

Research Article

Clinical profile, risk factors and aetiology of young stroke: a tertiary care hospital based study from the Sub-Himalayan region in North India

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ABSTRACT

Background: Rapid urbanisation of rural areas is predicted to increase the incidence of risk factors for vascular events like stroke. There is scarcity of literature addressing issue of stroke from Sub-Himalayan region in North India.

Methods: The study was conducted in the department of medicine, R. P. govt. medical college, Kangra, Himachal Pradesh. Consecutive patients between the age of 15-45 years presenting with signs and symptoms of stroke in a duration of one year were included in the study. CT scan-head and lipid profile was done in all patients. Other relevant investigations to rule out aetiology were undertaken.

Results: Thirty two patients with the mean age of 41.1 ± 5.41 years were recruited. The incidence of stroke in young forming 8.55% of the total stroke patients (374). There were larger proportion of male patients with a ratio of 3:1.16 patients (50%) presented between 6 am and 12 pm in the morning hours of day. Maximum patients presented in winter months from November to January. Average delay of presentation to hospital was 30.8 hours. 19 patients (59.3%) presented with infarct. Most common symptom reported was weakness in 18 (56.2%). Predominant traditional risk factors observed was hypertension in 18 (53.1%). Hyperhomocysteinemia was seen in 4 patients (12.5%). Primary antiphospholipid antibody syndrome was seen in 2 (6.25%).

Conclusion: This study demonstrated predominant presence of conventional risk factors in young strokes. There was substantial time delay of presentation. Majority of patients presented in winter months. Prevention of vascular risk factors as well as issue of factors leading to delay in presentation needs to be addressed.

Keywords: Young stroke, Sub-Himalayan, Risk factors

INTRODUCTION

Stroke is one of the leading causes of mortality and morbidity worldwide. Urbanization is predicted to increase the risk factors for vascular disease and hence lead to a sharp increase in stroke.

Ability to forecast stroke is critical but has been challenging, making the detailed study of predisposing factors essential. Prevention still holds the key to reduce the impact of stroke. For planning prevention strategies,

reliable information on profile of diseases, in defined populations, is necessary.

Younger patients with stroke account for 5-10% of all the stroke worldwide. The impact of stroke on the individual family and society is strongest when it affects a young individual.

Himachal Pradesh is situated in the north-west of India in Sub-Himalayan region. The only data available about stroke in young is from Kashmir by Kaul et al.¹ undertaken in 1989 which was a community based study.

This is the first study conducted in Himachal Pradesh regarding younger patients with stroke. Few epidemiological surveys conducted at different altitude suggest that cerebrovascular disease may be less frequent at higher altitude than at sea level.

Dr. Rajendra Prasad Government Medical College Hospital (RPGMC), Kangra in district Kangra, Himachal Pradesh is located in the rural area. District Kangra and adjoining areas is witnessing changing lifestyle and urbanisation and has an average elevation of 733 meters. The districts and areas of Himachal Pradesh served by RPGMC, Tanda is given in Figure 1.



Figure 1: Black marked area is the area served by RPGMC, Tanda.

It is the only major referral hospital in this part of the state serving to 7 districts comprising of 60% of the state population mainly of rural background. RPGMC serves to inhabited areas ranging from 600-4000 meters above sea level. This study was designed for better understanding in the present scenario of the clinical and risk factor profile of younger patients with stroke in this hilly, rural area of the state and compare with the other Indian and western studies. This will help in planning of strategies in terms of prevention and stroke management especially in thrombolytic era in Himachal Pradesh and other hilly states for these younger patients who deserve larger attention as the impact of stroke is large.

METHODS

The study was conducted for a period of 12 months from June 2012 to June 2013. It was an observational non-interventional study. The study was conducted in the department of medicine, RPGMC, Kangra a tertiary care teaching centre. The study was approved by the ethical committee of RPGMC, Kangra. Patients with age between 15-45 years presenting with signs and symptoms of stroke were included in the study. Those with neurological deficit caused by non-vascular causes were excluded.

Consecutive eligible patients of stroke willing to participate were subjected to focused history and examination including detailed neurological examination. Demographic profile of the patients was recorded which included age, sex and place of residence. History regarding smoking, diabetes, hypertension and history of CVA was also elicited. Focused examination was carried out to record blood pressure, heart rate and waist circumference. Detailed systemic examination was conducted. CT scan was done in all patients.

Blood Sugar level (RBS, FBS), ECG, urine routine examination, lipid profile, renal function test, HbA_{1c}, homocysteine levels, antiphospholipid antibody was also done. Echocardiography was done in all patients. The biochemical parameters were done at RPGMC by Erba Mannheim XL-300 fully automatic analyzer.

ROC curves were used to assess the optimal combinations of sensitivity and specificity of various case definitions through area-under-the-curve analyses. The level of significance was set at $P < 0.05$ for all tests.

RESULTS

Thirty two (32) consecutive patients in age group of 15-45 years with clinical diagnosis of stroke were taken into the study. Total number of stroke patients during the same duration was 374 patients and total admissions, in medicine ward during period of study were 9150. Hence the young stroke formed 8.55% of the total stroke patients and 34% of the total hospital admissions

Mean age of patients was found to be 41.1 ± 5.41 years. Mean age of males was 40.56 years and of females was 42.75 years. 24 (75%) patients out of total were males and 8 (25%) were females. Ratio of male to female was 3:1.

19 patients (59.3%) presented with infarct, 9(28.1) presented with intracerebral bleed and 4 (12.5%) with subarachnoid haemorrhage.

Time of onset of symptoms of stroke is as given in Table 1. The patients predominantly presented in morning hours.

Table 1: Time of onset of symptoms.

Time of onset	No. of patients
12:00 am to 6:00 am	2
6:00 am to 12:00 pm	16
12:00 pm to 6:00 pm	6
6:00 pm to 12:00 am	8

Average delay in hours of presentation to hospital was 30.8 hours. 4 patients (12.5%) presented within 3 hours. 6 infarct patients (31.5%) presented within 4.5 hours.

29 patients of stroke (90.6%) belonged to rural area.

Symptoms of patients of stroke in young are depicted in Table 2. Most frequently presenting symptoms were weakness seen in 62.5%, speech abnormality in 51.25% and vomiting in 43.7% of patients.

Table 2: Distribution of symptoms in stroke patients.

Symptoms	No.
Weakness	20 (62.5%)
Mouth deviation	4 (12.5%)
Speech abnormality	18 (56.25%)
Altered sensorium	11 (34.3%)
Headache	10 (31.25%)
Vomiting	14 (43.7%)
Seizures	5 (15.6.6%)
Vertigo	2 (.6.2%)
Giddiness	4 (.12.5%)

Traditional risk factors observed was hypertension seen in 18 (53.1%). 16 patients (50%) were smokers, dyslipidemia in 12 patients (37.5%). Diabetes mellitus was seen in 11 (34.3). Other risk factors seen were previous history of stroke or transient ischemic attacks in 5 patients (15.6%).

2 patients (6.2%) had rheumatic heart disease along with atrial fibrillation. Hyperhomocysteinemia was seen in 4 (12.5%) of patients and antiphospholipid antibody in 2 (6.25%) patients.

The difference of risk factors between infarct and intracerebral bleed is depicted in Table 3. Smoking, dyslipidaemia, diabetes, hypertension and hyperhomocysteinemia were the major risk factors for infarct whereas dyslipidaemia, hypertension, diabetes and smoking were the major risk factors for intracerebral haemorrhage.

Rice (68.7%) was more common staple food in diet as compared to wheat (31.3%).

Average systolic blood pressure on admission was 149.09 ± 45.07 mm of Hg and average diastolic blood pressure was 92.32 ± 20.61 mm of Hg.

Table 3: Distribution of risk factors between infarct and intracranial bleed.

Risk factor	Infarct (total 19)	I.C.B. (total 13)
Dyslipidaemia	8 (25%)	2 (15.3%)
Hypertension	14 (42%)	5 (38.4%)
Diabetes	7 (36.8%)	4 (30.76%)
Smoking	8 (42.1%)	10 (76.9%)
I.H.D.	0 (0%)	0
R.H.D.	2 (6.2%)	0
A.F.	2 (6.2%)	0
Prior stroke	5 (15.6%)	0
Drugs	0 (0%)	0
Homocysteine	4 (21.05%)	0
Antiphospholipid antibody syndrome	2 (6.25%)	0

18 (56.2%) patients had systolic blood pressure more than 140 mm of Hg. 16 patients (50%) out of total had diastolic blood pressure more than 90 mm of Hg.

Average random blood glucose was 126.66 ± 35.7 mg/dl in total patients of stroke.

Average cholesterol level was 168 ± 61.99 mg/dl. An average LDL-C level was 110.23 ± 47.98 mg/dl in total patients. Average HDL level was 51 ± 18.50 mg/dl. An average triglyceride level was 291 ± 56 mg/dl.

Out of total patients 17(53.1%) had lesions on left side and 14 (43.7%) had lesion on right side. Oedema on CT-scan was present in 5 patients (15.6%) and all were having intracerebral bleed. 22 patients (68.7%) had anterior circulation stroke and 10 (31.2%) had posterior circulation stroke.

DISCUSSION

To our knowledge this is the first hospital based study to evaluate the profile, risk factors aetiology of stroke in young in the Sub-Himalayan region of North India. The only other reported study is by Koul et al.¹ which was a community based survey study done in 1989. One study from Shimla was done by Mahajan et al.³ in 2004 but did not address the issue of stroke in young. Since then there has been rapid urbanisation and lifestyle changes.

Stroke in young formed 8.55% of all the stroke patients. This proportion is higher than reported from Taiwan (6.8%).² This incidence is much less than reported by Mahajan et al. from Shimla (20%).³ Hence in Himachal there is a decrease in the incidence of stroke in young since last one decade but a corresponding increase in older age group. Other Indian studies have shown that about 10% to 15% of strokes occur in young adults.⁴ In India nearly one-fifth of patients with first ever strokes admitted to hospitals are young adults.⁵ Hence our incidence was less than seen in other studies from India.

24 (75%) patients out of total were males and 8 (25%) were females. Ratio of male to female was 3:1. Men are more likely to have a stroke than women as was seen in our study. The male female sex ratio in Himachal Pradesh is 10:9 whereas male/female sex ratio for India is 7:1.⁶ Hence males are affected more in Himachal. This probably is due to differences in risk factors such as smoking and alcohol intake.⁷

19 patients (59.3%) presented with infarct, 9 (28.1) presented with intracerebral bleed and 4 (12.5%) had Subarachnoid haemorrhage. As reported from other studies from India.⁸

Ischemic stroke is the most common subtype followed by haemorrhagic and embolic stroke. So our study is at par with other studies.

As far as the risk factors are concerned smoking, alcoholism, increased BMI, diabetes and hypertension are significantly associated with strokes among young people.⁹ The main findings in our study was the substantial presence of traditional risk factors. Hypertension was detected in 53.1% of patients and was the most common risk factor. Other risk factors in descending order were smoking, dyslipidaemia, diabetes, past H/o stroke, hyperhomocysteinemia and rheumatic heart disease with atrial fibrillation. The risk factors were present in 50%, 37.5%, 34.3%, 15.6%, 12.5% and 6.2% respectively. This data further emphasises the need for primary prevention of traditional risk factors even in the younger stroke patients. Hyperhomocysteinemia and antiphospholipid antibody syndrome was also rarely seen.

The young adult stroke patients predominantly presented in morning hours. 50% of them presented in morning hours. This circadian variation pattern is also observed in Myocardial infarction. Study by William support the presence of a circadian pattern in the onset of stroke with a significantly higher risk in the morning.¹⁰ Similarly there is a significantly lower risk of stroke during night-time (midnight to 6 am). In our study only 2 young adult patients presented with stroke in night-time. This has an implications that the symptoms of stroke can be recognised as patient will be awake and secondly preferably those antihypertensives with timing at night time be preferred which cover the morning hours adequately.

Maximum patients presented in winter months from November to January. Another study from All India Institute of Medical Sciences, New Delhi¹¹ also showed an increasing trend in number of patients with stroke from the month of November which is the start of winter season in our region and it remain elevated till February which is the start of summer season. This event can be explained on the basis of increased vasoconstrictor endothelin and decreased vasorelaxant nitric oxide in winters. Also Fibrinogen and factor VII plasma values are significantly more in winters.

Average delay in hours of presentation to hospital was 30.8 hours. 4 patients (12.5%) presented within 3 hours. 6 infarct patients (31.5%) patients presented within 4.5 hours. Similar delay in presentation was seen in another study where there was a considerable prehospital delay with 63% of patients presenting more than 12 hours after the onset of symptoms.¹² A study undertaken in a rural area identified that the mean arrival time of stroke patients to hospital was 34 ± 6 hours.⁷ Hence majority of patients arrive after the time frame of thrombolysis and whoever reach in the required time frame is not able to afford thrombolysis because of poor socioeconomic status in rural area¹³ as seen in our study where 90.6% belong to rural background.

The most common symptoms observed in our study were weakness, speech abnormality, headache, vomiting and altered sensorium which is same as reported in other studies and needs to be communicated to public by the mass media so that the symptoms are recognised early so as to take tertiary care medical assistance at the earliest so as to reduce the delay in presentation to the hospital.

Our study showed the predominance of traditional risk factors like hypertension, smoking, diabetes, dyslipidaemia. Hyperhomocysteinemia is associated with increased risk of cardiovascular and cerebrovascular disease. Tan et al.¹⁴ found that homocysteinemia is an independent risk factor for Ischemic stroke in young Asian adults with a strong relationship between increasing homocysteine levels and stroke risk. In our study 21.05% of the patients had hyperhomocysteinemia.

Rice (68.7%) was more common staple food in diet as compared to wheat. Rice is not associated with risk of stroke in either gender.¹⁵

Study from South India¹⁶ depicted elevated levels of triglycerides in 10% of patients, raised LDL in 33% of patients. Our study showed predominantly triglycerides as dyslipidaemia in 65% of cases and LDL in 34.3% of patients.

The only limitation of the study was that it was only one year duration study hence number of patients were less and also that some costly investigations to rule out various other rare aetiologies could not be undertaken.

CONCLUSION

This study demonstrated substantial presence of premature atherosclerosis and conventional risk factors in young strokes. Hence emphasis on the preventive aspects should be undertaken e.g. smoking, hypertension, dyslipidaemia and diabetes which are modifiable but still on rise due to lifestyle changes. Rural areas where the study was conducted is witnessing rapid lifestyle changes which will further exponentially increase the incidence of risk factors and vascular events. The predominant type of stroke was ischemic which needs thrombolytic therapy

but there was substantial time delay of presentation to the hospital in our study affecting the management. Further majority of patients were of rural background who will not be able to afford the therapy. For this Government agencies should take over the funding so as to increase the number of patients for thrombolysis. Majority of patients presented in winter months which may further delay the presentation to hospital because of difficult terrain and weather conditions during these months. Majority of patients presented in morning hours when the symptoms can be recognised and early management can be instituted.

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Ethical approval: The study was approved by the ethics committee of RPGMC, Kangra

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