Section: Neurosurgery

Research

A PROSPECTIVE STUDY TO DETERMINE THE RELATIONSHIP BETWEEN DYSLIPIDEMIA AND HYPERGLYCEMIA IN STROKE PATIENTS

Satyendra Kumar[1]

[1]Assistant Professor, Department of Neurosurgery, Anugrah Narayan MagadhMedical College and Hospital, Gaya, India

Received : 12/10/2022
Received in revised form : 05/11/2022
Accepted : 17/11/2022

Keywords:
Stroke, Genetics, Family History, Risk Factor.

Corresponding Author:
Dr. Satyendra Kumar
Email:drskumar99@gmail.com
ORCID: 0000-0002-7407-8244

DOI: 10.47009/jamp.2022.5.1.135

Source of Support: Nil,
Conflict of Interest: Nonedeclared

Int J Acad Med Pharm
2023; 5 (1); 645-647

Abstract

Background: Stroke is the major cause of disability and second most common cause of death of adults worldwide.The association between lipid profile and stroke is reported to vary with stroke subtype. **Aim:** To determine the association between dyslipidemia and hyperglycemia in stroke patients. **Materials and Methods:** This was a prospective study. 200 stroke patients were evaluated in this study. Fasting venous blood samples were collected from the study subjects to evaluate cholesterol, TAG, LDL, HDL, FBG, and HbA1c. **Result:** 200 patients were evaluated in this study. The mean age of the patients was 66.9 years with majority of them were above 50 years, and were males. The co-morbidities incidence rate were high. A majority of subjects had positive family history. The lipid profile were deranged and glucose level were also high. **Conclusion:** The relationship between genetic, family history and environmental factors, viz- smoking, hypertension and diabetes, with stroke is established. Awareness and prevention centers for stroke may significantly reduce incidence of stroke.

INTRODUCTION

Stroke is classically characterized as a neurological deficit. Stroke is the major cause of disability and second most common cause of death of adults worldwide.[1] The prevalence of stroke in India, is estimated to be 203 per 100,000. The incidence of stroke in India, is 105 to 152/100,000 persons per year.[2] Of these, majority of the cases are of ischemic stroke followed by primary intracerebral hemorrhage (ICH) and least cases are of subarachnoid hemorrhage (SAH).[3]

The established risk factors for ischemic heart disease includes, lipid and lipoprotein biomarkers, eg,- total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG).[1,2,4] The role of lipid and lipoprotein biomarkers as a causative factor for ischemic stroke is not ascertained completely.[4]

The association amid lipid profile and stroke reported to be varying with stroke subtype. In contrast, at low cholesterol levels the risk of ICH increases many folds. This risk again is dependent on specific lipid component, with a strong positive correlation for TC and LDL-C.[5]

The major risk factors for CVD encompass hypertension, diabetes, as well as dyslipidemia. Many middle-aged people reportedly more than one chronic diseases.[6-8] Aging, obesity, and smoking are amongst the other risk factors. It is established that, clustering of two or more risk factors increases the risk of CVDs.[9-10]

The incidence and degree of hyperglycemia is directly associated with severe acute stroke as well as associated mortality.[11] Dyslipidemia and diabetes are the two common lifestyle diseases and are considered causative factor for many diseases. In contrast, stroke is condition directly causing mortality and morbidity. Therefore, this study was conducted to determine the association between dyslipidemia and hyperglycemia in stroke patients.

MATERIALS AND METHODS

This prospective, observational, unicentric study was conducted at Department of Neurosurgery, at Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India. The study was conducted over a period of 2 years from June 2020 to May 2022. The study was approved by the institutional research and ethical committee. An informed and written consent was obtained from the participating subjects before the commencement of the study.

A total of 200 stroke patients with a confirmed CT scan admitted to our hospital and willing to participate, were evaluated towards the success of this study. Patients without a confirmed CT scan, suspected transient ischemic attack, refused to give blood sample and not willing to participate were excluded.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

The demographic characteristics, detailed history including habits were recorded in a pre-structured form.

Procedure:

Fasting venous blood samples were collected from the study subjects to evaluate cholesterol, TAG, LDL, HDL, FBG, and HbA1c. Patients who were normoglycemic at the time of presentation, but with a history of diabetes, taking insulin or oral hypoglycemic were also considered as diabetics. The data was tabulated in Microsoft excel spread sheet, and the data was subjected to statistical analysis using SPSS Software, Version 20.0.

RESULTS

200 patients were evaluated in this study. The mean age of the patients was 66.9 years with majority of them in the age 50 years and above, and majority were males. The demographic distribution is shown in [Table1].

Table 1: Demographic characteristics of subjects. (n =200)

Gender	
Male	134
Female	66
Age in years	
Below 50	46
Above 50	154

The co-morbidities incidence rate is shown in Table 2. While evaluating the co-morbidity it was found that, 156 subjects had hypertension, 108 subjects had diabetes mellitus, and 22 subjects had transient ischemic attack. 98 subjects were smokers, the majority of smokers were males, and 22 subjects were obese with a BMI above 30 kg/m2 with a mean of 33.3 kg/m2.

Table 2: Demographic characteristics of subjects. (n =200)

Co-morbidities	**Number ofcases**
HTN (Hypertension)	156
DM (diabetes mellitus)	108
TIA (transient ischemic attack	22
Smoker	98
BMI > 30 (body mass index)	22

Table 3 shows the family history of the participating subjects. The family history of hypertension, stroke and diabetes mellitus were evaluated. 158 subjects had a family history of hypertension, 104 subjects had a family history of stroke and 122 subjects had a family history of diabetes mellitus.

Table 3: Distribution of family history

Familial history	**Number of cases**
HTN	158
Stroke	104
DM	122

The venous blood sample were evaluated for various parameters of lipid profile and hyperglycaemia. (Table 4). It was observed that, 58 subjects had LDL greater than 130 mg/ dl, cholesterol was found to be equal or greater than 200 mg/dl in 38 subjects, equal or greater than 200 mg/dl was found in 34 subjects, low HDL level was observed in 122 subjects. The glycemic parameter showed HbA1c levels equal or greater than 6.5% was seen in 104 subjects and FBG equal or greater than 126 mg/dl was observed in 108 subjects.

Table 4: Lipid profile and fasting blood glucose and Glycosylated Hemoglobin levels in stroke patients

Test	**Number of cases**
LDL≥ 130 mg/dl	58
Cholesterol≥ 200 mg/dl	38
Triglyceride≥ 200 mg/dl	34
Low levels of HDL	122
HbA1c ≥ 6.5%	104
FBG ≥ 126 mg/dl	108

Table 5: Mean and standard deviation of age, BMI, lipids, glycosylated hemoglobin and fasting blood sugar

Parameter	**Mean (± SD)**
Age(years)	66.9 (±9.5)
Obesity(BMI) (kg/m2)	33.3 (±3.7)
Cholesterol (mg/dl)	163.7 (±39.4)
LDL (mg/dl)	116.4(±29.8)
HDL(mg/dl)	42.7 (±19.2)
Triglyceride (mg/dl)	135.1 (±61.4)
HbA1c (%)	7.2 (±1.5)
FBG (mg/dl)	157 (±71.4)

ISSN (O): 2687-5365; ISSN (P): 2753-6556

The mean and standard deviation of the variables studied are shown in Table 5. The mean age of the patients was 66.9 years; the main BMI was 33.3 kg/m2. The mean level of cholesterol, LDL, HDL and TAG were 163.7, 116.4, 42.7, and 135.1mg/dl respectively. The mean of the HbA1c was 7.2%, while the mean of FBG was 157mg/dl.

DISCUSSION

Classically stroke is described as a neurological deficit, credited to acute focal injury of vascular origin in central nervous system. This includes intracerebral hemorrhage, cerebral infarction, and subarachnoid hemorrhage. Globally stroke is a key reason for disability and death.[12] The clinical presentation of stroke varies widely, and it ranges from restrained to severe. This clinical appearance varies with the type of the attack and the area of brain involved.[13]

The association between dyslipidemia and the pathogenesis of stroke is in vague. Previous study results correlating dyslipidemia with stroke remained inconclusive.[14]

The present study, evaluated the impact of dyslipidemia, hyperglycemia and other associated aggravating risk factors for stroke. There found to be a male predominance for stroke. This finding was in consonance with the previous studies.[15-16] This higher predominance of male for stroke may be due to high prevalence of smoking and also a comparatively more likely towards the more fatty food in our population.

Another explanation for this could be protective effect of estrogen against stroke in females. Previous studies have also explained a possible genetic linking and a positive family history of males compared to females.[17] The mean age of our study sample was also similar to the previous study reports of Indian population, and to Palestine population as well.[16,18]

The majority of our study subjects were in the 7th decade of life, this again was in consonance with the studies on Palestinian population where it was early 6th decade.[18]

Our study results also indicate the incidence of stroke being higher in age group 50 years or old. In the current study, the mean BMI of stroke patients were 33.3 kg/m2. This is significantly higher than the previous study on Japanese population.[19] Obesity and increased BMI is established to be a risk factor for coronary artery disease. Its effect as a risk factor for stroke remained inconclusive.

Genetic linkage and familial history has long been considered as a strong risk factor for diabetes mellitus, carcinoma and stroke. The current study, found a positive history for DM, HTN and stroke was related to increased incidence of stroke. In our study, amongst the family history, HTN, DM and stroke remained the major cause of cerebrovascular accidents in decreasing order respectively, in majority of subjects. This suggests that a positive family may be considered as a high risk factor and a relatively good predictor of stroke risk.[20]

CONCLUSION

The relationship between genetic, family history and environmental factors viz- smoking, hypertension and diabetes, with stroke is established. Awareness and prevention centres for stroke may significantly reduce incidence of stroke.

REFERENCES

1. Kim AS, Cahill E, Cheng NT. Global stroke belt: geographic variation in stroke burden worldwide. Stroke 2015; 46:3564–70.
2. Kamalakannan S, Gudlavalleti ASV, Gulavalleti VSM, Goenka S, Kuper H. Incidence & prevalence of stroke inIndia: A systematic review. Ind J Med Res. 2017;146(2):175-185.
3. Smith NM, Pathansali R, Bath PMW. Vascular Medicine. 1999;25(2):50-5
4. Pikula A, Beiser AS, Wang J, Himali JJ, Kelly- Hayes M, Kase CS, et al. Lipid and lipoprotein measurements and the risk of ischemic vascular events: Framingham Study. Neurol. 2015;84(5): 472–9.
5. Yaghi S, Elkind MSV. Lipids and Cerebrovascular Disease: Research and Practice. Strok. 2015;46(11): 3322–8.
6. Liu LS. 2018 Chinese guidelines for the management of hypertension. Beijing: People's Medical Publishing House (China), 2018.
7. Zhang DD, Tang X, Jin DY, et al. Prevalence of diabetes in Chinese adults: a Meta-analysis. Zhonghua Liu Xing Bing XueZaZhi 2018;39:852-7.
8. Joint Committee for Developing Chinese Guidelines on Prevention and Treatment of Dyslipidemia in Adults. 2016 Chinese guidelines on prevention and treatment of dyslipidemia in adults. Zhonghua Xin Xue Guan Bing ZaZhi 2016;44:833-53.
9. Bloomgarden ZT. Insulin resistance, dyslipidemia, and cardiovascular disease. Diabetes Care 2007;30:2164- 70.
10. Sehestedt T, Hansen TW, Li Y, et al. Are blood pressure and diabetes additive or synergistic risk factors? Outcome in 8494 subjects randomly recruited from 10 populations. Hypertens Res 2011; 34:714-21
11. Melamed E, "Reactive hyperglycaemia in patients with acute stroke," J Neurol Sci.1976; 29(2–4): 267–275.
12. Sacco R L, Kasner S E, Broderick J P."An updated definition of stroke for the 21st century," Stroke.2013;44(7): 2064–2089.
13. Victor M, Ropper A H, and Adams R D, Adams and Victor's principles ofneurology, McGraw Hill, New York, USA, 2001.
14. Goldstein L B. "the complex relationship between cholesterol and brain hemorrhage," Circulation.2009; 119(16): 2131–2133.
15. Qari F A, "Profile of stroke in a teaching university hospital in the western region," Saudi Medical Journal.2000; 21(11):1030–1033.
16. Marwat M A, Usman M, and Hussain M. "Stroke and its relationship to risk factors," Gomal Journal of Medical Sciences.2009;7(1):17–21.
17. Touze E and Rothwell P M, "Sex differences in heritability of ischemic stroke: a systematic review and meta-analysis," Stroke.2008; 39(1):16–23.
18. Sweileh W M, Sawalha A F, Al-Aqad S M, Zyoud S H, and Al-Jabi S W."epidemiology of stroke in Northern Palestine: a 1-year, hospital-based study," Journal of Stroke and Cerebrovascular Diseases.2008;17(6):406–411.
19. Kawase S, Kowa H, Suto Y. "Association between body mass index and outcome in Japanese ischemic stroke patients," Geriatrics & Gerontology International.2017;17(3):369–374.
20. Kardia S L, Modell S M, and Peyser P A."Family- centered approaches to understanding and preventing coronary heart disease," American Journal of Preventive Medicine.2003; 24(2):143–151.

ISSN (O): 2687-5365; ISSN (P): 2753-6556