ASSESSMENT OF CARDIOMETABOLIC RISK FACTORS AMONG LOCAL POPULATION OF NATIONAL CAPITAL REGION

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ABSTRACT

Objective: In view of marked accentuations in cardiometabolic diseases in developing countries such as India, we aimed to conduct a cross-sectional study analyzing the prevalence of cardiometabolic risk factors in local population of Ghaziabad.

Methods: The study is descriptive, random sample survey, and cross-sectional study. The study was carried out at Santosh Medical College, Ghaziabad, on 350 participants between the age group 18-70 years. After taking the informed consent, they were included in the study. The variables recorded were clinical history, all risk factors of cardiovascular disease including blood pressure, body mass index, waist circumference, blood sugar and serum lipid levels, cigarette use, and dietary habit.

Result: Our study shows that the high prevalence of multiple risk factors in a general population with as many as 70% of the participants had metabolic syndrome. Among individually studied groups, obesity was the most common followed by dyslipidemia then diabetes and hypertension and the least prevalent was smoking. Females were more commonly affected than males by dyslipidemia and obesity, probably due to physical inactivity coupled with unhealthy diet and lifestyle.

Conclusion: There is the higher prevalence of cardiometabolic risk factors among the population making the individuals prone to associated spontaneous coronary artery dissection and their predisposition. Therefore, timely detection of cardiometabolic factors and appropriate interventions may be of prime concern.

Keywords: Cardiometabolic risk factors, Dyslipidemia, Risk to associated spontaneous coronary artery dissection.

INTRODUCTION

One of the major causes of mortality and morbidity, the cardiometabolic diseases are emerging as an important health concern in developing and developed countries. Predominantly, they are lifestyle-related diseases having various modifiable and non-modifiable risk factors. Smoking, sedentary lifestyle, psychosocial stress, and obesity are modifiable risk factors while diabetes mellitus, hypercholesterolemia, and hypertension metabolic syndrome are non-modifiable risk factors [1]. These factors if not timely checked or controlled may lead to ischemic heart disease secondary to atherosclerotic coronary vascular disease [1-3]. Besides all these parameters, homocysteine level, elevated coronary artery calcium, marked carotid intima-media thickness, aortic pulse wave velocity as a measure of arterial stiffness, elevated C-reactive protein, elevated lipoproteins(a), fibrinogen, plasminogen activator inhibitor, platelet count, lipoprotein-associated phospholipase A2 are few other non-conventional markers but their clinical relevance has not been established [4]. There are substantial variations present at country, regional, and urban-rural levels due to lifestyle variations such as dietary factors, physical activity, and smoking. In India, also a number of studies conducted and have shown the prevalence of obesity, hypertension, hypercholesterolemia, and diabetes in urban as compared to rural population [5,6]. Various ethnic and sociocultural differences are responsible for this vast geographical variation in cardiometabolic risk factors. Due to marked accentuation in cardiometabolic diseases in developing countries such as India, it is necessary to study the various cardiometabolic risk factors in a local population such as Ghaziabad as there is no population-based cross-sectional study analyzing the prevalence of cardiometabolic risk factors in this part of the world.

METHODS

It was a hospital-based cross-sectional study carried out at Santosh Medical College and Hospital, Ghaziabad during the past 2 years from 2015 to 2016. Total 350 participants between the age group 18 and 70 years were included in the study after receiving their written consent. Following are the inclusion criteria for selection of participants:

Waist circumference - >90 cm for males and >80 cm for females. Dyslipidemia - Triglycerides >150 mg/dl and are on no specific medication. High-density lipoprotein cholesterol (HDLc): <40 and 50 mg/dl, respectively, for males and females with no medication. Hypertension: Blood pressure (BP) ≥130 mm Hg and systolic BP ≥85 with no specific medication. Fasting plasma glucose (FPG) ≥100 mg/dl, post-prandial plasma glucose 140-199 mg/dl or hemoglobin A1c - 5.7-6.4%. All diabetic patients were irrespective of specific treatment for diabetes. All patients who were diagnosed as having metabolic syndrome as per Asian Specific Harmonized Criteria.

Patients suffering from coronary artery disease and atherosclerotic coronary vascular diseases, chronic granulomatous diseases such as tuberculosis and leprosy or any oncological diseases, hepatic impairment and thyroid disorder were excluded from the study.

The participants were evaluated and selected by detailed medical history, physical examination, systemic examination, or routine investigations to rule out any underlying disease.

All patients were subjected to measurement of height, weight, body mass index (BMI), and waist circumference and waist-hip ratio [6]. FPG

estimation was done by glucose oxidase and peroxidase, i.e., glucose oxidase-peroxidase method [7]. Electrocardiogram was done to rule out coronary artery disease/atherosclerotic coronary vascular disease. Total serum cholesterol estimation was done using cholesterol oxidase-phenol 4-aminophenazone peroxidase method [8]. Triglycerides (TGs) estimation was done by GPO-Trinder method [8]. Very low-density lipoprotein cholesterol (LDLc) and LDLc concentration estimation were done using Friedwald's formula. HDLc estimation was done by polyethylene glycerol methyl ether coupled classic precipitation method [8]. All data were analyzed and reported as mean with standard using group and descriptive statistics using SPSS database. Independent Student's t-test was done to find out the significance (p value) between data of male and female test group. p<0.05 was considered as statistically significant.

RESULTS

The participants consisted of 171 males and 179 females with the prevalence of 48.86% and 51.14%, respectively. Largest number of participants of studied population belongs to the age group 40-49 years of age. The prevalence of various cardiometabolic risk factors in the study group was represented by metabolic syndrome which is affecting 245 (70%) out of participants and is the most important risk factor. Next, the most common factor was obesity with 56.9% prevalence including 199 out of 350 people, followed by dyslipidemia, diabetes, and hypertension with 51.1%, 45.1%, and 44.9% prevalence, respectively. The least prevailing factor was smoking with 4.3% (Table 1).

Table 2 illustrates the various risk factors as variables studied among 350 participants. The analyzed variables were studied in both men and women. The most commonly encountered risk factor among study participants was raised total cholesterol at 247.8±57.89 in women and 247.3±58.82 among men. The difference between the two groups is not statistically significant (0.957). Among other variables, the difference in prevalence of obesity (BMI >30 kg/m^2) and smoking were statistically significant at p=0.023 and 0.003, respectively.

Table 3 is showing the prevalence of various risk factors with obesity. It is seen that the prevalence of raised cholesterol at 234.68±33.51 in obese participants and 274.27±84.10 in non-obese participants was the most commonly seen risk factor. The difference between the two groups was statistically significant (p=0.000). The difference in prevalence of central abdominal obesity with waist circumference >90 cm (0.000) in men and >80 cm in women along with metabolic syndrome was also significant (0.000).

DISCUSSION

It was planned to study the prevalence of major modifiable and non-modifiable factors in the general population, attending hospital outpatient department in Ghaziabad. The study included 350 participants of 18-70 years of age; the largest group was represented by 40-49 years. An important focus of recent studies is the changing trends in cardiovascular risk factors. In the past 30 years, the prevalence of hypertension and hypercholesterolemia has doubled while that of diabetes has tripled. In our study, we found metabolic syndrome as the most prevalent risk factor affecting 245 (70%) study participants out 350 while smoking was the least prevalent risk factor including just 15 (4.3%) people from our study population. We found the prevalence of hypertension, dyslipidemia, and diabetes to be 44.9%, 51.1%, and 45.1%, respectively (Table 1). The results obtained are having higher values than Jaipur Heart Watch-6 study which reported the prevalence of hypertension, dyslipidemia (TG ≥200 mg/dl) and diabetes to be 36%, 25.8%, and 19.2%, respectively. The Jaipur Heart Watch studies in India evaluated multiple cardiovascular risk factors in urban middle-class participants using multiple cross-sectional study design over a 20 year period from 1991 to 2010 [9]. During the period, the prevalence of smoking declined, no chance in hypertension was observed while all other risk factors such as obesity, truncal obesity, hypercholesterolemia, diabetes, and metabolic syndrome increased significantly. The data was analyzed by plotting graph of individual risk factors among male and female groups. More number of females was found to be associated with raised total cholesterol as compared to males. Data on hypercholesterolemia in our study reveal consistency with India Migratory Study including 1983 participants [10]. Obesity in our study was considered as patients having BMI ≥30 kg/m^2 was 35.04±4.02 (Table 2). When the difference in the mean and standard deviation (SD) assessed in between male and female group, it was found statically significant (0.023). On plotting difference in mean and SD, between male and female group across other parameters of obesity, namely, BMI ≥25 kg/m^2 but <30 kg/m^2 and waist to hip ratio (men >0.9; women >0.8 cm), it was found that female group had higher values than male group for the risk factor considered. The difference in their prevalence was however not statistically significant (p>0.05). All other risk factors of importance and their respective prevalence in obese participants (n=191) were studied and compared with non-obese study participants (n=151). It was seen that the prevalence of

Table 1: The prevalence of various cardiometabolic risk factors in the study group of 350 patients

Variables	Number of participants (%)
Obesity	199 (56.9)
Diabetes	158 (45.1)
Hypertension	157 (44.9)
Dyslipidemia	179 (51.1)
Metabolic syndrome	245 (70)
Smoking	15 (4.3)

Table 2: Comparative analysis of various cardiometabolic risk factors in men and women

Variables	Mean±SD			p value
	Total (n=350)	Women (n=179)	Men (n=171)	
Obesity BMI ≥25 kg/m^2 and <30 kg/m^2	27.18±1.33	27.22±1.23	27.14±1.42	0.701
BMI ≥30 kg/m^2	35.04±4.02	35.63±4.17	34.32±3.72	0.023
W:H ratio (men >0.9; women >0.8 cm)	0.99±0.53	1±0.05	0.99±0.05	0.337
Diabetes (FBS≥100 mg/dl)	164±72.02	161.1±72	167.4±72.3	0.538
HTN (known hypertensive; systolic BP ≥130 mmHg, and diastolic BP ≥85 mmHg)	147.2±80.12	148.1±19.5	146.2±16.6	0.458
Dyslipidemia (Total cholesterol ≥200 mg/dl)	247.6±58.11	247.8±57.9	247.3±58.8	0.957
TGL ≥150 mg/dl	224.4±87.94	221.5±77.3	227.5±98.5	0.656
LDL ≥130 mg/dl	168.6±33.44	171.2±36.8	165.3±28.6	0.318
HDL <40 mg/dl for male; <50 for female	47.15±10.12	39.01±5.92	34.33±4.41	0.631
Metabolic syndrome	1.3±0.459	1.26±0.44	1.34±0.48	0.119
Smokers	1.96±0.2	1.99±0.11	1.92±0.27	0.003

HTN: Hypertension, HDL: High-density lipoprotein, LDL: Low-density lipoprotein, BP: Blood pressure, FBS: Fasting blood sugar, SD: Standard deviation, BMI: Body mass index

Table 3: Comparative analysis of various clinical and biochemical parameters in obese patients

Variables	Mean±SD		p value
	Obese	**Non-obese**	
Age	46.63±12.07	45.61±13.54	0.459
Central abdominal obesity-waist circumference			
Men >90 cm	108.46±12.52	99.85±7.31	0.000
Women >80 cm	108.27±12.60	99.13±7.49	0.000
W:H ratio (men >0.9 cm; women >0.8 cm)	1.0±0.47	1±0.47	0.976
Diabetes (known diabetics of FBS ≥100 mg/dl)	155.69±65.51	174.41±78.52	0.066
HTN (known hypertensives/systolic BP ≥130 mmHg, diastolic BP ≥85 mmHg)	147.58±19.90	146.75±15.91	0.747
Dyslipidemia (total cholesterol ≥200 mg/Hg)	234.68±33.51	274.27±84.10	0.000
TGL ≥150 mg/dl	228.34±92.21	216.95±79.60	0.420
LDL ≥130 mg/dl	165.82±32.46	175.42±35.25	0.137
HDL (<40 mg/dl; women <50 mg/dl)	33.76±4.89	34.77±4.00	0.387
Metabolic syndrome	1.21±0.41	1.42±0.50	0.000
Smokers	1.96±0.20	1.95±0.21	0.778

HTN: Hypertension, HDL: High-density lipoprotein, LDL: Low-density lipoprotein, BP: Blood pressure, FBS: Fasting blood sugar, SD: Standard deviation, W:H: Waist-hip

raised total cholesterol at 234.68±33.51 in obese participants and 274.27±84.10 in non-obese participants (Table 3) was most commonly seen risk factor. The difference in mean between the two groups was statistically significant (p=0.000). The difference in means of prevalence of central abdominal obesity with waist circumference >90 cm (0.000) in men and >80 cm in women along with metabolic syndrome was also statistically significant (0.000) (Table 3). Similar results were reported by DS Prasad *et al.* [10]. Numerous other epidemiological studies also show that BMI is a powerful predictor of Type 2 diabetes, hypertension, hypercholesterolemia, and heart diseases [11-15].

CONCLUSION

The study shows the higher prevalence of multiple risk factors in a general population with as many as 70% (n=245) participants were having metabolic syndrome. Among the groups, obesity was the most common followed by dyslipidemia then diabetes, hypertension, and least prevalent factor was smoking. Females were most commonly affected than males by dyslipidemia and obesity, probably due to physical inactivity coupled with unhealthy lifestyle. Therefore, Indians are at high risk for ASCVD and their predisposition. Early identification of cardiometabolic risk factors and appropriate intervention may be of primary importance in population.

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