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CAROTID PLAQUES AMONG DIFFERENT ETHNIC PATIENTS WITH ISCHEMIC STROKE

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ABSTRACT

Introduction: *Sonographic evaluation of the carotid artery is commonly used for risk assessment in stroke. These changes quite vary in relation to age, sex, and ethnicity, and other risk factors. The primary objective of the study was to find the prevalence of carotid plaques in different ethnic groups with ischemic stroke.*

Materials and Methods: *The study was an observational, cross-sectional descriptive study conducted in the Neuromedicine department of the National Academy of Medical Sciences. The study included a consecutive sampling of the patients diagnosed with ischemic stroke admitted in the neuro/medicine ward or those visiting neuro/medicine OPD of Bir hospital.*

Results: *Among 80 patients, 26.3% patients were Brahmans/Chhetri, 11.3% were Madhesi, 10 % were Dalits, 25% were Newars and 27.5% were Janajati. The prevalence of carotid plaques in Janajati (20%) was followed by Newars (18.8), Brahmans (17.5%), Madhesi group (8.8%), and Dalit (7.5%). The mean number of plaque was higher in Brahman/Chhetri group. It was found that, around 21% of the cases had unilateral carotid plaques and 51% had bilateral carotid plaques. Janajati and Newar groups had a maximum proportion of bilateral plaques while Dalit had the least proportion (15% vs 2.5%). However, the difference among the ethnic groups was not significant.*

Conclusion: *The prevalence of carotid plaques, the maximum number of plaques, and the number of bilateral plaques were highest in the Janajati group. However, the mean number of the carotid plaque was highest among the Dalit group.*

INTRODUCTION

Stroke is the second leading cause of death in the world. It accounts for the 11 percent of the deaths in the world.[1,2] The incidence of ischemic stroke is 57% to 68% in Nepal.[3,4] 80% of strokes are thromboembolic in origin, in which carotid plaque is one of the sources of embolus.[5] Sonographic evaluation of the carotid artery is commonly used for risk assessment in stroke and also in finding the cause of ischemic stroke. Carotid artery intimal media thickness, types of plaque, degree of stenosis are the different findings in carotid artery study which are correlated with the stroke.[6]

There are few studies done in Nepal regarding morphological changes in carotid artery including percentage of stenosis, types of plaque, sites of plaque.[7] These changes quite vary in relation with age, sex, and ethnicity and other risk factors.[8]

However, there are few data revealing the prevalence of stroke and the carotid morphological changes in stroke patients of different ethnic groups of Nepal are known little. [9] This study finds the prevalence of carotid plaques in patients of different ethnic groups of Nepal. The findings will be helpful in policy development, conducting any prevention program for reduction of stroke and carotid atherosclerosis, and also screening of its complications along with active intervention program focused on the specific ethnic groups.

MATERIALS AND METHODS

The study was an observational cross-sectional descriptive study conducted in Neuro/Medicine Department of the National Academy of Medical Sciences, from September 2018 for 6 months. Consecutive sampling method was used to enroll the patients who are diagnosed with Ischemic Stroke as per definition of WHO guideline and clinico-radiological evidence of ischemic stroke. Sample size 80 was calculated using the prevalence formula $n = z^2p(1-p)/d^2$ where, n is required sample size, z is statistical value

for a level of confidence (for 95% level of confidence, z=1.96, p is estimated proportion in the population and d is precision or maximum tolerable error.

The patients were excluded in study who denied for consent, patients with evidence of hemorrhage in CT/MRI brain, CT/MRI scan of brain suggestive of Space occupying lesion ,subjects where the imaging circumstances were very poor, with limited boundary visualization or where there were anatomical constraints, either a high carotid artery bifurcation or a short thick neck, where more than 2 segments were not visualized, patients with Head injury and presence of fever/systemic infection prior to neurological deficit.

The ethical approval was taken from the Institutional Research Committee of National Academy of Medical Sciences, (NAMS). To begin with the study, permission was obtained from the department with an approval of the protocol of the study. Patients fulfilling the inclusion criteria were explained about the nature of the study and their rights to refuse, then informed written consent was obtained from those willing to get enrolled.

Ethnic groups in this study was categorized as Brahmans/ Chhetri, Madhesi and other terai caste, Dalits, Newar, Janajati, Muslims and Others which is same as the ethnic groups classified in national demographic health survey 2006.[10]

Bilateral carotid arteries were scanned by trained skilled radiologist with high-resolution ultrasound. The presence of a plaque was defined if 2 of the following 3 characteristics are met: (1) wall shape (protrusion into the lumen, loss of alignment with adjacent arterial boundary, roughness of the arterial boundary); (2) wall texture (brighter echoes than adjacent boundaries); and (3) wall thickness (Intimal Media Thickness, IMT ≥1.5 mm).[11,12,13]

Data derived from the patients, patients' party and their hospital records were filled in structured Proforma covering the relevant details. Data was entered in the tabulated format. SPSS version 26 was used for data analysis. For the purpose of this study a 95% confidence interval was accepted and p value of <0.05 was taken as significant. Statistical significance was tested by using Analysis of the variance (ANOVA).

RESULTS

Total number of patients enrolled in this study was 80 out of which male accounted for 58.8% and female 41.2%. Mean age of the patients was 65.7 years in the study with standard deviation of 15.4 years. Minimum and maximum age of the patients were 27 years and 94 years respectively. The mean age of the female patients was 68.5 years and that of male patients was 63.7 years. Maximum number of the patients were above 65 years, which included 29 percent female patients and 34 percent male patients. Younger patients less than 45 years accounted for 12 percent.

The distribution of different ethnic group is shown in table 1.

Table 1. Distribution of different ethnic groups with ischemic stroke

Ethnicity	Frequency	Percent
Brahman/Chhetri	21	26.3
Madhesi	9	11.3
Dalit	8	10.0
Newar	20	25.0
Janajati	22	27.5
Total	80	100.0

The most common risk factors in ischemic stroke were smoking followed by hypertension, dyslipidemia, alcohol consumption, diabetes, previous stroke and rheumatic heart disease with the frequencies of 57%, 46%, 46%, 40%, 20%, 12% and 2.5% respectively. Smoking was found more prevalent among Brahman/Chhetri group, dyslipidemia among Newars, and alcohol consumption among Janajati group.

The baseline characteristic of the patients is shown in the table 2.

It was found that Janajati other than Newar had more (20%) carotid plaques than other castes. In descending order, prevalence of carotid plaques in Janajati was followed by Newars (18.8), Brahmans (17.5%), Madhesi group (8.8%) and Dalit (7.5%) which is shown in table 3, however it was not statistically significant (p value 0.96).

Table 2. Baseline characteristic of the patients

Baseline characteristics	Mean	Std. Deviation	Mini-mum	Maxi-mum
Age (years)	65.7	15.4	27	94
SBP(mmHg)	145	22.8	100	220
DBP (mmHg)	88	11.6	60	120
RBS (mg/dl)	127	52.3	72	300
LDL (mg/dl)	84.3	32.3	30	178
HDL (mg/dl)	45.8	8.5	23	77
Total Cholesterol (mg/dl)	152	40.1	84	254
TG (mg/dl)	145	98	33	613

Hb (g/dl)	13.9	2.1	10.8	20.0

Table 3. Prevalence of carotid plaques in different ethnic groups.

Carotid Plaque	Ethnicity no (%)					P Value
	Brahmans/ Chhetri	Terai/ Madhesi	Dalits	Newar	Janajati	
Yes	14(17.5)	7(8.8)	6(7.5)	15(18.8)	16(20)	0.96
No	7(8.8)	2(2.5)	2(2.5)	5(6.3)	6(7.5)	

The number of plaques (mean & standard deviation) in different ethnic groups with ischemic stroke is shown in table 4.

Table 4. Number of plaques in different ethnic group

Number of Carotid Plaque	Ethnicity					P Value
	Brahman/ Chhetri	Terai/ Madhesi other caste	Dalits	Newar	Janajati	
Mean	3.33	2.50	4.0	2.60	2.20	0.35
S.D	3.28	2.66	0	3.33	3.16	
Minimum	2.00	2.00	4.00	2.00	2.00	
Maximum	4.00	4.00	4.00	4.00	5.00	

It was found that around 21% of the cases had unilateral carotid plaques. 11% had ipsilateral and 10 % had contralateral plaques. 51% had bilateral carotid plaques. Janajati and Newar groups had maximum proportion of bilateral plaques while Dalit had the least proportion (15% vs 2.5%). However, the difference among the ethnic groups was not significant as shown in table 5.

Table 5. Site of plaques in different ethnic groups

Site of plaque	Ethnicity Frequency (%)						P Value
	Brah-man/ Chhetri	Mad-hesi	Dalit	Newar	Jana-jati	Total	
None	7(8.8)	2(2.5)	2(2.5)	5(6.3)	6(7.5)	22(27.5)	0.93
Ipsilateral	2(2.5)	1(1.3)	2(2.5)	2(2.5)	2(2.5)	9(11.3)	
Contralateral	2(2.5)	1(1.3)	2(2.5)	1(1.3)	2(2.5)	8(10)	
Bilateral	10(12.5)	5(6.3)	2(2.5)	12(15)	12(15)	41(51.2)	

DISCUSSION

The sample size of the study was 80. There were male more than female, males were 58.8% and female were 41.2%. The proportion was similar to the study done in Bir Hospital by Amina et.al in which there were 59.05% male and 40.95% female.[4] There was slightly more prevalence of female patients (56.7%) in one recent study by A. thapa.[14] The mean age of the female patients was 68.5 years and that of male patients was 63.7 years which was more than the mean age of 59 years in study done by M.Shaik.[15] Younger patients less than 45 years accounted for 12 percent in this study which was less than the study done in Kathmandu Medical College.[14]

There were 26.3 percent of Brahman/Chhetri, and Newars, other Janajati and Madhesi caste accounted for around 25 percent, 27.5 percent and 11 percent, and the least was Dalit group 10%. R.Dhungana et al reported in his study done in peri urban area of Kathmandu the prevalence as around 60% of Brahmans/chhetri,24% Newar,11% Janajati and 4.3% Dalit and others.[16]

The most common risk factors in this study were smoking followed by hypertension, dyslipidemia, alcohol consumption, diabetes, previous stroke and rheumatic heart disease with the frequencies of 57%, 46%, 46%, 40%, 20%,12% and 2.5% respectively. Shrestha. A. and her team in their study reported that the commonest modifiable risk factor was smoking 60.48% followed by excessive intake of alcohol 41.43% , hypertension 38.57% , Diabetes Mellitus 10 %, Dyslipidemia 9.05 % and valvular heart disease 3.33%.[4]

Carotid plaques were present in 72% of the cases in this study, and male had higher prevalence. G. Thapa also reported similar frequency of plaque (65%) in ischemic stroke patients.[7]

It was found that around 21% of the cases had unilateral carotid plaques and 51% had bilateral carotid plaques in this study. One study done in India revealed plaque was found bilaterally in 29 patients (39%), only on right side in 16 patients (21%) and only on left side in 12 patients (16%).[17]

The study had some limitations. It included only small sample size of the patients with ischemic stroke, the difference in the prevalence of the carotid plaques in different ethnic groups could not be established with statistical significance. Hence study with larger sample is warranted to study the ethnic difference in prevalence of the carotid morphological changes. It is one center study only, so the accessibility of the different ethnic community to the center might be one limiting factor. The study did not find the proportion of ischemic and hemorrhagic stroke in different ethnic groups, as the study was only conducted in ischemic stroke patients.

CONCLUSION

The prevalence of carotid plaques, the maximum number of plaques and the number of bilateral plaques, all were highest in Janajati group. However, the mean number of the carotid plaque was highest among Dalit group. Further larger studies are required to study the association of the Nepalese ethnicity with carotid morphological changes.

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