Original article

Clinico-epidemiological profile of stroke patients admitted in a tertiary care Hospital of Assam

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ARTICLE INFO

Article history:

Received 16 May 2017

Received in revised form 7 September 2017

Accepted 9 September 2017

Available online 11 September 2017

ABSTRACT

Problem considered: Stroke or Cerebrovascular Accident (CVA) is the leading cause of death and disability and is a major problem in most part of the world as reported by WHO.

Aims: To estimate the clinico-epidemiological profile of acute stroke cases admitted in Assam Medical College and Hospital.

Methods: All consecutive cases attending the study site were enrolled and studied with predesigned questionnaires after obtaining ethical clearance for this observational study. Predesigned pretested questionnaire was used to assess socio-demographic profile, behavioural risk factor, health care seeking behaviour, dietary history, clinical examination along with routine blood examination and CT Scan. Statistical analysis was done using rates, ratio, proportion and chi-square test.

Results: Out of 470 cases enrolled the response rate was 96%. Average age was 54.3 ± 13 years with an average monthly income of Rs. 10,831. Majority were literate (76.4%). Majority presented with haemorrhagic cerebro-vascular accidents (CVA) (287, 63.6%), while 164 (36.4%) had ischemic CVA. Significant difference in prevalence of haemorrhagic and ischemic CVA in younger age group ($p = 0.001$), lower socio-economic strata ($p = 0.001$), patient's place of stay during symptom onset ($p = 0.048$) and mode of transportation to hospital ($p = 0.021$) was seen. Clinical signs and symptoms of ischemic and haemorrhagic CVA showed significant difference in symptoms like change in consciousness ($p = 0.000$), weakness in face/limb ($p = 0.022$), dysphagia ($p = 0.042$), headache ($p = 0.006$), diabetes ($p = 0.001$), tobacco consumption ($p = 0.000$) and alcohol consumption ($p = 0.000$). MLR showed significant association of haemorrhagic stroke with high salt consumption and loss of consciousness.

Conclusion: haemorrhagic CVA constitutes a larger percentage of stroke subtypes on this side of the globe effecting poor to lower middle class. Proper strategy to prevent and treat haemorrhagic CVA in this part of the world is the need of the hour.

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1. Introduction

Stroke is defined by WHO as “rapidly developing clinical symptoms and signs of focal (at times global) disturbance of cerebral function with symptoms lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin.”¹ Globally, CVA or stroke accounts for about 10% of all deaths, two-thirds of which occur in low income countries.² In India, stroke is a leading cause of death and acquired adult disability.^{3–6} While exact estimates of the incidence and clinical consequence of stroke in India are unavailable, the epidemiological survey covering 52,577 people reported an estimated standardized prevalence of 545 per 100,000, an annual incidence of 145 per

100,000 and a 1-month case-fatality of 41%, all rates exceeding those in North America and Europe.⁷ Accordingly, the social and economic consequences of stroke are proposed to be enormous, particularly when stroke occurs in the main income earner of a household.⁸

Among the stroke subtypes, cerebral ischemia and infarction constitute about 85–90% of the total stroke subtypes in western countries with only about 10–15% patients with cerebral haemorrhage.⁹ But contrary to the western population, hemorrhagic CVA constitutes a larger percentage of stroke subtypes on this side of the globe as seen in countries like Japan and China probably because of poorly controlled hypertension.¹⁰

Despite the obvious importance of stroke in India, our understanding of the epidemiology, natural history and clinical management of stroke remains grossly inadequate.¹¹ Large scale acute coronary syndromes, where large observational studies have been completed in India (INTERHEART and CREATE-Registry),^{12–14}

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there have been no observational studies for stroke in North east region. Dibrugarh District is having 27% tea garden population having high prevalence of cardiovascular risk factor like hypertension, high salt intake and tobacco consumption.¹⁵ The stroke registry of Assam Medical College caters the whole District population as it is the only referral centre for the District. The present study is therefore designed to estimate the clinico epidemiological and practice pattern of acute stroke cases admitted in Assam Medical College and Hospital and to maintain a stroke registry.

2. Methods

Assam Medical College is the only tertiary care hospital in Dibrugarh District of Assam catering a total population of 1.3 million. All consecutive patients with diagnosis of stroke who attended Assam Medical College within 14 days of occurrence of disease during 2013–2015, and who came from the state of Assam were interviewed and were enrolled in the study. Written informed consent was obtained from all participants. Predesigned, pretested schedule including socio-demographic profile, clinical history and examination was recorded. Anthropometric measurement was done in the form of weight, height, waist circumference, hip circumference etc. Dietary assessment was done using food frequency questionnaire. Radiological diagnosis of causes other than stroke, like meningitis, encephalitis, space occupying lesion etc. was excluded. Also metabolic causes of altered sensorium based on clinical or laboratory means were not included in the study. Unconsciousness or loss of consciousness was defined as a condition in which ability to maintain awareness of self and of the environmental stimuli. The institutional ethics committee of Assam Medical College cleared this observational study.

2.1. Sample size calculation

Taking proportion of first-ever stroke captured in Mumbai registry, 89.2%, and 80.2% were ischemic strokes and 17.7% haemorrhagic strokes,¹⁰ with 95% CI for 2 tail distribution the required sample size is 468.

Statistical analysis was done using rates, ratio and proportion and the difference in proportion was assessed by using chi square test and F-test.

3. Results

A total of 450 cases of strokes were enrolled, out of 470 CVA. So the response rate is 96%. The age of the participants ranges from 18–87 years with an average of 54.3 ± 13 years (Fig. 1). Average

Fig. 1. Age wise distribution of stroke patients.

family size of study participant was six. Average income is Rs. 10831. Majority of the study participants 83 (75.8%) were between 40–69 years and Hindu by religion 135 (96.4%). Majority were literate (76.4%), while 23.6% were illiterate. 47.1% subjects were either unemployed or retired, while 33.6% were self-employed and only 19.3% were employed in any government or private concerns. Majority (55%) were the earning member of the family. Regarding assets; 82.9% owned houses as property, while access to media in the form of phone or mobile was available in 48.6% cases. Most of the study participants (95.7%) were from poor or lower middle class as per socio-economic classification. During occurrence of current event symptoms occurs at home in 88.6% while 7.9% were in workplace and 3.6% were alone at home. Ambulance services were availed by 82.1% of the sufferers for transportation, while 15.7% travelled by privately hired vehicle. In 75.7% cases the patient was first admitted to the Medical College, while in 24.3% cases the patient was referred from other hospital. The first consultation was with a general doctor in 87.9% cases and only 10% could get specialist advices like physician and 2.1% sufferers could not get access to any doctor (Table 1).

3.1. Prehospital symptoms

Majority presented with haemorrhagic shock (HS)(287, 63.6%), while 164 (36.4%) had ischemic shock (IS). Stroke was diagnosed as initial diagnosis in 94.7% cases. Stroke diagnosis was made at home in 3(0.7%) cases, while 256(62.2%) cases were diagnosed by first level health care provider and 158(37.1%) were diagnosed in emergency medicine department. Ranking scale 1 week prior to event ($n = 140$) was '0' in 138 (98.6%) cases, while '1' in 2 (1.4%) cases. Ranking scale at admission was '3' in 17(12.1%) cases and '4' in 55 (39.3%) cases. History of transient ischemic attack ($n = 176$) was found in 9 (5.1%) cases.

3.2. Symptoms on presentation in hospital

Change in consciousness was present in 257 (77.1%) cases, while 193 (42.9%) had no change of consciousness. Altered speech was present in 138 (30.7%) cases, weakness of face/limb in 294 (65.3%) cases, while dysphagia was present in 5(1.1%). Ocular/visual symptoms was found in 33(7.3%) cases, vertigo/ataxia was evident in 16(3.6%) and sensory symptoms were present in 69 (15.3%) cases. Headache was complained by 149 (33.1%) cases.

3.3. On clinical examination

Mean ($\pm$ SD) SBP was $168(\pm 29)$ and DBP was $97 (\pm 14)$. The mean heart rate ($\pm$ SD) was $80 (\pm 9)$ beats/min, while average temperature was $96.6 (\pm 8.0)$ degree F. Respiratory rate ($\pm$ SD) was $20.5 (\pm 2.4)$ /min. Anthropometric examination shows average weight as 54.2 ± 8.9 kg, waist circumference (supine)- 69.8 ± 20.1 cm and hip circumference (supine) - 70.2 ± 28.2 cm.

3.4. Regarding past medical history

Hypertension was known in 163(36.2%) cases, while 287(63.8%) has either normal blood pressure or unknown status. Fifty two individual (11.6%) were known diabetic, while 3(0.7%) had angina, 1(0.2%) had valvular heart disease, 4(0.9%) had atrial fibrillation and 2(0.4%) had past history of stroke.

3.5. Behavioural risk factor

Majority were current user of tobacco was 235(52.2%), while 84 (18.7%) were former user and 131 (19.1%) had never used tobacco.

Table 1
Socio-demographic profile of study participants.

Demographic Profile		N	Percentage
Gender	Men	277	61.6
	Women	173	38.4
Area of Residence	Urban	32	7.1
	Semi urban	118	26.2
	Rural	300	66.7
Education status	None	104	23.1
	Primary School	196	43.6
	High School	140	31.1
	University	10	2.2
Occupational status	Employed	59	13.1
	Self employed	115	25.6
	Unemployed	236	52.4
	Retired	40	8.9
No of earning family members	One	233	51.8
	Two	170	37.8
	3 to 4	42	9.3
	5 to 6	5	1.1
Earning members in the family	Patient	84	18.7
	Spouse	68	15.1
	Son/daughter	156	34.7
	Patient & son	112	24.9
	Patient & Spouse	9	2
Owned Car	No	444	98.7
	Yes	6	1.3
Motorcycle/scooter	No	309	68.7
	Yes	141	31.3
Bicycle	No	78	17.3
	Yes	372	82.7
House	No	132	29.3
	Yes	318	70.7
Computer	No	440	97.8
	Yes	10	2.2
Washing machine	No	446	99.1
	Yes	4	0.9
Telephone	No	276	61.3
	Yes	174	38.7
Refrigerator	No	425	94.4
	Yes	25	5.6
Agricultural vehicle	No	425	94.4
	Yes	25	5.6
Land/property	No	340	75.6
	Yes	110	24.4
Tube well	No	207	46
	Yes	243	54
Socio economic status	Upper middle class	95	21.1
	Lower middle class	295	65.6
	Poor	60	13.3

Current alcohol use was 150 (33.3%), while 92 (20.4%) were former user and majority 208 (46.2%) had never consumed alcohol.

3.6. Knowledge about stroke

Majority 371(82.4%) had no idea about suddenness of onset of stroke. Altered speech as a symptom of stroke was not known to

322 (71.6%) cases, while sudden onset of severe headache as probable symptoms was known to only 120 (26.7%) cases. Unawareness about sudden onset of weakness was found in 300 (66.7%) cases, similarly sudden onset of shortness of breathing was not known to 353 (78.4%) cases. Sudden onset of trouble seeing with one or both eye was known to only 32 (7.1%) cases. Only 7 (1.6%) cases know about most of the symptoms of stroke.

3.7. Knowledge about known risk factors of stroke

Diabetes as a risk factor of stroke was known to 34 (7.6%), while obesity as a risk factor was known to 88(19.6%), heart disease as risk factor was known to 113(25.1%). Regarding behavioural risk factor alcohol consumption was considered as risk factor by 78 (17.3%), while smoking is considered as risk factor by 64(14.2%). Tea was considered as risk factor by 91(20.9%), while high cholesterol 94(20.9%), stress 112 (24.9%), high blood pressure 138 (30.7%), pollution 107(23.8%), lack of exercise 85(18.9%). Amongst the studied participants 221 (49.1%) had no idea about factors which increases risk of stroke.

3.8. Dietary history

Dietary history using 24 hour recall method shows 445(98.9%) consumes rice as staple food, while majority takes weekly meat 306(68%), fish 392(87.1%), egg 368(81.8%). Refined pulses was consumed daily by 186 (41.3%) and weekly by 183(40.7%). Dairy consumption was very rare in 203 (67.3%), only 116(25.8%) consumes milk daily and 31 (6.9%) consumes weekly. Extra salt intake and salty snake use was common (daily) in 102 (22.7%), while 158 (35.1%) consumes weekly. Sweet and sugar consumption was done daily in 8 (1.8%) and 68 (15.1%) cases, while weekly in 253 (56.2%) and 213 (47.3%) cases. Fruits and nuts consumption is very rare as 51 (11.3%) and 15 (3.3%) consumes it respectively. Only 148 (32.9%) consumes green leafy vegetables daily, while 274 (60.9%) consumes weekly. Extra salt use is meal was told by 206(45.8%) cases, while 32(7.1%) consumes salted tea.

CT Scan showed 30%(135) cases as ischemic stroke, while intracerebral haemorrhage was found in 69.3% (312) and subarachnoid haemorrhage was found in 0.1% (3) cases.

Determinant of ischemic and haemorrhagic stroke showed significantly different in prevalence of haemorrhagic and ischemic stroke in younger age group ($p=0.001$) and those hailing from lower socio-economic strata ($p=0.001$). There is significant difference of patient stay during symptom onset in haemorrhagic and ischemic stroke ($p=0.048$). Transport to hospital was also significantly different ($p=0.021$) amongst haemorrhagic and ischemic stroke. Diagnosis of stroke done as initially was also significantly higher in ischemic than haemorrhagic stroke ($p=0.064$) (Table 2).

Clinical signs and symptoms of ischemic and haemorrhagic stroke showed significant difference in symptoms like change in consciousness ($p=0.000$), weakness in face/limb ($p=0.022$), dysphagia ($p=0.042$), headache ($p=0.006$), diabetes ($p=0.001$), tobacco consumption ($p=0.000$) and alcohol consumption ($p=0.000$) (Table 3).

Dietary survey using food frequency questionnaire, showed consumption of meat ($p=0.000$), dairy product ($p=0.001$), pickled vegetable ($p=0.012$), sugar ($p=0.016$), nuts ($p=0.008$) and extra salt use with meal ($p=0.048$) was significantly different amongst ischemic and haemorrhagic stroke (Table 4).

Multiple logistic regression analysis showed significant association of haemorrhagic stroke with high salt consumption [AOR 1.715, 95% CI 1.034–2.843, $p=0.037$] and loss of consciousness [AOR 2.946, 95% CI 1.665–5.210, $p=0.000$] (Table 5).

Table 2

Comparison of determinant of ischemic and haemorrhagic stroke.

Variable		Type of stroke		chi-square	p-value
		Ischemic stroke N (%)	Haemorrhagic stroke N (%)		
Gender	Male	94 (33.9)	183 (66.1)	1.959	0.162
	Female	70 (40.5)	103 (59.5)		
Area of residence	Urban	16 (50.0)	16 (50.0)	5.39	0.068
	Semi urban	49 (41.5)	69 (58.5)		
	Rural	99 (33.0)	201 (67.0)		
Age group	<30	0 (0.0)	4 (100.0)	19.796	0.001
	30–39	8 (30.8)	18 (69.2)		
	40–49	34 (32.4)	71 (67.6)		
	50–59	37 (31.4)	81 (68.6)		
	60–69	34 (32.4)	71 (67.6)		
	≥ 70	51 (55.4)	41 (44.6)		
Education status	None	36 (34.6)	68 (65.4)	1.224	0.747
	Primary School	69 (35.2)	127 (64.8)		
	High School	56 (40.0)	84 (60.0)		
	University	3 (30.0)	7 (70.0)		
Occupational status	Employed	19 (32.2)	40 (67.8)	5.121	0.163
	Self employed	40 (34.8)	75 (65.2)		
	Unemployed	84 (35.6)	152 (64.4)		
	Retired	21 (52.5)	19 (47.5)		
Socio economic status	Upper middle class	49 (51.6)	46 (48.4)	13.613	0.001
	Lower middle class	100 (33.9)	195 (66.1)		
	Poor	15 (25.0)	45 (75.0)		
Patient during symptom onset	Alone at home	42 (48.8)	44 (51.2)	7.884	0.048
	At home with surrogate	98 (33.4)	195 (66.6)		
	At workplace	23 (35.4)	42 (64.6)		
	Others	1 (16.7)	5 (83.3)		
Transport to hospital	Ambulance	131 (35.6)	237 (64.4)	9.687	0.021
	Own transport	6 (60.0)	4 (40.0)		
	Privately hired transport	23 (33.8)	45 (66.2)		
	Public transport	4 (100.0)	0 (0.0)		
Was stroke an initial diagnosis	No	13 (54.2)	11 (45.8)	3.438	0.064
	Yes	151 (35.4)	275 (64.6)		
Rankin scale 1 week prior to event (n = 140)	0	40 (29.0)	98 (71.0)	4.734	0.030
	1	2 (100.0)	0 (0.0)		
Rankin scale at admission (n = 140)	3	8 (47.1)	9 (52.9)	2.781	0.249
	4	16 (29.1)	39 (70.9)		
	5	18 (26.5)	50 (73.5)		

4. Discussion

Age of onset of stroke is highest in 40–49 years, which is the most productive period of life. Haemorrhagic stroke is the commonest occurrence in our study. Our population is younger and mostly from lower socio-economic strata. Change in consciousness (77.1%), weakness of face/limb (65.3%), Headache (33.1%), altered speech (30.7%), sensory symptoms (15.3%), Ocular/visual symptoms (7.3%), vertigo/ataxia (3.6%), dysphagia (1.1%) are commonest symptoms during presentation of patients in hospital. Mean blood pressure was higher 168/97 mm of Hg than the cut off value with 36.2% known hypertensive, while 11.6% were known diabetic.

Stroke or Cerebrovascular Accident (CVA) is a frequent cause of death and disability and is a major problem in most part of the world.⁴ After heart disease and carcinoma, stroke is the third leading cause of death in developed countries.⁴ Of patients with

first-ever stroke captured in the Mumbai registry, CT imaging was done in 89.2%, and 80.2% were ischemic strokes and 17.7% hemorrhagic strokes.¹⁰ In the Trivandrum registry, 69.7% of patients underwent imaging. Of those, 83.6% were ischemic strokes, 11.6% intracerebral haemorrhages, and 4.8% subarachnoid haemorrhages, respectively.¹⁶ There were more strokes of undetermined type in patients enrolled from the rural communities because of a lack of neuroimaging information (31.2%).¹¹ In a hospital based retrospective study done in Kolkata, reported approximately equal no of haemorrhagic (399) and ischemic stroke (393) in 792 patients of strokes who underwent CT scan. Hypertension was observed in 77.3% of ICH cases. The striking finding of this study was a remarkably high number of ICH among the admitted patients.¹⁷ In another study done in Bangalore found ischaemic stroke, most frequent (73.8%) like in many other study.¹⁸ The possible cause of very high haemorrhagic stroke (69.3%) in our study population may be a feature of lifestyle rather than genetics

Table 3

Difference in clinical signs and symptoms of ischemic and haemorrhagic stroke.

Variable		Type of stroke		chi-square	p-value
		Ischemic stroke N (%)	Haemorrhagic stroke N (%)		
History of TIA (n = 176)	No	60 (35.9)	107 (64.1)	0.025	0.874
	Yes	3 (33.3)	6 (66.7)		
Change in consciousness	No	96 (49.7)	97 (50.3)	25.794	0.000
	Yes	68 (26.5)	189 (73.5)		
Speech	No	122 (39.1)	190 (60.9)	3.104	0.078
	Yes	42 (30.4)	96 (69.9)		
Weakness in face/limbs	No	68 (43.6)	88 (56.4)	5.263	0.022
	Yes	96 (32.7)	198 (67.3)		
Dysphagia	No	160 (36.0)	285 (64.0)	4.141	0.042
	Yes	4 (80.0)	1 (20.0)		
Ocular/visual symptoms	No	151 (36.2)	266 (63.8)	0.134	0.715
	Yes	13 (39.4)	20 (60.6)		
Headache	No	123 (40.9)	178 (59.1)	7.665	0.006
	Yes	41 (27.5)	108 (72.5)		
Hypertension	No	111 (38.7)	176 (61.3)	1.703	0.192
	Yes	53 (32.5)	110 (67.5)		
Diabetes	No	134 (33.7)	264 (66.3)	11.46	0.001
	Yes	30 (57.7)	22 (42.3)		
Ischemic heart Angina	No	163 (36.5)	284 (63.5)	0.013	0.911
	Yes	1 (33.3)	2 966.7)		
Atrial Fib	No	161 (36.1)	285 (63.9)	2.590	0.108
	Yes	3 (75.1)	1 (25.0)		
Stroke	No	163 (36.4)	285 (63.6)	0.159	0.690
	Yes	1 (50.0)	1 (50.0)		
Tobacco consumption	Never used	52 (39.7)	79 (60.3)	19.855	0.000
	Formerly used	46 (54.8)	38 (45.2)		
	Currently used	66 (28.1)	169 (71.9)		
Alcohol	Never used	82 (39.4)	126 (60.6)	18.124	0.000
	Formerly used	46 (50.0)	46 (50.0)		
	Currently used	36 (24.0)	114 (76.0)		

and possibly linked with economic transition of the general population. Das, S. et al from eastern India also demonstrated high proportion of cerebral haemorrhage in the Eastern Indian community than in Western countries.¹⁹ Our population is nearly similar with the population in West Bengal with near similar food habits showing higher occurrence of haemorrhagic stroke.

Current Tobacco use was common (52.2%) while 33.3% were current alcohol user. There is reports of rapid rise in tobacco and alcohol related disease in people of Assam. Available records indicate a higher prevalence of hypertension among certain groups (example tea garden workers) of population in comparison to other studies.²⁰ Alcohol use is woven into religious rituals and the cultural fabric of tea worker society. This population has a low prevalence of overweight/obesity, and higher physical activity levels as compared to other states of India while they have high prevalence of tobacco consumption mainly smokeless tobacco use in their community.¹⁵

Knowledge about risk factors of stroke was also very poor as only 7.6% knows diabetes as risk factor while 19.6% considers obesity as risk factor. Stress is considered as risk factor by 24.9%, while smoking as risk factor was considered by 14.2%, pollution by

23.8%, lack of exercise by 18.9% and 49.1% had no idea about factors which increases risk of stroke.

Milk or dairy product consumption, fruits and vegetable consumption was very less, while staple food is rice and 45.8% consumes extra salt with meal and 7.1% consumes salted tea. Dietary survey using food frequency questionnaire, showed consumption of meat, dairy product, pickled vegetable, sugar, nuts and extra salt use with meal was significantly different amongst ischemic and haemorrhagic stroke. The overall global target is a 30% reduction by 2025 in global average population salt consumption. This is the only nutrition-specific target and a core component of the Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020, which aims to achieve a 25% reduction in premature mortality from avoidable non-communicable diseases (NCDs) by 2025.²¹ Observational studies, shown that nutritional intake can alter stroke risk factors; but most interventional studies so far failed to achieve meaningful clinical outcomes. We therefore do not have much evidence that dietary or lifestyle interventions in absence of pharmacological therapy can effectively prevent stroke. It may not however be that such interventions will not work, but that dose of intervention was

Table 4

Comparison of dietary pattern amongst persons having ischemic and haemorrhagic stroke.

Variable		Type of stroke		chi-square	p-value
		Ischemic stroke N (%)	Haemorrhagic stroke N (%)		
Meat	<1per month	9 (64.3)	5 (35.7)	19.985	0.000
	Monthly	62 (49.6)	63 (50.4)		
	Weekly	92 (30.1)	214 (69.9)		
	Daily	1 (20.0)	4 (80.0)		
Fish	<1per month	1 (50.0)	1 (50.0)	6.731	0.081
	Monthly	24 (52.2)	22 (47.8)		
	Weekly	134 (34.2)	258 (65.8)		
	Daily	5 (50.0)	5 (50.0)		
Eggs	<1per month	8 (40.0)	12 (60.0)	0.309	0.958
	Monthly	13 (33.3)	26 (66.7)		
	Weekly	135 (36.7)	233 (63.3)		
	Daily	8 (34.8)	15 (65.2)		
Dairy products	<1per month	69 (30.4)	158 (69.6)	17.525	0.001
	Monthly	22 (28.9)	54 (71.1)		
	Weekly	13 (41.9)	18 (58.1)		
	Daily	60 (51.7)	56 (48.3)		
Soy sauce, fish sauce	<1per month	149 (35.8)	267 (64.2)	3.61	0.165
	Monthly	8 (34.8)	15 (65.2)		
	Weekly	7 (63.6)	4 (36.4)		
Salty foods, snacks	<1per month	50 (44.6)	62 (55.4)	6.661	0.084
	Monthly	32 (41.0)	46 (59.0)		
	Weekly	50 (31.6)	108 (68.4)		
	Daily	32 (31.4)	70 (68.6)		
Pickled vegetables	<1per month	45 (29.4)	108 (70.6)	10.938	0.012
	Monthly	39 (33.6)	77 (66.4)		
	Weekly	80 (44.9)	98 (55.1)		
	Daily	0 (0.0)	3 (100.0)		
Sugar	<1per month	14 (45.2)	17 (54.8)	10.278	0.016
	Monthly	38 (27.5)	100 (72.5)		
	Weekly	91 (42.7)	122 (57.3)		
	Daily	21 (30.9)	47 (69.1)		
Legumes	<1per month	1 (100.0)	0 (0.0)	7.856	0.049
	Monthly	22 (31.0)	49 (69.0)		
	Weekly	28 (28.0)	72 (72.0)		
	Daily	113 (40.6)	165 (59.4)		
Nuts	<1per month	86 (34.5)	163 (65.5)	11.918	0.008
	Monthly	69 (45.3)	82 (54.7)		
	Weekly	10 (20.0)	40 (80.0)		
	Daily	0 (0.0)	1 (100.0)		
Extra salt used in meal	No	99 (40.6)	145 (59.4)	3.924	0.048
	Yes	65 (31.6)	141 (68.4)		
Drink salted tea	No	152 (36.4)	266 (63.6)	0.017	0.898
	Yes	12 (37.5)	20 (62.5)		

insufficient, or that knowledge of how to make these interventions achieve a clinically significant impact is still deficient.²²

Determinant of ischemic and haemorrhagic stroke showed significant difference in prevalence of haemorrhagic and ischemic stroke in younger age group and those from lower socio-economic strata. Transport to hospital was also significantly different amongst haemorrhagic and ischemic stroke. Diagnosis of stroke done as initially was also significantly higher in ischemic than haemorrhagic stroke.

Clinical signs and symptoms of ischemic and haemorrhagic stroke showed significant difference in symptoms like change in consciousness, weakness in face/limb, dysphagia, headache,

diabetes, tobacco consumption and alcohol consumption. Other study also show association with high tobacco consumption amongst lower socio-economic class.²³ Indian Government, launched National Program for Prevention& Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) to address high prevalence of non-communicable diseases (NCDs).²⁴ Risk factor control requires, multidisciplinary approach, which includes approaching social determinants of health, health-care financing, improving medical education, and health system strengthening.²⁵

Determination of stroke subtypes by MRI was not done and this may be considered as a limitation of the study. Dietary assessment was done based on food frequency questionnaire,

Table 5

Multiple logistic regression analysis of risk factors with types of stroke.

Variable		N (%)	PR (%)	AOR	95% CI	p-value
Age group	30–39	30 (6.7)	22 (73.3)	Ref.		
	40–49	105 (23.3)	71 (67.6)	0.681	0.251–1.848	0.450
	50–59	118 (26.2)	81 (24.8)	0.744	0.272–2.039	0.565
	60–69	105 (23.3)	71 (67.6)	0.761	0.279–2.073	0.593
	≥ 70	92 (20.4)	41 (44.6)	0.276	0.100–0.767	0.013
Socio economic status	Upper middle class	95 (21.1)	46 (48.4)	Ref.		
	Lower middle class	295 (65.6)	195 (66.1)	1.416	0.761–2.635	0.272
	Poor	60 (13.3)	45 (75.0)	1.141	0.431–3.022	0.791
Patient during symptom onset	Alone at home	86 (19.1)	44 (51.2)	Ref.		
	At home with surrogate	293 (65.1)	195 (66.6)	0.842	0.363–1.951	0.688
	At workplace	65 (14.4)	42 (64.6)	1.366	0.622–3.001	0.473
	Others	6 (1.3)	5 (83.3)	4.742	0.410–54.806	0.213
Change in consciousness	No	193 (42.9)	97 (50.3)	Ref.		
	Yes	257 (57.1)	189 (73.5)	2.946	1.665–5.210	0.000
Weakness in face/limbs	No	156 (34.7)	88 (56.4)	Ref.		
	Yes	294 (65.3)	198 (67.3)	1.179	0.696–1.998	0.540
Dysphagia	No	445 (98.9)	285 (64.0)	Ref.		
	Yes	5 (1.1)	1 (20.0)	0.197	0.016–2.487	0.209
Headache	No	301 (66.9)	178 (59.1)	Ref.		
	Yes	149 (33.1)	108 (72.5)	1.19	0.605–2.341	0.615
Diabetes	No	398 (88.4)	264 (66.3)	Ref.		
	Yes	52 (11.6)	22 (42.3)	0.574	0.287–1.148	0.116
Tobacco history	Never used	131 (29.1)	79 (27.6)	Ref.		
	Formerly used	84 (18.7)	38 (45.2)	0.633	0.261–1.533	0.311
	Currently used	235 (52.2)	169 (71.9)	1.299	0.665–2.537	0.444
Alcohol	Never used	208 (46.2)	126 (60.6)	Ref.		
	Formerly used	92 (20.4)	46 (50.0)	0.904	0.407–2.008	0.805
	Currently used	150 (33.3)	114 (76.0)	1.152	0.599–2.215	0.672
Meat	<1per month	14 (3.1)	5 (35.7)	Ref.		
	Monthly	125 (27.8)	63 (50.4)	0.771	0.186–3.191	0.720
	Weekly	306 (68.0)	214 (69.9)	1.583	0.405–6.187	0.509
	Daily	5 (1.1)	4 (80.0)	2.530	0.171–37.364	0.499
Dairy products	<1per month	227 (50.4)	158 (69.6)	Ref.		
	Monthly	76 (16.9)	54 (71.1)	0.650	0.291–1.449	0.292
	Weekly	31 (6.9)	18 (58.1)	0.860	0.342–2.165	0.749
	Daily	116 (25.8)	56 (48.3)	2.045	0.731–5.717	0.173
Pickled vegetables	<1per month	153 (34.0)	108 (70.6)	Ref.		
	Monthly	116 (25.8)	77 (66.4)	1.243	0.655–2.358	0.506
	Weekly	181 (40.2)	101 (55.8)	0.936	0.479–1.827	0.845
Sugar	<1per month	31 (6.9)	17 (54.8)	Ref.		
	Monthly	138 (30.7)	100 (72.5)	2.447	0.886–6.759	0.084
	Weekly	213 (47.3)	122 (57.3)	1.459	0.572–3.723	0.429
	Daily	68 (15.1)	47 (16.4)	2.158	0.757–6.157	0.150
Extra salt used in meal	No	206 (45.8)	141 (68.4)	Ref.		
	Yes	244 (54.2)	145 (59.4)	1.715	1.034–2.843	0.037

which is a standard procedure but subject to some recall bias. There is a need to do further analytical study like case control study for better evidence generation.

5. Conclusion

Haemorrhagic CVA constitutes a larger percentage of stroke subtypes on this part of the globe effecting poor to lower middle socio-economic class. Proper strategy to prevent and treat hemorrhagic stroke in this part of the world is the need of the hour. Control of risk factors require multidisciplinary approach,

which include approaching social determinants of health, health-care financing, improving medical education, and health system strengthening.

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