

**ORIGINAL ARTICLE****To assess the contribution of Dyslipidemia and other unknown risk factors in the occurrence of Ischaemic stroke**

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**ABSTRACT:**

**Aim:** To assess the contribution of Dyslipidemia and other unknown risk factors in the occurrence of Ischaemic stroke. **Material and Methods:** A prospective observational study was conducted at the Department of Medicine to examine the correlation between dyslipidemia and cardiovascular risk factors in a sample of 100 patients with angiographically confirmed coronary artery disease. The study evaluated anthropometry and cardiovascular risk factors in all participants, and collected blood samples to analyze biochemical and inflammatory markers. The present investigation comprised a cohort of 100 participants who were admitted to the Department of Medicine for the purpose of evaluating chest discomfort and subsequently diagnosed with angiography positivity. **Results:** The study found no significant difference in total cholesterol level ( $168.41 \pm 17.26$  vs.  $198.24 \pm 10.45$ ,  $P=0.78$ ) and LDL cholesterol ( $103.21 \pm 7.21$  vs.  $98.41 \pm 8.45$ ,  $P=0.54$ ) between patients with and without atherogenic dyslipidemia. The study findings indicate that there was no significant statistical variation in the proportion of patients with hypercholesterolemia between those with and without atherogenic dyslipidemia. **Conclusion:** The occurrence of hypertriglyceridemia and low HDL cholesterol is more frequent than hypercholesterolemia in patients diagnosed with coronary artery disease (CAD). This indicates that a novel preventive strategy is required for individuals of Indian origin who have coronary artery disease (CAD).

**Keywords:** Dyslipidemia, Ischaemic stroke, unidentified risk factors

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**INTRODUCTION**

As per existing literature, individuals of Asian descent exhibit a greater incidence of risk factors associated with cardiovascular disease, type-2 diabetes mellitus (T2DM), and an earlier onset of cardiovascular disease (CVD) despite maintaining a normal body mass index (BMI) as per globally recognized standards.<sup>1,2</sup> It is anticipated that individuals belonging to the Indian Asian ethnicity will constitute a substantial proportion, ranging from 40% to 60%, of the worldwide burden of cardiovascular disease (CVD) in the forthcoming decade to decade and a half.<sup>3</sup> The hypothesis posits that the increased risk observed in this particular ethnic group may be attributed to a latent genetic predisposition that is revealed by environmental factors and the excessive accumulation of visceral adipose tissue during adulthood.<sup>4,5</sup> Individuals of South Asian origin exhibit a higher prevalence of metabolic abnormalities, specifically elevated triglycerides (TG) and reduced high density lipoprotein (HDL) cholesterol, which are associated with increased visceral fat.<sup>6-8</sup> Dyslipidemia is a prevalent condition that is recognized as a significant, autonomous risk factor for coronary artery disease (CAD) and may even serve as a precondition for CAD, manifesting prior to the involvement of other major risk factors.<sup>9</sup> studies have documented a greater occurrence of lipid abnormalities in the Asian population when compared to non-Asians.<sup>10,11</sup> The

presence of low levels of high-density lipoprotein (HDL) cholesterol and high concentrations of triglycerides (TG) have been suggested as potential autonomous indicators of cardiovascular disease (CVD). The co-occurrence of these two conditions is commonly referred to as atherogenic dyslipidemia. The prevalence of low HDL cholesterol is higher among Asian Indians, while the prevalence of high cholesterol is lower compared to non-Asian Indians. This observation implies a potential impairment in the process of reverse cholesterol transport. The results of this study indicate that elevated levels of triglycerides and reduced levels of high-density lipoprotein (HDL) cholesterol are of significant relevance among Asian Indians, as opposed to the prevalence of high cholesterol in Western nations. This observation may have implications for therapeutic interventions. The influence of dyslipidemia on the cardiovascular disease (CVD) burden among native Asians has not been extensively researched, despite its significant contribution to CVD in other global populations.<sup>12</sup> The prevalence of hypercholesterolemia is low among Asian Indians, while atherogenic dyslipidemia is highly prevalent. This observation may have therapeutic implications.

**MATERIALS AND METHODS**

A prospective observational study was conducted at the Department of Medicine to examine the

correlation between dyslipidemia and cardiovascular risk factors in a sample of 100 patients with angiographically confirmed coronary artery disease. The study evaluated anthropometry and cardiovascular risk factors in all participants, and collected blood samples to analyze biochemical and inflammatory markers. The present investigation comprised a cohort of 100 participants who were admitted to the Department of Medicine for the purpose of evaluating chest discomfort and subsequently diagnosed with angiography positivity. Chronic renal disease, hepatic impairment, and established endocrine disorders. The aforementioned metrics were recorded: stature, mass, waist girth, and hip girth. The Body Mass Index (BMI) was calculated through the multiplication of an individual's weight in kilograms by the square of their height in meters. The individual's body mass index (BMI) is 25 kg/m<sup>2</sup>. Central obesity is characterized by a waist circumference greater than 90 cm in males and greater than 80 cm in females. Type 2 diabetes mellitus (T2DM) is defined by the criteria outlined by the American Diabetes Association in 2012, as well as a documented medical history. Hypertension (HTN) is defined as systolic and diastolic blood pressures of 140 and 90 mmHg, respectively. Atherogenic dyslipidemia was defined as having triglyceride levels

of 150 mg/dl and HDL cholesterol levels of 40 mg/dl, irrespective of the gender of the patient. The present study assessed individual lipid abnormalities and categorized participants into groups based on the presence or absence of such abnormalities. Following a 14-hour period of fasting, blood samples were collected. The experiment involved the utilization of cholesterol oxidase, an enzymatic reaction, to analyze lipids. The computation of LDL cholesterol and very low-density lipoprotein cholesterol was carried out through the application of the Freidwald method. The biochemical parameters exhibited an inter-assay precision of 3.84% and an intra-assay precision of 2%. The technique of high-performance liquid chromatography (HPLC) was employed to ascertain the levels of hemoglobin A1c and highly sensitive C-reactive protein (hsCRP) with great precision. The statistical analysis was conducted utilizing SPSS Version 19. The data were reported in terms of mean  $\pm$  standard deviation, median, or frequency (percentage), as appropriate. The Chi-square test was utilized to analyze non-parametric data, including hypertension, dyslipidemia, smoking, and the number of vessels involved. The Chi-square test was employed to analyze the non-parametric data. A significance level of  $P < 0.05$  was deemed to be statistically significant.

## RESULTS

**Table 1: Baseline Characteristics of study population**

Parameters	Male(n=50)	Female(n=50)	P Value
Age	59.45 $\pm$ 11.21	53.21 $\pm$ 10.11	0.64
Smoking	34(68%)	3(6%)	0.001
BMI	27.98 $\pm$ 2.24	29.44 $\pm$ 1.22	0.07
WHR	0.89 $\pm$ 0.02	0.91 $\pm$ 0.06	0.22
T2DM	36(72%)	33(66%)	0.10
HTN	26(52%)	16(32%)	0.03
Dyslipidemia	27(54%)	23(46%)	0.15

A cohort comprising 100 individuals with established cardiovascular disease (CVD). Table 1 presents the baseline characteristics of the participants. There was no significant difference in age between males and females (Male: 59.45 $\pm$ 11.21; Female: 53.21 $\pm$ 10.11;  $P = 0.64$ ). The prevalence of dyslipidemia was observed to be higher among males as compared to females. The prevalence of T2DM, dyslipidemia, and HTN was found to be higher in males as compared to females.

**Table 2: Baseline Characteristics of Lipid profile and hs CRP**

Parameters	Male	Female	P Value
T. Cholesterol	168.41 $\pm$ 17.26	198.24 $\pm$ 10.45	0.78
Triglyceride	295.22 $\pm$ 89.21	207.41 $\pm$ 43.62	0.03
HDL	38.41 $\pm$ 9.42	37.42 $\pm$ 8.23	0.64
LDL	103.21 $\pm$ 7.21	98.41 $\pm$ 8.45	0.54
Hs CRP	11.51 $\pm$ 1.31	10.72 $\pm$ 1.56	0.18
HbA1C	6.72 $\pm$ 1.12	6.44 $\pm$ 1.38	0.61

The study found no significant difference in total cholesterol level (168.41 $\pm$ 17.26 vs. 198.24 $\pm$ 10.45,  $P=0.78$ ) and LDL cholesterol (103.21 $\pm$ 7.21 vs. 98.41 $\pm$ 8.45,  $P=0.54$ ) between patients with and without atherogenic dyslipidemia. The study findings indicate that there was no significant statistical variation in the proportion of patients with hypercholesterolemia between those with and without atherogenic dyslipidemia.

**Table 3: Cardiovascular risk factors with atherogenic dyslipidemia**

Parameters	Present	Absent	P Value
T. Cholesterol	246.22±32.14	175.25±11.25	<0.001
Triglyceride	298.32±124.24	175.23±7.45	<0.001
HDL	28.41±3.22	46.21±12.44	0.002
LDL	146.42±8.12	79.45±3.45	<0.001
Hs CRP	15.84±2.45	9.95±2.22	<0.001
HbA1C	8.21±1.22	5.34±1.02	<0.001

In table no 3. Cardiovascular risk factors found significantly higher in patients with atherogenic dyslipidemia present in cases and there was statistically significant difference in both groups.

## DISCUSSION

Numerous population-based prospective studies have been conducted to evaluate the impact of dyslipidemia on cardiovascular disease (CVD). Dyslipidemia has been observed to occur at varying frequencies and in different forms across multiple regions of India, as evidenced by several studies. Elevated levels of triglycerides (28-72.2%), low-density lipoprotein (LDL) cholesterol (23.3-44.5%), reduced levels of high-density lipoprotein (HDL) cholesterol (27%), and increased levels of total cholesterol (19-38.7%) were observed in individuals hailing from the northern, western, and southern regions of India.<sup>13</sup> The observed differences can be attributed to variations in the demographic characteristics of the research sample, specifically in terms of age and gender distribution, the incorporation of individuals with cardiovascular disease, and the setting in which the study was carried out, either in a community or hospital environment. Limited research has been conducted on the specific associations between different types of dyslipidemia and risk factors for cardiovascular disease in individuals diagnosed with coronary artery disease through angiography.<sup>13</sup> The study conducted in Delhi, India revealed a notable occurrence of elevated triglyceride levels among young patients diagnosed with coronary artery disease. The research conducted revealed that atherogenic dyslipidemia was present in 50% of the participants. In an Italian study, it was found that individuals with atherogenic dyslipidemia exhibited total cholesterol levels that were comparable to those without atherogenic dyslipidemia, a finding that is consistent with our own research.<sup>14-16</sup> The significance of elevated LDL and TC in the progression of CAD in comparison to atherogens has been highlighted in numerous western studies and NHANES data. The aforementioned assertion underscores the significance of low HDL and high TG as risk factors for cardiovascular disease in the Indian population, relative to the western population.<sup>17</sup> Atherogenic dyslipidemia is associated with age, gender, BMI, and central obesity. In this study, no significant variations were observed in terms of age, gender, BMI, or WHR between the subjects with dyslipidemia and those without it. Comparable results were observed in an Italian study, wherein no significant alteration in BMI was detected among subjects afflicted with dyslipidemia and CAD in

comparison to those who were not.<sup>14</sup> The presence of known CAD among all study participants may have confounded the association between dyslipidemia and BMI and WHR. The study revealed that a significant proportion of the patient cohort exhibited a mean waist-to-hip ratio (WHR) exceeding 0.9 and a mean body mass index (BMI) exceeding 25, both of which surpass the standard values established by International and Indian guidelines. This observation may account for the absence of a correlation identified in the study. The prevalence of individuals with type 2 diabetes mellitus and/or hypertension was significantly higher among patients exhibiting atherogenic dyslipidemia in comparison to those who did not. On the contrary, other studies have reported no significant difference in the prevalence of hypertension between individuals with and without atherogenic dyslipidemia.<sup>13</sup> The results of the univariate analysis indicate a positive association between serum TG and the presence of T2DM and HTN, while an inverse association was observed between HDL cholesterol and the presence of T2DM and HTN. The Genetic Epidemiology of Metabolic Syndrome Project, which is a study based on families, has reported a less robust association between blood pressure and atherogenic dyslipidemia.<sup>18-20</sup>

## CONCLUSION

The occurrence of hypertriglyceridemia and low HDL cholesterol is more frequent than hypercholesterolemia in patients diagnosed with coronary artery disease (CAD). This indicates that a novel preventive strategy is required for individuals of Indian origin who have coronary artery disease (CAD).

## REFERENCE

1. Moon JR, Capistrant BD, Kawachi I, Avendano M, Subramanian SV, Bates LM, et al. Stroke incidence in older us hispanics: Is foreign birth protective? *Stroke*. 2012;43:1224-1229.
2. Joshi P, Islam S, Pais P, Reddy S, Dorairaj P, Kazmi K, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *JAMA* 2007;297:286-94.
3. Gaziano TA, Reddy KS, Paccaud F, Horton S, Chaturvedi V. Cardiovascular disease. In: Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, et al., editors. *Disease Control Priorities in*

- Developing Countries. 2nd ed. New York: Oxford University Press; 2006. p. 645-62.
4. Radha V, Mohan V. Genetic predisposition to type 2 diabetes among Asian Indians. *Indian J Med Res* 2007;125:259-74.
  5. Yajnik CS. Early life origins of insulin resistance and type 2 diabetes in India and other Asian countries. *J Nutr* 2004;134:205-10.
  6. McKeigue PM, Ferrie JE, Pierpoint T, Marmot MG. Association of early-onset coronary heart disease in South Asian men with glucose intolerance and hyperinsulinemia. *Circulation* 1993;87:152-61.
  7. Enas EA, Mehta J. Malignant coronary artery disease in young Asian Indians: Thoughts on pathogenesis, prevention, and therapy. *Coronary Artery Disease in Asian Indians Study. Clin Cardiol* 1995;18:131-5.
  8. Gupta M, Brister S. Is South Asian ethnicity an independent cardiovascular risk factor? *Can J Cardiol* 2006;22:193-7.
  9. Genest JG Jr. Dyslipidemia and coronary artery disease. *Can J Cardiol* 2000;16 Suppl A:3A-4.
  10. Karthikeyan G, Teo KK, Islam S, McQueen MJ, Pais P, Wang X, *et al.* Lipid profile, plasma apolipoproteins, and risk of a first myocardial infarction among Asians: An analysis from the INTERHEART Study. *J Am Coll Cardiol* 2009;53:244-53.
  11. Labreuche J, Touboul PJ, Amarenco P. Plasma triglyceride levels and risk of stroke and carotid atherosclerosis: A systematic review of the epidemiological studies. *Atherosclerosis* 2009;203:331-45.
  12. Jellinger PS, Smith DA, Mehta AE, Ganda O, Handelsman Y, Rodbard HW, *et al.* American association of clinical endocrinologists' guidelines for management of Dyslipidemia and prevention of atherosclerosis. *Endocr Pract.* 2012;18(Suppl 1):1-78.
  13. Arca M, Montali A, Valiante S, Campagna F, Pigna G, Paoletti V, *et al.* Usefulness of atherogenic dyslipidemia for predicting cardiovascular risk in patients with angiographically defined coronary artery disease. *Am J Cardiol.* 2007;100:1511-6.
  14. Sirimarco G, Deplanque D, Lavallée PC, Labreuche J, Meseguer E, Cabrejo L, *et al.* Atherogenic dyslipidemia in patients with transient ischemic attack. *Stroke.* 2011;42:2131-7.
  15. Neaton JD, Wentworth D. Serum cholesterol, blood pressure, cigarette smoking, and death from coronary heart disease. Overall findings and differences by age for 316,099 white men. Multiple risk factor intervention trial research group. *Arch Intern Med.* 1992;152:56-64.
  16. Ninomiya JK, L'Italien G, Criqui MH, Whyte JL, Gamst A, Chen RS. Association of the metabolic syndrome with history of myocardial infarction and stroke in the Third National Health and Nutrition Examination Survey. *Circulation.* 2004;109:42-6.
  17. McBride PE. Triglycerides and risk for coronary heart disease. *J Am Med Assoc.* 2007;298:336-8.
  18. Micah FB, Nkum BC. Lipid disorders in hospital attendants in Kumasi, Ghana. *Ghana Med J.* 2012;46:14- 21.
  19. Geneva: WHO; 2000. World Health Organization. Obesity: Preventing and managing the global epidemic. WHO Technical Report Series: No 894.
  20. Kleindorfer D, Lindsell C, Alwell KA, Moomaw CJ, Woo D, Flaherty ML, *et al.* Patients living in impoverished areas have more severe ischemic strokes. *Stroke.* 2012;43:2055-2059.