

Original Research Article

Association of modifiable risk factors among stroke patients attending a tertiary care hospital at Durg district of Chhattisgarh: a case-control study

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ABSTRACT

Background: Non-communicable diseases (NCDs) are medical conditions or illnesses that are not caused by infectious agents. Modifiable behavioural risk factors, such as tobacco use, physical inactivity, unhealthy diet, stress and the harmful use of alcohol and metabolic risk factors, such as hypertension, diabetes, dyslipidemia, obesity, increase the risk of stroke. Strokes in Asian patients account for more than two-thirds of the overall stroke incidence worldwide.

Methods: The Hospital based case-control study was carried out on 88 hospitalized patients with history of first time stroke and Controls were selected from hospital with no history of stroke. For each case gender, age (+5 years) matched control was selected in 1:1 ratio. A predesigned pretested questionnaire was used to collect data. Data were compared between case and control groups using chi-squared test, Students t-tests as appropriate and Uni-variate odds ratio (ORs) for these risks factors were calculated.

Results: We recruited 88 cases of stroke and 88 controls for this study. In the current study Hypertension was found to be significantly associated with stroke. The stroke cases had significantly higher proportion of diabetes mellitus and the risk of developing stroke with diabetes mellitus was high and significant. Similarly, stroke was associated with alcohol, family history of stroke and obesity. Risk of developing stroke was not associated with cardiac disease.

Conclusions: Hypertension, alcohol, obesity are the biggest risk factors for stroke. This could be helpful in early identification of subjects at risk of stroke and formulation of public health strategy. Additional studies of large patient cohorts will be essential to validate these findings.

Keywords: Case-control study, Modifiable, Non-communicable diseases, Risk factors, Stroke

INTRODUCTION

Non-communicable diseases (NCDs) are medical conditions or illnesses that are not caused by infectious agents. These are chronic diseases of long duration, and generally slow progression and are the result of a combination of genetic, physiological, environmental and behavioural factors.¹ The main types of NCD are cardiovascular diseases (CVD) such as heart attacks and

cerebrovascular disease such as stroke, cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes.²

The term cerebrovascular disease includes all disorders in which an area of the brain is temporarily or permanently affected by ischemia or bleeding and one or more cerebral blood vessels are involved in the disease process. Cerebrovascular disease includes stroke, carotid stenosis,

vertebral stenosis and intracranial stenosis, aneurysms, and vascular malformations.³

Modifiable behavioural risk factors, such as tobacco use, physical inactivity, unhealthy diet, stress and the harmful use of alcohol and metabolic risk factors, such as raised blood pressure (hypertension), raised blood sugar (diabetes), raised and abnormal blood lipids (Dyslipidaemia), overweight/obesity, increase the risk of stroke. The immediate consequences of stroke during its acute phase are well recognized. But for many stroke survivors and their families, stroke is the beginning of their ongoing struggle with physical impairment and subsequent disability. Over time, the immediate clinical consequences of stroke are complicated by a variety of lesser-known medical, musculoskeletal, and psychosocial challenges.⁴

Stroke is the leading cause of disability worldwide and the second leading cause of death. The Global Stroke Fact-sheet released in 2022 reveals that lifetime risk of developing a stroke has increased by 50% over the last 17 years and now 1 in 4 people is estimated to have a stroke in their lifetime. From 1990 to 2019, there has been a 70% increase in stroke incidence, 43% increase in deaths due to stroke, 102% increase in stroke prevalence and 143% increase in Disability Adjusted Life Years (DALY).

The most striking feature is that the bulk of the global stroke burden (86% of deaths due to stroke and 89% of DALYs) occur in lower and lower-middle-income countries.⁵ Asia is the largest and mostly populated continent of the world. Strokes in Asian patients account for more than two-thirds of the overall stroke incidence worldwide. In Southeast Asian region, 41 million people die each year from non-communicable diseases, representing 74% of all deaths worldwide. In the South-East Asia region, NCDs cause approximately 9 million deaths per year, almost half of which are premature, during the first productive years.⁶

METHODS

The hospital based case-control study was carried out at a private Medical College & Hospital of Chhattisgarh, India. The study period was from January 2022 to December 2022. The study consisted of 88 hospitalized patients with history of first time stroke confirmed by radio-logical investigations with Sustained deficit at ≥ 24 hours verified by a Physician and conformed by Non contrast CT scan or MRI (age: >30 years).

Controls

Controls were selected from hospital with no history of stroke. For each case gender, age (± 5 years) matched control was selected in 1:1 ratio. Simple random sampling

method was used. Hypertension is a known major risk factor for stroke; therefore we calculated sample size for given study on the basis of a major risk factor (Hypertension).

The calculated sample size was 80. We selected total 88 cases and recruitment was conducted at a 1:1 case to control ratio.

Study tool/statistical analysis

All study subjects were informed in detailed about the research. Consent was taken from responding patient or valid surrogate respondent in case of inability of the patients to respond. A predesigned pretested questionnaire was used to collect data under following sections: Section A: Patient profile; Section B: Risk factors; Section C: General physical examinations.

Data analysis was done by using the statistical software (version 24.0). Data were compared between case and control groups using chi-squared test, Students t-tests as appropriate and Uni-variate odds ratio (ORs) for these risks factors were calculated. Results were presented in the form of tables.

RESULTS

Hypertension

In the current study among cases of stroke 62.5%, among controls 32.9%, had hypertension and the difference was found statistically significant ($P < 0.05$). Hypertension was found to be significantly associated with stroke ($OR = 3.39$, 95% C.I. 1.83-6.3).

Diabetes mellitus

The stroke cases had significantly higher proportion of diabetes mellitus (52.2%) than controls (29.5%) ($P = 0.002$). The risk of developing stroke with diabetes mellitus was high and significant ($OR = 2.61$, 95% C.I. 1.41-4.86).

Smoking

31.8% out of 88 stroke patients were smokers compared to 17% of controls. This difference was statistically significant ($P = 0.029$). Risk of developing stroke with smoking habit ($OR = 2.27$, 95% C.I. 1.18-4.51).

Alcohol

In the present study, 52.5% among stroke patients and 22.7% among controls had history of alcohol intake. The risk of stroke was associated with alcohol ($OR = 3.72$, 95% C.I. 2.31-5.69). The difference was statistically significant ($p < 0.05$).

Table 1: Uni-variate analysis of risk factors of stroke.

Risk factors	Cases	Controls	OR	95% C.I.	P value
Hypertension					
Present	55	29	3.39	1.83-6.3	0
Absent	33	59			
Diabetes mellitus					
Present	46	26	2.61	1.41-4.86	0.002
Absent	42	62			
Smoking					
Present	28	15	2.27	1.18-4.51	0.029
Absent	60	73			
Alcohol intake					
Present	46	20	3.72	2.31-5.69	0
Absent	42	68			
Family history					
Present	16	6	3.04	1.13-8.18	0.028
Absent	72	82			
Obesity					
Present	66	42	3.28	2.05-5.425	0
Absent	22	46			
Cardiac disease					
Present	14	9	1.66	0.68-4.07	0.267
Absent	74	79			

Family history

18.1% among stroke patients had family history of stroke compared to 6.8% among controls. It was found to be statistically significant difference among cases and controls ($P=0.028$). Risk of developing stroke is associated with family history of stroke ($OR=3.04$, 95% C.I. 1.13-8.18).

Obesity

Among cases 75% and among controls 47.7% were obese. And is statistically associated with stroke ($P<0.05$). The obesity tripled the risk of developing stroke ($OR=3.286$, 95% C.I. 2.05-5.425).

Cardiac disease

15.9% among stroke patients and 10.2% among controls had history of cardiac disease. In the study risk of developing stroke was not associated with cardiac disease ($OR=1.66$, 95% C.I. 0.68-4.07). The difference was not statistically significant ($P=0.267$) (Table 1).

DISCUSSION**Risk factors and stroke**

One of the important risk factors for both types of stroke is hypertension. In this study, we found that 55 (62.5%)

of cases and 29(32.9%) of controls had hypertension. Several studies confirm this relationship. Similar results were found by Saha et al observed hypertension as the most common risk factor for stroke. They found out of 50 cases, 39 cases (78%) were found hypertensive.⁷ Also in a meta-analysis conducted by HE et al reported hypertension as an important risk factor for stroke.⁸ A review article conducted by Wajngarten M et al observed hypertension as the single most important modifiable risk factor of stroke.⁹

In this study it was observed that 46 (52.2%) of cases and 26 (29.5%) of controls had diabetes. A study done by Sacco et al (1989), observed that, diabetic patients had higher mortality as well as high rate of recurrence compared to non- diabetic patients.¹⁰ Similar study done by Furie et al (2008), reported that, diabetes was the first ischemic stroke risk factor in their study.¹¹ The use of tobacco (smoking/chew able) is one of the main risk factors for stroke. Smoking causes dyslipidemia and more likely to clot which leads to an increased risk of stroke. In this study, we found 31.8% of cases and 17% of controls had either current or past history of tobacco use.

A study conducted by Sorganvi V. et al showed that the risk of stroke is directly proportional to the number of cigarettes smoked.¹² According to a Meta-analysis, linear elevation in stroke incidence was observed when cigarette consumption increased, and the risk of stroke increased by 12% for each increase of 5 cigarettes per day. From

the analysis, we also observed that second-hand smoking can increase the overall risk of stroke by 45%.¹³

Alcohol has been linked to stroke in many studies.¹⁴ In this study, found that 46 (52.2%) of cases and 20 (22.7%) of controls provided a history of alcohol intake either in the past or present. Our study correlates with a study done by Naik et al who observed a history of alcohol intake in 30.5% of patients with stroke. Chronic heavy drinking and acute intoxication of alcohol were associated with an increased risk among young adults.¹⁵ Sundell et al observed that drinking alcohol is associated with the risk of developing stroke.¹⁶ History of stroke in first-degree relatives is an important risk factor for strokes, such as an inherited predisposition for diabetes or hypertension.¹⁷ In this study, we found 16 (18.1%) stroke subjects had a family history of stroke compared to 6 (6.8%) of controls. similar findings were found in a study done by Sorganvi V et al reported that 31% of cases had a family history of stroke compared to 16% among the controls.¹²

In this study it was observed that majority of patients with stroke had waist circumference more than normal. Abdominal adiposity is an also important risk factor of stroke. A similar finding was observed by Furukawa Y et al Waist Circumference may be a better predictor for CVD or stroke in Japanese women.¹⁸

In this study, we observed that 14 (15.9%) of cases had a history of cardiac diseases and 9 (10.2%) of controls had a history of cardiac disease. A study done in Pakistan showed a history of myocardial ischemia in 11.8% of persons with stroke and 5.6% among controls.¹⁹ Similarly, a study done among Indian Americans showed 35.5% of cardiovascular diseases and 9.7% of atrial fibrillation among persons with stroke.²⁰

CONCLUSION

A hospital based case-control study was undertaken with the objective of assessing factors associated with stroke among the patients attending a tertiary care hospital from January 2022 to December 2022. This study quantifies the contribution of different factors to overall risk of development of stroke. It was found that, hypertension, alcohol, obesity are the biggest risk factors for stroke and are important modifiable risk factors like many other factors. This could be helpful in early identification of subjects at risk of stroke and formulation public health strategy. These modifiable risk factors can be treated by appropriate medication and life style modification strategies. Weight reduction, reducing alcohol intake, cessation of smoking and exercise these simple methods and life style alterations have a greater potential for stroke prevention.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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