ORIGINAL ARTICLE

HYPERCHOLESTEROLEMIA IN PATIENTS OF ISCHEMIC STROKE

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Background: Stroke is a common neurological disease that results in significant mortality and morbidity globally. Several risk factors have been identified for stroke among which hyperlipidaemia is one of the modifiable risk factors. Recent clinical trials have shown a reduction in ischemic stroke for patients taking lipid lowering medications. Therefore, the aim of this study was to find out the frequency of hypercholesterolemia in patients of ischemic stroke in Hazara region. **Methods:** This cross sectional study was carried out in the Medical Department of Ayub Teaching Hospital, Abbottabad. Ninety patients of stroke confirmed as ischemic by CT scan brain were enrolled in the study after informed consent. The frequency of hypercholesterolemia in patients was recorded. **Results:** There were 55 (61.1%) males. The mean age of patients was 64.4±11.5 years. The mean serum cholesterol in all patients was 4.16±1.1 mmol/l. The mean serum cholesterol of male patients was 4.3±1.2 mmol/l and 4.0±10.9 mmol/l in the case of females. **Conclusions:** Hypercholesterolemia could not be established as a major risk factor for stroke in our setup through this study that allude to the fact that other risk factors might be contributing more to the incidence of cerebrovascular accident in our population.

Keywords: Stroke, Lipids, Cholesterol, Hypercholesterolemia

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INTRODUCTION

Cerebrovascular disease has become the second leading cause of death globally. Stroke is a debilitating consequence of cerebrovascular disease which has long term implications for the patients as well as the whole family. Despite being such a distressing illness, stroke still remains a preventable disease. Stroke prevention strategies target high risk patients by identifying modifiable and non-modifiable risk factors. These risk factors need to be addressed through a multi-pronged strategy including pharmacological and non-pharmacological interventions.[1–3]

There is strong clinical evidence that using multiple drugs from different classes to target the major risk factors that are implicated in the aetiology of stroke can lead to a substantial risk reduction. Reducing blood pressure and use of aspirin (anti-platelet therapy) can lead to lesser frequency of strokes in at risk population. Similarly, use of statins to target hyperlipidaemia also results in reduced risk in patients who are at moderate to high risk for stroke.[1,2,4]

Many large cohort studies have repeatedly identified a relationship between the incidence of ischaemic heart disease and serum cholesterol levels. Many studies also point to a relationship between stroke and serum cholesterol.[2,4,5] In a study conducted by Lipovetskii BM, dyslipidaemia was present in 87% of patients with coronary heart disease, and 89% of patients with cerebrovascular disease.[6]

The aim of this study was to identify the frequency of hypercholesterolemia as a modifiable risk factor for ischaemic stroke in our local population.

MATERIAL AND METHODS

This hospital based descriptive cross sectional study was conducted on 90 consecutive patients admitted in the department of Medicine Ayub Teaching Hospital with clinical features of stroke. Patients >18 years of age of either gender, with a focal neurological deficit lasting more than 24 hours with infarct on CT scan were included in this study. Patients on drugs such as thiazide diuretics, beta blockers, and corticosteroids were excluded from the study. Informed consent was taken.

Venous blood sample was collected from each subject after an overnight fast and was sent to the hospital's laboratory. Auto analyser MERCK SELECTRA 2 was used for determination of serum total cholesterol. Data was analysed using SPSS-22 and *p*-value <0.05 was considered significant.

RESULTS

A total of 90 patients were included in the study out of which 55 (61.1%) were males and 35 (38.9%) females. The mean age of the patients was 64.44±11.5 years. Mean age of male patients was 65.31±11.85 and female as 63.09±10.97 years. The total number of patients below 50 years was 11 (12.21%), 46 (51.1%) in the age group 51–65 years, 26 (28.9%) from 66 to 80 years, and 7 (7.8%) above 80 years of age. The mean serum cholesterol in all patients was 4.16±1.1 mmol/l. In male patients the mean serum cholesterol was 4.26±1.2 mmol/l and that of female patients was 4.0±10.97 mmol/l. A total of 5 patients out of 90 had hypercholesterolemia and all of them were male. In the age group below 50

years only 1 patient had hypercholesterolemia (9.1%). Four patients between 51–65 years had hypercholesterolemia (8.7%). No patient had hypercholesterolemia above 66 years of age. Not a single female patient was found to have hypercholesterolemia.

DISCUSSION

A total of 5 patients out of 90 had hypercholesterolemia, all of them were male. In the age group below 50 years only 1 patient had hypercholesterolemia (9.1%). No patient had hypercholesterolemia above 66 years of age.

In a cross sectional study done by Almani *et al*, in Liaquat Medical College Jamshoro, the frequency of risk factors in patients with ischemic stroke was determined. Hypercholesterolemia was found to be present in 19% of the total patients, and it was proved to be an independent predictor of ischemic stroke.[7] Khan *et al.* conducted a study to determine the prevalence of modifiable risk factors in patients of ischemic stroke. The study was conducted in the neurology ward of JPMC Karachi. This study revealed that 32% of the patients of ischaemic stroke had dyslipidaemia. This figure was higher than that reported in other studies from Pakistan which ranged from 11–23%.[8]

Similarly in a study conducted by Khan *et al* in Hamad General Hospital in Qatar, risk factors for ischaemic stroke in young patients were determined. The age ranged from 17–44 years (mean 37.1±13.27). Hypercholesterolemia was seen as one of the most common risk factors. It was present in 27.5% of patients.[9] Rathore *et al* also documented hypercholesterolemia as a significant risk factor for stroke, others being hypertension, diabetes, atrial fibrillation, cardiac diseases and smoking. Though they suggested that hypercholesterolemia is more associated with haemorrhagic stroke.[10] This being contrary to the findings of our study.

In many Asian countries there are rising levels of serum cholesterol. How will this affect their population has been largely based on models derived from Western populations. One of the local cohorts is the Asia Pacific Cohort Studies Collaboration (APCSC). It combined data from 29 cohorts to estimate the age, region and gender specific hazard ratios of major cardiovascular diseases by the fifths of total cholesterol. Australia and New Zealand (ANZ) had a higher mean value of total cholesterol adjusted for age/sex than Asia at baseline which was statistically significant. In Asian and ANZ cohorts, the association of total cholesterol with stroke and ischaemic heart disease was similar. Each 1-mmol/l higher level of total cholesterol was associated with 25% increased risk of ischaemic stroke.[11]

In our study we have established that hypercholesterolemia is not a very common risk factor among ischaemic stroke patients in Hazara region. In this study only 5.6% of the male patients had hypercholesterolemia and none of the females had it. This is at variance with a number of other studies that have documented significantly high percentage of hypercholesterolemia in ischaemic stroke patients. Ischaemic strokes are likely to be associated with atherosclerosis. Tirschwell *et al*[12] investigated the association of total and high density lipoprotein cholesterol with the risk of stroke subtypes in a case control study. The results showed that highest total cholesterol quintile was associated with an increased risk of ischaemic stroke compared to the lowest quintile, with the strongest associations for atherosclerotic stroke and lacunar stroke subtypes.

One of the strengths of our study is that data was carefully collected by the investigator to avoid inter-observer bias. Laboratory investigations were conducted in the most professional manner with utmost care. However, due to smaller sample size the results may not be generalized to the population of patients of Hazara division suffering from stroke. Nonetheless the results could reflect the situation of those health clients that visit Ayub Teaching Hospital Abbottabad to seek medical care for stroke. A larger representative study might be more useful to determine the exact situation.

CONCLUSION

Hypercholesterolemia could not be established as a major risk factor for stroke in our setup through this study that allude to the fact that other risk factors might be contributing more to the incidence of cerebrovascular accident in our population.

AUTHOR'S CONTRIBUTION

ES: Designed the study, analysed data and drafted the manuscript. RA, MJ, AS, RJJ, MM: Facilitated data collection and analysis, helped in drafting and revising the manuscript.

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