

Original Article

Prevalence, patterns, and associations of dyslipidemia among Sri Lankan adults—Sri Lanka Diabetes and Cardiovascular Study in 2005–2006

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KEYWORDS:

Dyslipidemia;
Sri Lanka;
Diabetes;
Cardiovascular risk;
Metabolic syndrome;
Obesity

BACKGROUND: Dyslipidemia is a major risk factor for cardiovascular disease. Prevalence patterns and determinants of dyslipidemia in Sri Lanka are unknown.

OBJECTIVES: We aimed to determine the prevalence and correlates of dyslipidemia among Sri Lankan adults.

METHODS: A nationally representative sample was recruited by multistage random cluster sampling in Sri Lanka Diabetes and Cardiovascular Study, a cross-sectional study. Data collected by an interviewer-administered questionnaire, physical examination, anthropometric measurements lipid analysis from take 12-hour fasting blood samples were used.

RESULTS: Among 4451 participants 60.5% were women and mean age was 46 years. Mean (standard deviation) total cholesterol (TC), high-density lipoprotein cholesterol (HDL), low-density lipoprotein cholesterol (LDL), triglycerides (TGs), and TC/HDL levels were 206.7 mg/dL (± 43.5), 46.8 mg/dL (± 10.6), 135.5 mg/dL (± 37.6), 121.7 mg/dL (± 66.8), and 4.6 (± 1.1), respectively. Women had higher mean TC, HDL, LDL, and TG values compared to men across all age groups. Mean TC, LDL, and TGs increased with age in both genders; 77.4% of participants had some form of dyslipidemia. Low HDL was the commonest type (49.6%) of dyslipidemia. Increasing age, female sex, living in urban sector, high body mass index, central obesity, diabetes, hypertension, insufficient physical activity, and smoking were associated with having some form of dyslipidemia.

CONCLUSION: Three in four Sri Lankan adults have some form of dyslipidemia. Physical inactivity, obesity, hypertension, and diabetes are the leading modifiable risk factors.

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Conflicts of interest: The authors declare no conflict of interest.

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Background

Cardiovascular disease (CVD) remains the leading cause of hospital mortality in Sri Lanka.¹ Dyslipidemia is a major risk factor for development of CVD.² Treatment of lipid abnormalities is of proven benefit in reducing the morbidity and mortality associated with CVD.^{3,4} Several studies have identified low-density lipoprotein cholesterol (LDLC) as the main atherogenic lipoprotein, which has the strongest association with development of CVD.⁵

National surveys on dyslipidemia in Australia and United States have shown prevalence ranging from 48% to 53%.^{6,7} A USA national survey showed an association of dyslipidemia with obesity.⁷ According to a British study, dyslipidemia was significantly associated with diet, gender, and age.⁸ A study from Nigeria and African lower middle-income countries revealed that 23% of the population had elevated total cholesterol (TC), 51% had elevated LDLC, and 60% had low high-density lipoprotein cholesterol (HDLC) with females recording better overall lipid profile⁹ when interpreted according to the National Cholesterol Education Programme/Adult Treatment Panel III (NCEP/ATP III) criteria for definition and risk classification.

Data from Sri Lanka on dyslipidemia are limited. In 1994, a study in central province on prevalence of cardiovascular risk factors found median serum TC to be 189.6 mg/dL and median HDLC to be 37.6 mg/dL.¹⁰

Objectives

Sri Lanka has no countrywide data on patterns and distribution of lipids. Identifying the prevalence and nature of dyslipidemia among Sri Lankans would help determine risk of CVD. Therefore, we aimed to determine prevalence, patterns, and determinants of dyslipidemia in a large representative randomly selected adult population in Sri Lanka.

Methods

Sri Lanka Diabetes and Cardiovascular Study (SLDCS) was a cross-sectional study conducted by the Diabetes Research Unit of the Faculty of Medicine, University of Colombo, and the Oxford Centre for Diabetes Endocrinology and Metabolism of the University of Oxford, UK. Ethical approval was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Colombo. All participants provided informed written consent. Data collection was conducted between August 2005 and September 2006. Detailed methods have been previously published.¹¹

Study population

SLDCS was conducted in 7 of all 9 provinces in Sri Lanka. Northern and the Eastern provinces (14% of the

total population) were excluded due to insurgency prevailed. The total sample frame was approximately 14 million people living in 12,018 “village officer” units. A multistage random cluster sampling technique was used to select a nationally representative sample of 5000 noninstitutionalized adults aged 18 years or above. Those who were pregnant ($n = 26$), acutely ill (febrile illness, immobility following trauma, or recent hospitalization) ($n = 19$) or who declined participation ($n = 222$), and those on any form of lipid-lowering medication ($n = 207$) were excluded.

Data collection

Temporary data collection centers were established within or in close proximity to each cluster. The selected subjects were advised to visit the centers in the morning between 7.30 AM and 9.00 AM after an overnight fast of 12–14 hours. They were advised to follow an unrestricted diet and to continue with usual physical activities for at least 3 days before visit to data collection centers. An interviewer-administered, structured, and precoded questionnaire was used for data collection. Data on demography, medical history, medication usage, physical activities, and alcohol and smoking status were recorded. Anthropometric measurements were noted, and fasting blood samples were drawn. Serum was stored at -20°C . TC, HDLC, and triglycerides (TGs) were measured by enzymatic photometric methods using a Hitachi 704 chemical autoanalyzer (Roche Diagnostics, Mannheim, Germany) in the Reproductive and Endocrinology Laboratory, Faculty of Medicine, University of Colombo, Sri Lanka. Internal quality control samples were run daily and participated in a monthly external quality assurance program. LDLC was calculated using the Friedewald formula.

Statistical analysis

Central tendencies of continuous variables were expressed as mean \pm standard deviation, whereas data on categorical variables were expressed as percentages or frequencies. Determinants of dyslipidemias were analyzed applying multivariate logistic regression. Comparison of continuous variables in discrete groups was done using Student's t -test or analysis of variance. All the statistical analyses were conducted with SPSS 16.0 statistical software package (SPSS, Inc., Chicago, IL), and P values $< .05$ were considered to be statistically significant.

Definitions

Lipid profiles were interpreted according to NCEP/ATP III criteria (Tables 1 and 2). Patients with diagnosed diabetes (by a registered medical practitioner, confirmed by review of medical records) or newly diagnosed (based on American Diabetes Association and WHO criteria) were considered as having diabetes. Level of physical activity

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