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Original Article

Stroke in the Young Adults and Its Risk Factors — A Case-control Study

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Muhammad Salah Uddin[1*], Nayana Nazir[2], Abu Jafar Md. Shahidul Hoq[3], Mohammad Mostafizur Rahman[4]

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*Corresponding Author

ABSTRACTS

Introduction*: Stroke is a complex pathological condition that results in brain impairment across many age groups. In the past, stroke was predominantly considered a condition affecting older individuals but now it has revealed the occurrence of several stroke subtypes among young adults.* ***Objective****: The aim of this study was to determine the prevalence of stroke among the young adults and its risk factors.* ***Method:*** *This case-control study was conducted at the department of Neurology during January, 2021 to December, 2021 in Cox Bazar Medical College Hospital, Chattrogram, Bangladesh.* ***Results:*** *The mean age of the case group (n=58) was 23.31±2.01 years and 77.58% were male, 22.41% were female while in the control group (n=42), the mean age was 23.02±2.27 years and 50% were male and 50% were female. In the case group, .87.93% patients smoked, 93.10% had hypertension, 94.82% had diabetes, 13.79% had vasculitis, 20.68% had SLE, and 27.58% had cardiac arrhythmia while in the control group, 50% patients smoked, 69.04% had hypertension, 54.76% had diabetes, 2.38% had vasculitis, 4.76% had SLE, and 0% had cardiac arrhythmia(p<0.05)%)except vasculitis. The case group had 93.10% grey-white matter distinction and 87.93% CT hypodensity while no alteration was observed in the control group's brain CT images(p=0.000).* ***Conclusion:***

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1. *Associate Professor, Department of Neurology, Chittagong Medical College, Chattogram, Bangladesh*
2. *Dialysis Medical Officer (DMO), Department of Nephrology, Chittagong Medical College, Chattogram, Bangladesh*
3. *Associate Professor, Department of Skin &VD, Mugda Medical College , Mugda, Dhaka, Bangladesh*
4. *Associate Professor and Head of ICU, Department of Anesthesiology and ICU, Shaheed Monsur Ali Medical College Hospital,Uttara, Dhaka, Bangladesh.*

This study investigated that hemiplegia, slurring speech, blurring of vision, and headache are the major clinical presentations of the stroke in the young adults and smoking, hypertension, diabetes, SLE, and cardiac arrhythmia are the significant risk factors of occurring stroke in the young adults.

Key words: *Stroke, young, adults, clinical, presentation, risk factors, CT scan*

INTRODUCTION

A stroke is a focal brain dysfunction that lasts more than 24 hours. TIA symptoms usually fade within 24 hours. Ischemic and hemorrhagic strokes are the main forms of "stroke." Most cerebral infarctions are caused by anterior (carotid) circulation restriction, while a portion are caused by posterior circulation obstruction. Lacunar strokes make up a small percentage of ischemic strokes. Stroke is usually thought of as a condition that primarily affects individuals in the middle-aged and elderly population. The existing body of literature about information systems (IS) in the younger demographic lacks a standardized age threshold for defining the category of "young adults" [1-5]. Stroke risk increases with several factors. Ischemic stroke is more common in older people. However, young adult strokes have increased recently. Hypertension significantly increases stroke risk. Stroke is more likely in people with uncontrolled hypertension and poor treatment adherence. Uncontrolled hypertension can also lead to hemorrhagic stroke. Both uncontrolled and controlled diabetes increase stroke risk. Atrial fibrillation, obesity, and lack of exercise increase stroke risk. Excess salt, saturated fat, inadequate fruits and vegetables, family history, race, ethnicity, lifestyle, and socioeconomic level can increase stroke risk. Prevention and early intervention for risk factors can reduce strokes. By enhancing awareness of stroke risk factors, symptoms, and prevention techniques, stroke prevalence can be reduced. Younger patients have various extra-stroke risk factors. These factors include Systemic lupus erythematosus (SLE), which includes anti-phospholipid syndrome, vasculitis, familial hypercholesterolemia, congenital heart disease, cardiac arrhythmias like atrial fibrillation, and oral contraceptive pills, which can cause stroke. Two types of hemorrhagic stroke are intracerebral hemorrhage and subarachnoid hemorrhage. Intracerebral bleeding is more prevalent than subarachnoid. Subarachnoid bleeding is usually caused by cerebral aneurysm rupture. Intracerebral hemorrhage accounts for around 15% of strokes on a global scale, and it can manifest in various locations within the brain, including the deep regions such as the basal ganglia and brainstem, as well as the cerebellum and lobes[6]. Men, especially those in younger age groups, have a higher incidence of hypertension than women do[7]. According to Ko et al. (2017) research, atrial fibrillation is the most common kind of arrhythmia in people of both sexes all over the world. This condition is characterized by an irregular and frequently very rapid heartbeat[7]. Within a short period, Covid-19 has emerged as a significant contributing factor to the occurrence of stroke. According to a study, hospitalized COVID-19 patients had a comparatively significant risk of stroke when compared

to patients who had sepsis or other viral respiratory infections[8]. High cholesterol and dyslipidemia are important risk factors for several illnesses, such as stroke, peripheral vascular disease, ischemic heart disease, and hypertension [9]. Cardiac arrhythmias and congenital heart diseases have been associated in the development of stroke, with atrial fibrillation being the most common among them. Severe neurologic symptoms and a high recurrence rate sometimes accompany atrial fibrillation-related ischemic strokes[10]. Stroke with hemorrhagic transformation may be the initial symptom that presents itself in the early stages of small vessel vasculitis[11] Hemorrhagic strokes may arise from a range of underlying factors, such as cerebral aneurysms, arteriovenous malformations (AVMs), hypertension, trauma or head injury, and bleeding disorders. Hemorrhagic stroke, though less prevalent in comparison to ischemic stroke, has been associated with a higher mortality rate.

OBJECTIVE

General Objective:

- To determine the prevalence of stroke in the young adults and its risk factor

Specific Objectives:

- To determine the socio-demographic characteristics of the young adults.
- To know the clinical presentation and symptoms of stroke in the young adults..
- To identify the risk factors of the stroke in the young adults.
- To compare the risk factors, clinical presentations and symptoms between the case and the control groups.

METHODS AND MATERIALS

This case-control study was conducted during January, 2021 to December, 2021 in Cox Bazar Medical College Hospital, Chattrogram, Bangladesh.. The purpose and benefits of this study were disclosed to the patients or their legal guardians and written informed consent were obtained from the patients or their legal guardians. Probability sampling technique was used and a total of 100 patients aged (18-260 years admitted at the Department of Neurology with the symptoms of headache, disorientation, epilepsy, hemiplegia, and fever were enrolled in this study. Out of 100 patients, 58 were diagnosed as stroke patients by brain CT scans and considered as the case group, whereas the remaining 42 patients were diagnosed as the non- stroke patients by brain CT scans and considered as the control group. The collected data were analyzed by using Statistical Package for Social Sciences (SPSS) software, version-23.0. Descriptive inferential statistical analysis were performed and the results were presented in the table. To compare the results of the case and control groups unpaired t test and Chi-square tests were also performed where $p<0.05$ considered as the level of significant with 95% CI. The ethical clearance of this study was obtained from the Institutional Review Board (IRB) of Cox's Bazar Medical College, Chattrogram, Bangladesh.

Inclusion criteria:

- Age:<26 years
- Admitted patients with the symptoms of stroke

- Willing to participate in the study

Exclusion criteria:

- Age: >26 years
- OPD patients
- Unwilling or unable to participate in the study

RESULTS

Table 1: Socio-demographic characteristics of the study patients (n=100).

Socio-demographic factors	Case (Stroke) (N=58)	Control (N=42)	P value
Age in years: Mean (SD)	23.31± 2.01	23.02± 2.27	0.096
Sex			
Male	45 (77.58%)	21 (50%)	0.004*
Female	13 (22.41%)	21 (50%)	
Religion			0.581
Muslim	52 (89.65%)	39 (92.85%)	
Hindu	6 (10.34%)	3 (7.14%)	
Marital status			0.266
Married	28 (48.27%)	25 (59.52%)	
Unmarried	30 (51.72%)	17 (40.47%)	
Educational background			0.669
Secondary	5 (8.62%)	6 (14.28%)	
Higher Secondary	18 (31.03%)	12 (28.57%)	
Graduate	35 (60.34%)	24 (57.14%)	
Occupation			0.387
Businessmen	26 (44.82%)	20 (47.61%)	
Service holder	16 (27.58%)	6 (14.28%)	
Housewives	12 (20.68%)	13 (30.95%)	
Others	4 (6.89%)	3 (7.14%)	

Table 1 shows the socio-demographic factors of the study patients. In the case group, the mean age was 23.31 years with a standard deviation of 2.01. The majority of the patients 45 (77.58%) were male, and13 (22.41%)were female. 52 (89.65%) were Muslim, and 6 (10.34%) were Hindu. 25(59.52%) were married and 30(51.72%) were unmarried (51.72%). 5 (8.62%) of the patients had secondary education, 18(31.03%) had higher secondary education, and 35(60.34%) were graduate. 26(44.82%) were businessmen 16(27.58%) were service holders 12(20.68%) were housewives 4 (6.89%%) did other jobs while in the control group, the mean age was 23.02 years, with a standard deviation of 2.27. 21 (50%) of them were male, and 2 (50%) ere female 39 (92.85%) were Muslim, and 3(7.14%) were Hindu. 28(48.27%) were married and

17(40.47%)were unmarried, 6(14.28%) of the patients had secondary education, 12(28.57%) had higher secondary education, and 24 (57.14%) were graduates. 20 (47.61%) were businessmen, 6 (14.28%) were service holders, 13 (30.95%) were housewives and 3 (7.14 %) did other jobs. According to the Table 1 result, sex among the case and control are significant variables(p,0.05) among but there is no statistically significant difference in age between the two groups, marital status, education, and occupation(p>0.05) .

Table 2: Clinical presentations of the study patients (n=100).

Presenting features	Case (Stroke) (N=58)	Control (N=42)	P value
Hemiplegia	46 (79.31%)	0 (0)	0.000
Slurring of speech	47 (81.03%)	30 (71.42%)	
Blurring of vision	55 (94.82%)	3 (7.14%)	
Convulsion	46 (79.31%)	13 (30.95%)	

Table 2 shows the clinical presentation of the study patients. In the case group. 46 (79.31%) patients had hemiplegia, 47 (81.03%) had slurring of speech, 55 (94.82%) had blurring of vision, 46(79.31%) had a convulsion while in the control group 0 (0%) had hemiplegia, 30 (71.42%) had slurring of speech, 3(7.14%) had blurring of vision, 13(30.95%) had convulsion. Clinical feature showed significant difference between the groups (P=0.000).

Table 3: Clinical characteristics of the study patients (n=100).

Examination	Case (Stroke) (N=58)	Control (N=42)	P value
Systolic BP	139.91±12.01	130±13.92	0.084
Diastolic BP	94.48± 6.73	87.38± 9.38	0.268
Pulse	86.63± 10.27	83.38± 9.14	0.685
Brisk or exacerbated jerks	54 (93.10%)	0(0)	0.000
Extensor plantar response	57 (98.27%)	0(0)	0.000

Table 3 shows the clinical findings of the study patients. In the case group systolic BP was 139.91 mm of Hg with a standard deviation of 12.01. Diastolic BP was 94.48mm of Hg with a standard deviation of 6.73. mean pulse was 86.63 per minute with a standard deviation of 10.27,54 patients (93.10%) showed brisk jerk on examination, and 57 patients (98.27%) showed extensor plantar response while in the control group, systolic BP was 130 mm of Hg with a standard deviation of 13.92. diastolic BP was 87.38 mm of Hg with a standard deviation of 9.38. mean pulse rate was 83.38 per minute with a standard deviation of 9.14, 0 patients (0%) showed brisk jerk on examination, and 0 patients (0%) showed extensor plantar response. Brisk or exacerbated jerks, extensor

plantar response were significant (p=0.000).

Table 4: shows the risk the risk factors of stroke in the young adults (n=100).

Risk factors	Case (Stroke) (N=58)	Control (N=42)	P value
Smoker	51 (87.93%)	21 (50%)	0.000*
Hypertension	54 (93.10%)	29 (69.04%)	0.002*
DM	55 (94.82%)	23 (54.76%)	0.000*
Vasculitis	8 (13.79%)	1 (2.38%)	0.075
SLE	12 (20.68%)	2 (4.76%)	0.038
Cardiac arrhythmia	16 (27.58%)	0 (0)	0.000*

Table 4 shows the major risk factors of stroke in the young adults. In the case groups 51 (87.93%) were smokers, 54 (93.10%) had hypertension, 55(94.82%) had diabetes mellitus, 8(13.79%) had vasculitis, 12(20.68%) had SLE. 16(27.58%) had cardiac arrhythmia while in the control groups, 20(50%) were smokers, 29(69.04%) had hypertension, 23(54.76%) had diabetes mellitus, 1(2.38%) had vasculitis, 2(4.76%) had SLE and no patient had a history of cardiac arrhythmia. Smoker, hypertension, diabetes and cardiac arrhuthmia found significantly associated with the outcome variables ($p<0.05$) except, vasculitis.

Table 5: shows the CT scan findings of brain of the study patients (n=100).

CT scan of brain findings	Case (Stroke) (N=58)	Control (N=42)	P value
Hypodensity	51 (87.93%)	0 (0)	0.000
Grey-white matter differentiation	54 (93.10%)	0 (0)	
No change	55 (94.82%)	42 (100%)	

Table 5 shows the CT scan findings of brain of the study patients. In the case group51 (87.93%) patients had Hypodensity in CT, and 54(93.10%) had grey-white matter differentiation. In control groups, no patients showed a change in their CT scan of the brain. The CT scan result among the case and control group was significant (p=0.000).

DISCUSSION

Our study presents data on socio-demographic factors for both the case and control groups. The mean age of the case group was 23.31 years with a standard deviation of 2.01. 77.58% of them were male, and 22.41% were female. 89.65% were Muslim, and 10.34% were Hindu. 59.52% were married, and 51.72% were unmarried. In terms of education, 8.62% had secondary education, 31.03% had higher secondary education, and 60.34% were graduates. Concerning occupation,

44.82% were businessmen, 27.58% were service holders, 20.68% were housewives, and 6.89% did other jobs. In our study we found that age is significantly associated among socio demographic factors. Similar to our study we found in another study that the incidence was greater in women than in males and rose exponentially with age, especially in the younger patients (18–44 years old)[12]. For the control group, the mean age was 23.02 years, with a standard deviation of 2.27. 50% of them were male, and 50% were female. 92.85% were Muslim, and 7.14% were Hindu. 48.27% were married, and 40.47% were unmarried. In terms of education, 14.28% had secondary education, 28.57% had higher secondary education, and 57.14% were graduates. In terms of occupation, 47.61% were businessmen, 14.28% were service holders, 30.95% were housewives, and 7.14% did other jobs. We also present the major clinical features observed in the case group, where 79.31% had hemiplegia, 81.03% had slurring of speech, 94.82% had blurring of vision, and 79.31% had a convulsion. In contrast, in the control group, 0% had hemiplegia, 71.42% had slurring of speech, 7.14% had blurring of vision, and 30.95% had convulsions and found significantly significant. In another study we see the predominant clinical manifestation reported by the patients was headache, with a prevalence of 75.0%. This was followed by aphasia, reported by 60.3% of the patients, and hemiparesis, reported by 53.4% of the patients[13].

Furthermore, we found significant differences in clinical examination findings between the two groups. In the case group, the systolic BP was 139.91 mm of Hg with a standard deviation of 12.01, and the diastolic BP was 94.48 mm of Hg with a standard deviation of 6.73. The mean pulse was 86.63 per minute with a standard deviation of 10.27. Additionally, 93.10% of patients showed brisk jerk on examination, and 98.27% showed extensor plantar response. In the control group, the systolic BP was 130 mm of Hg with a standard deviation of 13.92, and the diastolic BP was 87.38 mm of Hg with a standard deviation of 9.38. The mean pulse was 83.38 per minute with a standard deviation of 9.14. No patients in the control group exhibited brisk jerk or extensor plantar response. Only the Brisk or exacerbated jerks and extensor plantar response found to be significant with p value of less than 5%.

Our study also highlights the major risk factors observed in the case group, where 87.93% were smokers, 93.10% had hypertension, 94.82% had diabetes mellitus, 13.79% had vasculitis, 20.68% had SLE, and 27.58% had cardiac arrhythmia. Among the all the variables smoking, diabetes, hypertension and cardiac arrhythmia found significantly associated with outcome. In contrast, the control group had significantly fewer risk factors, where 50% were smokers, 69.04% had hypertension, 54.76% had diabetes mellitus, 2.38% had vasculitis,, 4.76% had SLE, and none had a history of cardiac arrhythmia. A study conducted in India has demonstrated that hypertension and diabetes are significant risk factors for stroke[14]. Finally, we conducted CT scans of the brain for both groups. In the case group, 87.93% had Hypodensity in CT, and 93.10% had grey-white matter differentiation. In contrast, the control group showed no changes in their CT scans of the brain.

CONCLUSION

This study investigated that hemiplegia, slurring speech, blurring of vision, and headache are the major clinical presentations of the stroke in the young adults and smoking, hypertension, diabetes, SLE, and cardiac arrhythmia are the significant risk factors of occurring stroke in the young adults.

LIMITATIONS OF THE STUDY

This study was a single cater study with a sample size of probability over a short period of study. Therefore, the results of this study may not reflect the whole scenario of the whole country.

RECOMMENDATIONDS

A multi- center study is recommended with a large sample size and long study period of time and sample to justify the results of this study.

FUNDING: Self-funding

CONFLICT OF INTEREST:

None declared

REFERENCES

1. *Boot E, Ekker MS, Putaala J, Kittner S, De Leeuw FE, Tuladhar AM. Ischaemic stroke in young adults: a global perspective. Journal of Neurology, Neurosurgery & Psychiatry. 2020 Apr 1;91(4):411-7.*
2. *Ekker MS, Boot EM, Singhal AB, Tan KS, Debette S, Tuladhar AM, de Leeuw FE. Epidemiology, aetiology, and management of ischaemic stroke in young adults. The Lancet Neurology. 2018 Sep 1;17(9):790-801.*
3. *Ekker MS, Jacob MA, van Dongen MM, Aarnio K, Annamalai AK, Arauz A, Arnold M, Barboza MA, Bolognese M, Brouns R, Chuluun B. Global Outcome Assessment Life-long after stroke in young adults initiative—the GOAL initiative: study protocol and rationale of a multicentre retrospective individual patient data meta-analysis. BMJ open. 2019 Nov 1;9(11):e031144.*
4. *Putaala J. Ischemic stroke in the young: current perspectives on incidence, risk factors, and cardiovascular prognosis. European Stroke Journal. 2016 Mar;1(1):28-40.*
5. *Yahya T, Jilani MH, Khan SU, Mszar R, Hassan SZ, Blaha MJ, Blankstein R, Virani SS, Johansen MC, Vahidy F, Cainzos-Achirica M. Stroke in young adults: Current trends, opportunities for prevention and pathways forward. American journal of preventive cardiology. 2020 Sep 1;3:100085.*
6. *Murphy SJ, Werring DJ. Stroke: causes and clinical features. Medicine. 2020 Sep 1;48(9):561-6.*
7. *Branyan TE, Sohrabji F. Sex differences in stroke co-morbidities. Experimental neurology. 2020 Oct 1;332:113384.*
8. *Fridman S, Bullrich MB, Jimenez-Ruiz A, Costantini P, Shah P, Just C, Vela-Duarte D, Linfante I, Sharifi-Razavi A, Karimi N, Bagur R. Stroke risk, phenotypes, and death in COVID-19: systematic review and newly reported cases. Neurology. 2020 Dec 15;95(24):e3373-85.*
9. *Horibe H. Cholesterol, coronary heart disease, and stroke in the Asia Pacific region. IntJ Epidemiol. 2003;32(4):563-72.*
10. *Katsanos AH, Kamel H, Healey JS, Hart RG. Stroke prevention in atrial fibrillation: looking forward. Circulation. 2020 Dec 15;142(24):2371-88.*
11. *Uppal S, Goel S, Randhawa B, Maheshwary A. Autoimmune-Associated Vasculitis Presenting as Ischemic Stroke With Hemorrhagic Transformation: A Case Report and Literature Review. Cureus. 2020 Sep 12;12(9).*
12. *Ekker MS, Verhoeven JI, Vaartjes I, van Nieuwenhuizen KM, Klijn CJ, de Leeuw FE. Stroke incidence in young adults according to age, subtype, sex, and time trends. Neurology. 2019 May 21;92(21):e2444-54.*

13. *Fekadu G, Chelkeba L, Kebede A. Risk factors, clinical presentations and predictors of stroke among adult patients admitted to stroke unit of Jimma university medical center, south west Ethiopia: prospective observational study. BMC neurology. 2019 Dec;19(1):1-1.*

14. *Ram CV, Kumar S, Renjen PN, Kumar GP, Swaminathan J, Reddy CR, Kondati S, Sharma M, Selvan VA, Sundaram M, Vasudevan A. Risk factors predisposing to acute stroke in India: a prospective study. Journal of hypertension. 2021 Nov 1;39(11):2183-9.*