwar Prasad, Kapil K Singhal. Stroke in young: An Indian perspective. Neurology India 2010; 58: 343-50.
4. Adams RD, Victor M: Cerebrovascular Disease. In: Principles of Neurology. Ropper AH, Brown RH (eds). 8th edition. McGraw-Hill, New York. 2005; 34: 660-746.
5. Zunni FS, Ahmed M, Hassan KM, Prakash PS. Stroke: Incidence and pattern in Benghazi Libya. Ann. Saudi med 1995; 15(4): 32-37.
6. Bansal BC, Prakash C, Jain AC, Brahmanandan KRV. Cerebrovascular disease in young individuals below the age 40 years. Neurology (India) 1973; 21: 11-18.
7. Bevan H, Sharma K, Bradley W. Stroke in young adults. Stroke 1990; 21: 382-386.
8. Alvarez J, Guiu JM, Somalla J, Molins M, Insa R, Molto JM, et al Ischemic stroke in young adults. Analysis of etiological subgroups. Acta Neurol Scand Jul 1989; 80(1): 28-34.
9. Grindal AB, Choen RJ, Saul RF, Taylor JR. Cerebral infarction in the young adults. Stroke 1978; 9: 39-42.
10. Lipska K, P N Sylaja, P S Sarma, K R Thankappan, V R Kutty, R S Vasan, et al. Risk factors for acute ischaemic stroke in young adults in South India. J Neurol Neurosurg Psychiatry 2007; 78: 959-963.
11. Gulcin Benbir, Derya ULUDUZ, Birsen INCE, Aysegul GUNDUZ. Clinical characteristics and risk factors in young stroke. Egalite Journal of Internal medicine, Quarter One, 2007: 1-14.
12. Dalal PM. Strokes in young and elderly: Risk factors and strategies for stroke prevention; J Assoc Physicians India 1997; 45(2): 125 -130.
13. Venkataraman S, Bhargava S, Virmani V. Cerebrovascular accidents. Clinical and radiological features. J Assoc Physicians India 1977; 25: 523-529.
14. Toubin A. The syndrome of latent cerebral venous thrombosis. Its frequency and relation to age and congestive heart failure. Stroke 1973; 4: 419-27.
15. Bogousslavsky J, Despland P. A, Regli F. Spontaneous carotid dissection with acute stroke. Arch Neurol 1987; 44: 137-140.

ORIGINAL ARTICLE

AUTHORS:

1. Chethankumar K. L.
2. Anikethana G. V.
3. Ravikumar T. N.

PARTICULARS OF CONTRIBUTORS:

1. Post Graduate Student, Department of General Medicine, Karnataka Institute of Medical Sciences, Hubli.
2. Post Graduate Student, Department of General Medicine, Karnataka Institute of Medical Sciences, Hubli.
3. Post Graduate Student, Department of General Medicine, Karnataka Institute of Medical Sciences, Hubli.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Chethan Kumar K. L,
S/o, Lingaiah B. Karadakere,
Maddur Taluk, Mandya District,
Karnataka – 571422.
E-mail: dr.chethu@gmail.com

Date of Submission: 11/08/2014.
Date of Peer Review: 12/08/2014.
Date of Acceptance: 03/09/2014.
Date of Publishing: 01/10/2014.