International Journal of Advances in Medicine
Srinivas G et al. Int J Adv Med. 2021 Jan;8(1):57-62
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933

DOI: https://dx.doi.org/10.18203/2349-3933.ijam20205471

Original Research Article

The study of the risk factor profile of stroke in young: a retrospective study

Srinivas G., Manoj Muthalik*, Aashik Y. S.

Department of General Medicine, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India

Received: 04 December 2020
Revised: 04 December 2020
Accepted: 15 December 2020

***Correspondence:**
Dr. Manoj Muthalik,
E-mail: drmuthalik9215@gmail.com

ABSTRACT

Background: Cerebrovascular accidents (CVA) is the second leading cause of mortality and morbidity in the world. Traditional risk factors for stroke are not very frequent in young population. However, other permanent or transient risk factors such as smoking, alcohol consumption, use of oral contraceptives, migraine, and puerperium have a more important role in young population. The objective of our study is to establish the risk factor profile in stroke in young.
Methods: This retrospective study of 100 patients of stroke, in the age group of 18–40 years, admitted in the medical wards of BMCRI, Bangalore. The patients were identified from the medical records from January 2018 to June 2019.
Results: Out of 100 patients of stroke in young, males were (58%) than females (42%) sex ratio was 1.38:1. Most common age group was 36-40 years (34%), mean age was 31.24 years. Most common risk factor was Hypertension (34%) followed by smoking (33%), alcohol consumption (28%), diabetes (21%), morbid obesity (12%). Most common type of stroke was ischemic (78%) and hemorrhagic (22%). In our study, 63.6% of hemorrhagic patients had hypertension showing statistically significant. Among patients of ischemic stroke, most common risk factor was smoking and tobacco chewing (32%).
Conclusions: There is rising trend in stroke among young, hence we should evaluate for various risk factors and identification these factors in otherwise healthy individuals and with life style modifications, we can prevent the increase in incidence of Stroke among young.

Keywords: Stroke in young, CVA, Risk factors, Hypertension, Ischemic, Hemorrhagic

INTRODUCTION

A stroke or cerebrovascular accident (CVA), is defined as an abrupt onset of a neurologic deficit that is attributable to a focal vascular cause.[1] Stroke is the second leading cause of death worldwide causing 6.2 million deaths in 2011.[2] In 2020, stroke will be the leading cause of death and disabilities after cancer throughout the world.[3] Numerous studies have been going on for the past 25-30 years, yet there is no uniform consensus regarding the most important predicting factors for mortality.

Stroke incidence rises steeply with age, therefore, stroke in young population is less common. However, stroke in a young person can be devastating in terms of productive years lost and impact on a young person's life. Some causes of stroke are more frequent in adults under 45 years of age compared to more aged populations.[4] Hypertension, alcoholism, smoking and dyslipidemia are the most common causes of stroke among the elderly.[5] Whereas infections, smoking, alcoholism, obesity, T2DM, head injury, sexual promiscuity, use of oral contraceptives, migraine, use of illicit drugs, and pregnancy or puerperium and hypertension are significantly associated with stroke among young people.

Some of the recent studies have demonstrated the stroke pattern to considerable extent in our country with a

prevalence rate 471/100000 population.[6] Recent studies identified that 7% of medical and 45% of neurological admissions were due to stroke with a mortality rate of 9% at time of discharge and 20% at 1 month.[7] The global burden of disease Studies projects that the total deaths from stroke in India will surpass established market prevalence by the year 2020.[8,9]

In India, 10–15% of strokes occur in people below the age of 40 years.[10] It is believed that the average age of patients with stroke in developing countries is 15 years younger than that in developed countries. In India, nearly one-fifth of patients with first ever strokes admitted to hospitals are aged<40 years.[11] In this study we tried to analyze risk factor profile in south Indian population.

METHODS

This retrospective study of stroke in young, conducted in the Department of Medicine of Bangalore Medical College and Research Institute, Bangalore, which is a tertiary care center in the region. The study was conducted for a period of 6months, between May 2019 and December 2019. The patients were identified from medical records, and after appropriate consent for accessing, medical records were obtained. The study protocol was approved by the institutional review board.

Inclusion criteria

Inclusion criteria were 1) age group of 18 to 40 years of either gender 2) patient with stroke in young adults of any etiology 3) clinical and radiological evidence of stroke.

Exclusion criteria

Exclusion criteria were 1) age below 18 years and more than 40 years of either gender 2) traumatic cases of intracerebral hemorrhage 3) the existence of unresolved differential diagnosis and uncertainty about the diagnosis of stroke 4) incomplete investigations about the cause of stroke.

Consent was sought for accessing medical records.

A retrospective, record-based study of patients of stroke, in the age group of 18–40 years, admitted to hospitals attached to Bangalore Medical College and research institute, Bangalore. The patients were identified form the medical records starting from January 2018 to June 2019.

One hundred patients fulfilling the World Health Organization (WHO) definition of stroke.9 Stroke of all types were included (i.e., ischemic, hemorrhagic, embolic).

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.[12]

The following information was noted in a semi-structured proforma: the socio-demographic patient characteristics (like age, sex, and occupation), risk factors present (like diabetes mellitus, hypertension, smoking, alcoholism, family history, cardiac disease, and dyslipidemias), and investigations performed were also noted.

Hypertension was defined as a blood pressure recording of>140/90 mm Hg on two or more values on two or more occasions after initial screening. Patients who are already on oral antihypertensive drugs were also considered hypertensive. Diabetic patients were diagnosed as per the WHO recommendations for the diagnostic criteria for diabetes (fasting plasma glucose≥110 mg/dl or 2-hour plasma glucose>200 mg/dl). Patients were included who had heart diseases if they had ischemic heart disease, congestive heart failure, rheumatic heart disease, and atrial fibrillation. Dyslipidemia was taken as LDL cholesterol>130mg/dl, serum cholesterol>200mg/dl, and HDL cholesterol<35mg/dl in females and <40mg/dl in males.

Patients diagnosed and treated earlier as stroke were taken as previous history of stroke. A family history of stroke was accounted only if first degree relatives of the patients had stroke. Smoking, tobacco chewing, alcohol consumption and risky sexual behavior were noted in the clinical history of past and present history. BMI was noted according to WHO classification.

Statistical analysis

Data was analyzed using SPSS version 20.0. The data was represented using descriptive statistics and expressed in terms of mean, standard deviation, proportions and percentages wherever needed. Appropriate parametric and non-parametric tests such as chi square test were used to find the significance among the variables.

RESULTS

A total of one hundred patients, 58 (58%) males and 42 (42%) females diagnosed to have Stroke were taken in our study. Our study found that mean age of the study group was 31.24+6.18 years and that of male patients was 31.81+6.04 and female patients was 30.66+6.33 years respectively. The majority of strokes occurred between the ages of 36-40 years at 34% and 22 % of male were also in the same age group, where as in females it was in the ages between 36-40 years at 12%.

The male to female ratio was 1.38:1. From above findings we can conclude that incidence of stroke in young is more common in male gender (Table 1) (Figure 1).

Observing the above-mentioned in Table 2. the most common risk factor for stroke in young population was

hypertension with 34% followed by smoking and tobacco chewing in (33%), alcohol consumption (28%), diabetes (21%), morbid obesity (12%), H/O of cardiovascular diseases (11%), hyperhomocystenemia (10%), H/O prior TIA/stroke (7%), dyslipidemia (9%), pregnancy and peripartum period (9%), H/O migraine (8%), intravenous drug users (1%) etc.

Table 1: Age and sex distribution.

Age (years)	Male		Female		Total	
	N	%	N	%	N	%
18- 25	08	08	10	10	18	18
26-30	15	15	09	09	24	24
31-35	13	13	11	11	24	24
36-40	22	22	12	12	34	34
Total	58	58	42	42	100	100
Mean age	31.81		30.66		31.24	

Table 2: Risk factors associated with stroke.

S. no.	Risk factors	Present		Absent	
		N	Percentage	N	Percentage
1	Smoking and tobacco chewing	33	33	67	67
2	Alcohol consumption	28	28	72	72
3	Hypertension	34	34	66	66
4	Diabetes mellitus	21	21	79	79
5	Morbid obesity	12	12	88	88
6	Dyslipidemia	9	9	91	91
7	Cardiac Disease (RHD/valvular HD/CAD/A. Fib)	11	11	89	89
8	Prior history of TIA/stroke	7	7	93	93
9	Hyperhomocystenemia	10	10	90	90
10	Family history of stroke	2	2	98	98
11	OCP/ hormonal exposure	4	4	96	96
12	Peripartum Period	9	9	91	91
13	Vasculitis (SLE)	2	2	98	98
14	Illicit drug abuse	1	1	99	99
15	Migrane	8	8	92	92
16	Hematologic disease (protien C/S deficiency/polycythemia)	5	5	95	95

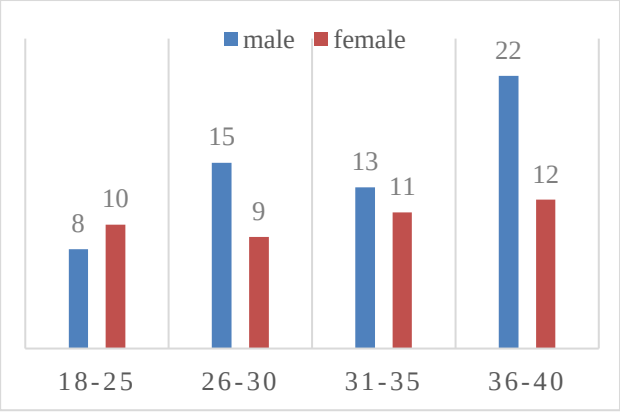

Figure 1: Age and sex distribution.

Ischemic stroke also includes the cortical venous thrombosis. In our study out of 78 ischemic stroke patients, 18 had cortical venous thrombosis as the aetiology of ischemic stroke (Table 3) and (Figure 2).

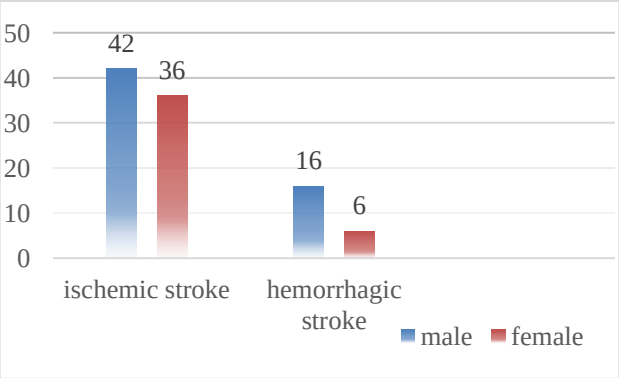

Figure 2: Gender wise distribution of different types of stroke.

As mentioned in the above table, in our study we assessed multiple risk factors, among these most common risk factors was hypertension followed by smoking and tobacco chewing. Among 100 strokes in young patients' records assessed 78 had acute ischemic stroke, among these 18 of them had cortical venous thrombosis. Rest 22 patients had acute hemorrhagic stroke (intracranial hemorrhage or IC bleed). 33% of all the patients were smokers and among ischemic and hemorrhagic strokes 32% and 36.3% (P>0.05) were smokers respectively. Hypertension was seen among 34% of patients, 25.6% of ischemic stroke patients and 63.6% of hemorrhagic stroke had hypertension, (p<0.001) statistically significant association between hypertension and hemorrhagic stroke. Among ischemic stroke patients 26.9% had H/O alcoholism, 23% were diabetic patients, 12.8% were morbidly obese, 12.8% had H/O cardiovascular diseases, and other 12.8% had homocystienemia. Among hemorrhagic stroke patients none of them had risk factors such as hyperhomocystienemia, prior H/O of TIA/stroke, or family history of stroke, none of them were in peripartum period or had H/O illicit drug abuse. Rest of the risk factors, parameters are mentioned in the above Table 4.

Table 3: Gender wise distribution of different types of stroke.

Gender	Type of stroke			
	Ischemic stroke	Percentage	Hemorrhagic	Percentage
Male	42	42	16	16
Female	36	36	6	6
Total	78	78	22	22

Table 4: Risk factors associated with type of stroke.

S. no.	Risk factors	Type of stroke		P value
		Ischemic (n=78)	Hemorrhagic (n=22)	
1	Smoking and tobacco chewing	25 (32%)	8 (36.3%)	0.704
2	Alcohol consumption	21 (26.9%)	7 (31.8%)	0.65
3	Hypertension	20 (25.6%)	14(63.6%)	<0.001**
4	Diabetes mellitus	18(23%)	3(13.6%)	0.336
5	Morbid obesity	10(12.8%)	2(9%)	0.634
6	Dyslipidemia	8(10.8%)	1(4.5%)	0.4
7	Cardiac disease (RHD/valvular HD/CAD/ A. Fib)	10(12.8%)	1(4.5%)	0.2
8	Prior history of TIA/stroke	7(8.9%)	0	>0.05
9	Hyperhomocystenemia	10(12.8%)	0	>0.05
10	Family history of stroke	2(2.5%)	0	>0.05
11	OCP/hormonal exposure	3(3.8%)	1(4.5%)	0.88
12	Peripartum period	9(11.5%)	0	>0.05
13	Vasculitis (SLE)	1(1.3%)	1(4.5%)	0.33
14	Illicit drug abuse	1(1.3%)	0	>0.05
15	Migraine	7(8.9%)	1(4.5%)	0.49
16	Hematologic disease (Protein C/S deficiency/Polycythemia)	3(3.8%)	2(9%)	0.31

**p<0.001 is statistically significant, i.e. there is association between hemorrhagic stroke and hypertension.

DISCUSSION

Our study is a retrospective study, conducted in a tertiary care hospital, various patients from different parts of Karnataka (South India) visit our hospital, and sample size taken for our study is 100 patients of stroke in young fitting into definition of stroke by WHO. Out of 100 patients 58 were male 42 were female, sex ratio was 1.38:1, which correlates to study conducted by Chandrashekar et al.[13] showing 1.7:1 and another study in north India Mehndiratta et al showed a ratio of 1:0.8.[14] We can conclude there is male preponderance among stroke in young and male sex may be non-modifiable risk factor among young. Our study found that mean age of the patients was 31.24+6.18 years, whereas it was 31.38 years in study by Chandrashekar et al.[13] and 31.97 years in study by Mehndiratta et al.[14] The mean ages of males and females in study by Mehndiratta et al were 30.66 and 33.28 years.[14] Our study had a bit higher mean age among male gender at 31.81 years; whereas in female group, it was much lower at 30.66 years most probably because there were more number of females who belong to reproductive age group and in peripartum period who had presented with cerebral venous thrombosis (CVT) in the early age.

In our present study 34 patients (34%) had hypertension, which was the most common risk factor for stroke in young in our patients. Dalal et al showed an incidence of 46.7%, Alverez et al 23%, Nagaraja et al 22.6% and Grindal et al 17.2% of hypertension as risk factor for stroke.[15-18]

Next common risk factor in our study was smoking and tobacco chewing was 33 patients (33%), Chandrashekar et al showed an incidence of 36%, Dalal 40%, Alvarez et al 56.7%, Nagaraj et al 15% Bogousslavsky et al.[13,15-17,19] 36.6%. In meta-analysis of 32 various studies of relation between stroke and smoking analyzed by Shinton et al.[20] there was a strong association between smoking and incidence of stroke.

Other risk factor was alcohol consumption, our study showed an incidence of 28%, Chandrashekar et al 42%, Dalal 40%, Alvarez et al 37.8%, Nagaraj et al 15%. Our study showed 21% incidence of diabetes among the study group.[13,15,17] Chandrashekar et al showed an incidence of 4%, Dalal 20%, Alvarez et al 10.9%, Nagaraj et al 11%, Grindal et al 5.2% and Zunni et al showed 14.8% incidence of diabetes.[13,15-18,21]

Incidence of morbid obesity as a risk factor for stroke among young in our study it was 12% it was 8.3% in study by Patne et al.[22] Dyslipidemia among our study group was 9% in Chandrashekar et al.[13] it was 16%, and 8.94% in Patne et al.[22]

In the study of Mehdiratta et al the incidence of homocysteinemia was 0.9%.[14] Chandrashekar et al study showed 12% which did not concur with the Mehdiratta et al.[13,14] study, present study showed an incidence of 10% concurring with Chandrashekar et al.[13] Incidence of other risk factors among the study group is mentioned in above table 2.

In the present study smoking was present in 32% of ischemic strokes and 36.3% of hemorrhagic strokes where as it was 18.11% and 4.72% in ischemic and hemorrhagic strokes respectively in Mehndiratta et al.[14] In the study by Alverez et al it was present in 56.74% of ischemic strokes.[16] In the present study alcohol consumption was present in 26.9% of ischemic strokes and 31.8% of hemorrhagic strokes where as it was 16.7% and 28.26% in ischemic and hemorrhagic strokes respectively in Bevan et al.[23] Diabetes was present in 23% of ischemic and 13.6% of hemorrhagic strokes in present study whereas it was 3.96% and 2.36% in ischemic and hemorrhagic strokes respectively in Mehdiratta et al.[14] This did not concur with the present study probably because the incidence of diabetes mellitus was less in Mehdiratta et al.[14]

In the present study hypertension was present in 25.6% of the ischemic and 63.6% of hemorrhagic strokes whereas it was 16.53% and 3.14% in ischemic and hemorrhagic strokes respectively in Mehndiratta et al.[14] This did not concur with the present study probably because there were number of risk factors present in the same patients diluting the effect of single risk factor. Remaining risk factor incidence among the ischemic stroke and hemorrhagic stroke patients are described in the table 4.

Risk factor evaluation play an important role in predicting the outcome of the stroke in young. First step in evaluation of risk factors is taking a thorough history of the patients and the details of the various habits such as smoking, alcohol intake, food habits etc. also details of uncommon or unconventional risk factors such as H/O migraine, prior TIA\stroke, illicit drug abuse must be elicited and respective investigations must be performed to find out vasculitis aetiology, hematological derangements such as protein C\S deficiency APLA, polycythemia, dyslipidemia and cardiac evaluation such as ECG, 2D ECHO is a must for diagnosis of cardio embolic stroke and other cardiovascular diseases like RHD\CAD\A Fib etc.

Especially among women who have stroke in young age history of OC pills intake, medical conditions during pregnancy or peripartum period must be given importance. By all these methods, a various cause can be detected, management and the treatment of these patients can be tailored according to the risk factors and aetiology detected to improve the outcome of stroke.

Limitations

Hospital based study hence referral bias and admission bias cannot be eliminated, It is a retrospective study hence problems associated with retrospective study cannot be eliminated.

CONCLUSION

This issue of stroke among young individuals has long been of keen interest to neurologists in the country. Males are at increased risk for stroke in comparison to female in young population. Peak incidence in younger population is between 35-45 years. Traditional risk factors like hypertension, diabetes mellitus, smoking and alcoholism are important risk factors in younger population and are progressively increasing in Indian population in comparison to previous studies the reason could be change in life style, industrialization and dietary habits. Migraine and possibly OCPs are probably not significant risk factors for stroke in young. Prior TIA and strokes are not uncommon.

Various diagnostic challenges have to be encountered in evaluating the rare etiologies. Hypertension was amongst leading risk factors for both types. After hypertension previous tobacco chewing smoking and alcohol consumption. More research studies have to be conducted to address stroke pattern in young to combat this deadly morbidity.

By observations made through this study we can conclude that most of the risk factors among young are modifiable

risk factors and can be controlled by life style modifications and appropriate treatment. Better outcome can be achieved by early identification and primary prevention. Prevention is better than cure.

ACKNOWLEDGEMENTS

We are sincerely thankful to medical record department in charge for helping in medical record retrieval.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kasper D, Fauci A, Hauser S, Longo D, Jameson J, LosCalvo J. Harrison's Principles of Internal Medicine, 19e,Newyork ;McGraw-Hill Professional publishing. 2015:2559-86.
2. Murray C J, Lopez A D. Alternative projection of mortality and disability by cause 19902020. Global burden of disease study. Lancet. 1997;349:1498-504.
3. Sturm JW, Mackay M, Thrift AG; Stroke among women, ethnic groups, young adults and children. In Handbook of Clinical Neurology. Fisher M editor, volume 92, Elsevier, New York, NY, USA, 2009.
4. Eapen RP, Parikh JH, Patel NT. A study of clinical profile and risk factors of cerebrovascular stroke. Guj Med J. 2009;64(2):47-54
5. Das SK, Banerjee TK, Biswas A, Roy T, Raut DK, Mukherjee CS, et al. A prospective community-based study of stroke in Kolkata, India. Stroke. 2007;38(3):906-10.
6. Nagaraja D, Gururaj G, Girish N, Panda S, Roy AK, Sarma GR, et al. Feasibility study of stroke surveillance: data from Bangalore, India. Ind J Medic Res. 2009;130(4):396.
7. Dayna Griffiths and Jonathan Sturm. Epidemiology and Etiology of Young Stroke. Strok Res Treat. 2011;2011.9.
8. Maharaj JC, Reddy M. Young stroke mortality in Fiji Islands: An economic analysis of national human capital resource loss. Neurology. 2012;2012.
9. Hatano S. Experience form a multi-centre stroke register: A preliminary report. Bull WHO. 1976;54:541-3.
10. Griffiths D, Sturm J. Epidemiology and Etiology of Young Stroke. Strok Res Treat. 2011;2011:209370.
11. Tripathi M, Vibha D. Stroke in Young in India, Strok Res Treat. 2011;2011:368629.
12. 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.
13. Chandrashekar G, Reddy AGH. Etiology and Risk Factors of Stroke in Young: A Prospective Study. Int J Sci Stud. 2016;4(7):79-83.
14. 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:CR535-41.
15. Dalal PM. Strokes in young and elderly: Risk factors and strategies for stroke prevention; J Assoc Physic Ind. 1997;45(2):125-30.
16. 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.
17. Nagaraj D, Murthy SG, Taly AB, Subbakrishna K, Rao BSS. Risk factors for stroke: Relative risk in young and elderly. Neurol Ind. 1998;46:183-4.
18. Grindal AB, Choen RJ, Saul RF, Taylor JR. Cerebral infarction in the young adults. Stroke 1978;9:39-42.
19. Bogousslavsky J, Pierre P. Ischemic stroke in patients under age 45. Neurolog Clinic. 1992;10(1):113-24.
20. Shinton R, Beevers G. Meta-analysis of relation between cigarette smoking and stroke. Br Medic J. 1989;298(6676):789-94.
21. Zunni FS, Ahmed M, Hassan KM, Prakash PS. Stroke: Incidence and pattern in Benghazi Libya. Ann Saudi Med. 1995;15(4):32-7.
22. Patne SV, Chintale KN. Study of clinical profile of stroke patients in rural tertiary health care centre. Int J Adv Med. 2016;3:666-70.
23. Bevan H, Sharma K, Bradley W. Stroke in young adults. Stroke. 1990;21:382-6.

Cite this article as: Srinivas G, Muthalik M, Aashik YS. The study of the risk factor profile of stroke in young: a retrospective study. Int J Adv Med 2021;8:57-62.