Research Article

Cardiometabolic risk factors in bank employees

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Abstract

Background: Coronary heart disease and type 2 diabetes mellitus (T2DM) are preceded by a cluster of metabolic risk factors that include hypertension, dyslipidemia, and prediabetes. The prevalence of these metabolic risk factors shows an upward trend with increasing body mass index and waist circumference. **Aims and Objective:** To examine cardiometabolic risk factors among bank employees. **Materials and Methods:** This cross-sectional study was conducted on 160 male bank employees. Blood pressure and anthropometric measurements were recorded. Fasting blood samples were analyzed for blood glucose and lipid profile. **Result:** Generalized obesity and central obesity were found in 9% and 69% subjects, respectively. Nearly half of the subjects were observed to have hypertension and another one-third prehypertension. Nearly 14% subjects had T2DM. Dyslipidemia was observed in this study as high triglycerides (TGs; 10.8%) and low high-density lipoprotein-cholesterol levels (10%), high total serum cholesterol (5%), and high low-density lipoprotein-cholesterol levels (5%). Significant number of subjects had suboptimal lipid levels. The prevalence of metabolic syndrome (MetS) was found to be 38%. **Conclusion:** Obesity and overweight are prevalent among bank employees. Central obesity and MetS are also prevalent in normal weight subjects. Obese subjects had higher levels of systolic blood pressure, diastolic blood pressure, and blood glucose and also had higher prevalence of MetS.

KEY WORDS: Metabolic Syndrome; Sedentary Job; Obesity; Lipid Profile; Type 2 Diabetes Mellitus; Coronary Heart Disease

Introduction

The prevalence of coronary heart disease (CHD) and type 2 diabetes mellitus (T2DM) among Indian population is high.[1,2] By the time these chronic diseases present clinically, irreversible vascular damage has already occurred. It is estimated that T2DM is diagnosed, on the average, 4–7 years after onset.[3] This signifies the importance of prevention and early diagnosis of these chronic ailments. T2DM and CHD are preceded by cluster of cardiometabolic risk factors that include traditional risk factors such as hypertension, dyslipidemia, prediabetes, and smoking as well as emerging risk factors such as abdominal obesity, inflammatory profile, and ethnicity.[4] The prevalence of these risk factors shows upward trend with increasing body mass index (BMI) and waist circumference (WC).[5,6]

Indians are even known to develop these metabolic abnormalities at a lower BMI and WC compared to other ethnic groups.[7] The situation is further compounded by the pattern of dyslipidemia that includes high serum levels of TGs and low levels of high-density lipoprotein-cholesterol (HDL-C).[7] An association between chronic work-related stress and CHD is well established.[8] Stress is an important health issue among bank employees. High to very high stress levels have been reported in majority of them.[9,10]

Bank employees because of sedentary nature of their job and associated job stress form a high-risk group. The objective of this study was to examine (i) the pattern of dyslipidemia, hypertension, and dysglycemia among bank employees, and (ii) association of BMI with cardiometabolic risk factors.

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Table 1: Baseline characteristics of subjects (n = 160)

Parameters	Mean ± SD
Age (years)	44.76 ± 8.92
BMI (kg/m^2)	25.58 ± 3.33
WC (cm)	93.18 ± 9.78
SBP (mmHg)	132.2 ± 15.49
DBP (mmHg)	86.23 ± 11.16
Fasting blood sugar (mg/dl)	102.73 ± 28.63
Serum HDL-C (mg/dl)	48.31 ± 7.63
Serum TGs (mg/dl)	149.11 ± 60.61
Total serum cholesterol (mg/dl)	174.38 ± 39.12
Serum LDL-C (mg/dl)	97.61 ± 33.77

BMI, body mass index; WC, waist circumference; SBP, systolic blood pressure; DBP, diastolic blood pressure; HDL-C, high-density lipoprotein-cholesterol; LDL-C, low-density lipoprotein-cholesterol; TG, triglyceride.

Materials and Methods

This cross-sectional study was conducted in the Postgraduate Department of Physiology, Government Medical College, Jammu, J&K, India. Total 160 male employees from eight bank branches in the vicinity of Government Medical College, Jammu, were studied. Females were excluded because of inadequate sample size.

Informed written consent was obtained from all the subjects after explaining the nature of the study. Ethical clearance was obtained from the institutional ethics committee.

All permanent bank employees were included in the study whereas those with history of CHD or thyroid disorders were excluded.

BMI (calculated as weight in kilograms divided by the square of height in meters), WC, systolic blood pressure (SBP), and diastolic blood pressure (DBP) were measured using standard methods. Laboratory assessments included venous blood samples in a fasting state for determination of components of the lipid profile (serum total cholesterol, HDL-C, TGs) and blood glucose levels. Blood glucose was measured using the glucose oxidase method and lipid profile by the enzymatic colorimetric method. Serum low-density lipoprotein-cholesterol (LDL-C) level was calculated as described by Friedewald *et al.*[11]

Metabolic syndrome (MetS) was defined as per JIS (Joint Interim Statement) criteria.[12] Accordingly, MetS was attributed in patients if three or more risk determinants were present, that is, increased WC ($>$90 cm), elevated TG levels ($\geqslant$150 mg/dL), low HDL-C levels ($<$40 mg/dL), hypertension ($\geqslant$130/$\geqslant$85 mmHg), and impaired fasting glucose (IFG; $\geqslant$100 mg/dL). Dyslipidemia was defined according to ATP-III guidelines.[13] IFG and DM were defined as per the World Health Organization criteria.[14] Prehypertension and hypertension were defined as per JNC VII report.[15]

Subjects were categorized into three groups depending on their BMI.[16] Group I comprised subjects with normal weight (BMI $<$ 25 kg/m^2), Group II had overweight subjects (BMI = 25–29.9 kg/m^2), and Group III had obese subjects (BMI = $\geqslant$30 kg/m^2).

Table 2: Prevalence of cardiometabolic risk factors among subjects (n = 160)

Parameters	No. (%)
Generalized obesity	
Overweight	76 (47.50)
Obese	14 (8.75)
Central obesity	110 (68.75)
High blood pressure	
Prehypertension	53 (33.12)
Hypertension	78 (48.75)
High blood sugar	
IFG	48 (33.00)
T2DM	22 (13.75)
Low serum HDL-C (mg/dL)	16 (10)
Elevated serum TGs	
Suboptimal	46 (28.75)
High	17 (10.62)
Elevated serum total cholesterol	
Suboptimal	28 (17.50)
High	7 (4.37)
Elevated serum LDL-C	
Suboptimal	60 (37.50)
High	6 (3.75)

IFG, impaired fasting glucose; T2DM, type 2 diabetes mellitus; HDL-C, high-density lipoprotein-cholesterol; LDL-C, low-density lipoprotein-cholesterol; TG, triglyceride.

Statistical Analysis: Intergroup comparisons were done using Pearson's χ^2-test for categorical variables and analysis of variance for continuous variables. Statistically significant differences were reported at a p-value of <0.05.

Results

The data regarding cardiometabolic risk factors in the bank employees are presented.

The difference in mean age of subjects in Groups I–III was not statistically significant. The difference of means of BMI, WC, SBP, DBP, and fasting blood sugar of subjects across these groups was statistically significant. The difference of means of serum total cholesterol, serum HDL-C, serum LDL-C, and serum TGs of subjects in Groups I–III was not statistically significant (Table 3).

MetS was observed in 38.12% (61/160) subjects. It was observed in 27.14% (19/70), 43.42% (33/76), and 64.29% (9/14) subjects in Groups I, II, and III, respectively. The difference among groups was statistically significant (p = 0.0139; Table 4).

Discussion

Framingham investigators identified obesity, dyslipidemia, hypertension, and hyperglycemia as important risk factors in

Table 3: Comparison of subjects on BMI basis (n = 160)

Variables	Group I[a] (n=70) (mean ± SD)	Group II[b] (n=76) (mean ± SD)	Group III[c] (n=14) (mean ± SD)	p-Value
Age (years)	43.2 ± 10.21	46.18 ± 7.33	44.85 ± 9.19	0.086
BMI (kg/m^2)	22.76 ± 1.88	26.92 ± 1.33	32.39 ± 1.86	0.000
Waist circumference (cm)	87.12 ± 9.49	96.39 ± 5.86	106 ± 7.75	0.000
SBP (mmHg)	127.5 ± 16.14	135.09 ± 13.33	140 ± 17.09	0.001
DBP (mmHg)	83.8 ± 11.95	87.85 ± 9.88	89 ±.57 ± 11.97	0.046
Fasting blood sugar (mg/dL)	99.6 ± 19.86	102.39 ± 32.14	120.21 ± 39.88	0.047
Serum HDL-C (mg/dL)	48.1 ± 7.43	48.56 ± 8.21	48 ± 5.34	0.925
Serum TGs (mg/dL)	150.24 ± 58.43	146.36 ± 62.59	158.35 ± 63.79	0.079
Total serum cholesterol (mg/dL)	174.72 ± 40.20	171.17 ± 35.95	190.07 ± 48.60	0.252
Serum LDL-C (mg/dL)	97.43 ± 34.71	95.40 ± 30.26	110.5 ± 45.39	0.308

[a]Normal weight (BMI < 25 kg/m^2).
[b]Overweight (BMI = 25–29.99 kg/m^2).
[c]Obese (BMI > 30 kg/m^2).

Table 4: Relationship of BMI with MetS in bank employees

Metabolic syndrome	Group I[a] (n = 70) No. (%)	Group II[b] (n = 76) No. (%)	Group III[c] (n = 14) No. (%)	Total (n = 160) No. (%)	p-Value
Present	19 (27.14)	33 (43.42)	9 (64.29)	61 (38.12)	0.0139
Absent	51 (72.86)	43 (56.58)	5 (35.71)	99 (61.88)	
Total	70 (100.00)	76 (100.00)	14 (100.00)	160 (100.00)	

[a]Normal weight (BMI < 25 kg/m^2).
[b]Overweight (BMI = 25–29.99 kg/m^2).
[c]Obese (BMI > 30 kg/m^2).

the development of CHD.[17] In this study, we examined the pattern of risk factors in bank employees.

Recent studies have found high prevalence of generalized and abdominal obesity in India.[18,19] Results of this study also show that majority of the participants were overweight/obese. Also, WC, an indicator of central obesity, was high even in normal weight subjects.

Clustering of cardiometabolic risk factors is known as MetS. In this study, 38% subjects had MetS. Highest prevalence was observed in the obese subjects, followed by the overweight and least in the normal weight category. This finding supports the observation that the higher the BMI, the more the risk of MetS.[20] Adipose tissue is an endocrine organ that releases adipokines and inflammatory cytokines into the bloodstream, which impair insulin signaling and promote insulin resistance leading to metabolic abnormalities.[21]

Interestingly, 27% subjects with normal weight had MetS. The term "metabolically obese normal weight" is used to qualify such subjects. High prevalence of central obesity and MetS among subjects with normal weight underscores importance of evaluating this group for MetS parameters. These results are in accordance with studies suggesting vulnerability of normal weight subjects to develop MetS.[22–24]

Blood pressure has a consistent relationship with the risk of CHD; the higher the BP, the higher the chance of CHD. Hypertension promotes atherosclerosis. It damages the endothelium through altered shear stress and oxidative stress, resulting in increased endothelial cell synthesis of collagen and fibronectin, reduced nitric oxide–dependent vascular relaxation, and increased permeability to lipoproteins.[25,26] In this study, 49% subjects had hypertension and a significant number had prehypertension (33%). This finding can be attributed to high prevalence of obesity among the subjects. Obesity is considered to be a major risk factor for hypertension.[27] Over 70% hypertension among males was attributed to excess adiposity in the Framingham study.[28] The INTERSALT study also showed a strong association between BMI and blood pressure.[29]

Dyslipidemia is the most important factor in the pathogenesis of CHD. The possible reasons for dyslipidemia include sedentary lifestyle, high consumption of fat, obesity, and ethnicity. Dyslipidemia was observed in this study as high TGs (10.8%) and low HDL-C (10%) levels, high total serum cholesterol (5%), and high LDL-C (5%). Significant number of subjects had suboptimal lipid levels.

DM is associated with a two- to threefold increase in the likelihood of developing CHD.[30] Glucose intolerance is

also associated with a 1.5-fold increase in the risk of developing CHD.[31] In this study, about 50% subjects had either prediabetes or T2DM. This concurs with a study showing high prevalence of DM among bank employees in Mangalore city, Karnataka, India.[32]

Conclusion

From this study, we conclude that obesity and overweight are prevalent among bank employees. Central obesity was also prevalent in normal weight subjects. MetS was observed in 38% bank employees. Majority of obese subjects had MetS. Obese subjects had higher levels of SBP, DBP, and blood glucose. Central obesity and MetS were also prevalent in normal weight subjects. However, lipid levels were similar in the three groups. Results of this study underscore screening of cardiovascular disease risk factors in employees with sedentary lifestyle, including those with normal weight to prevent future CHD and T2DM. Modification of lifestyle, with emphasis on more physical activity and weight reduction, should be encouraged.

References

1. Viswanathan V. Type 2 diabetes and diabetic nephropathy in India—magnitude of the problem. Nephrol Dial Transplant. 1999;14(12):2805–7.
2. World Health Organization. Cardiovascular Disease Statistics, 2008. Available at: http://www.who.int/mediacentre/factsheets/fs317/en/index.html.
3. Harris MI, Klein R, Welborn TA, Kuniman MW. Onset of NIDDM occurs at least 4–7 years before clinical diagnosis. Diabetes Care. 1992;15:815–9.
4. Leiter LA, Fitchett DH, Gilbert RE, Gupta M, Mancini GB, McFarlane PA, et al. Cardiometabolic risk in Canada: a detailed analysis and position paper by the cardiometabolic risk working group. Can J Cardiol. 2011;27(2):e1–e33.
5. Behan KJ, Mbizo J. The relationship between waist circumference and biomarkers for diabetes and CVD in healthy non-obese women. The Pensacola study. Lab Med. 2007;38(7):422–7.
6. Meigs JB, Wilson PF, Fox CS, Vasan RS, Nathan DM, Sullivan LM, et al. Body mass index, metabolic syndrome and risk of type-2 diabetes or cardiovascular disease. J Clin Endocrinol Metab. 2006;91(8):2906–12.
7. Enas EA, Mohan V, Deepa M, Farooq S, Pazhoor S, Chennikkara H. The metabolic syndrome and dyslipidemia among Asian Indians: a population with high rates of diabetes and premature coronary artery disease. J Cardiometab Syndr. 2007;2(4):267–75.
8. Chandola T, Britton A, Brunner E, Hemingway H, Malik M, Kumari M, et al. Work stress and coronary heart disease: what are the mechanisms? Eur Heart J. 2008;29(5):640–8.
9. Kumar SG, Sundaram ND. Prevalence of stress level among bank employees in urban Puducherry, India. Ind Psychiatry J. 2014;23:15–7.
10. Kumar SG, Unnikrishnan B, Nagaraj K. Self-reported chronic diseases and occupational health risks among bank employees of southern Karnataka city, India. Indian J Community Med. 2013;38:61–2.
11. Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. Clin Chem. 1972;18:499–502.
12. Alberti KG, Eckel RH, Grundy SM, Zimmet PZ, Cleeman JI, Donato KA, et al. Harmonizing the metabolic syndrome: a Joint Interim Statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. Circulation. 2009;120(16):1640–5.
13. National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) Final Report. Circulation. 2002;106:3143–421.
14. Alberti KG, Zimmet PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. Diabet Med. 1998;15(7):539–53.
15. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr., et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA. 2003;289(19):2560–71.
16. National Institutes of Health. Clinical guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults—the Evidence Report. Obes Res. 1998;6(Suppl 2):51S–209S.
17. O'Donnella CJ, Elosuab R. Cardiovascular risk factors. Insights from Framingham Heart Study. Rev Esp Cardiol. 2008;61(3):299–310.
18. Singh RB, Pella D. Prevalence of obesity, physical inactivity and undernutrition, a triple burden of diseases during transition in a developing economy. The Five City Study Group. Acta Cardiol. 2007;62:119–27.
19. Ramachandran A, Snehalatha C. Rising burden of obesity in Asia. J Obes. 2010;pii:868573.
20. Meigs JB, Wilson PF, Fox CS, Vasan RS, Nathan DM, Sullivan LM, et al. Body mass index, metabolic syndrome and risk of type 2 diabetes or cardiovascular disease. J Clin Endocrinol Metab. 2006;91(8):2906–12.
21. Ibarra J. Obesity and cardiovascular disease. J Lancaster Gen Hosp. 2009;4(4):130–3.
22. Lee K. Obese but normal weight [MONW] and metabolically healthy but obese [MHO] phenotypes in Koreans: characteristics and health behaviors. Asia Pac J Clin Nutr. 2009;18(2):280–4.
23. St-Onge MP, Janssen I, Heymsfield SB. Metabolic syndrome in normal weight Americans new definition of the metabolically obese, normal-weight individual. Diabetes Care. 2004;27(9):2222–8.
24. Karelis AD, St-Pierre DH, Conus F, Rabasa-Lhoret R, Poehlman ET. Metabolic and body composition factors in subgroups of obesity: what do we know? J Clin Endocrinol Metab. 2004;89(6):2569–75.
25. O'Donnell VB. Free radicals and lipid signaling in endothelial cells. Antiox Redox Signal. 2003;5:195–203.

26. Wolfrum S, Jensen KS, Liao JK. Endothelium-dependent effects of statins. Arterioscler Thromb Vasc Biol. 2003;23:729–36.
27. Schorr U, Blaschke K, Turan S, Distler A, Sharma AM. Relationship between angiotensinogen, leptin and blood pressure levels in young normotensive men. J Hypertens. 1998;16:1475–80.
28. Kannel WB, Garrison RJ, Dannenberg AL. Secular blood pressure trends in normotensive persons: the Framingham Study. Am Heart J. 1993;125:1154–8.
29. Stamler R, Shipley M, Elliott P, Dyer A, Sans S, Stamler J. Higher blood pressure in adults with less education. Some explanations from INTERSALT. Hypertension. 1992;19:237–41.
30. Fox C, Coady S, Sorlie P, Levy D, Meigs JB, D'Agostino RB Jr. Trends in cardiovascular complications of diabetes. JAMA. 2004;292: 2495–9.
31. Kannel WB, McGee DL. Diabetes and glucose intolerance as risk factors for cardiovascular disease: the Framingham study. Diabetes Care. 1979;2:120–6.
32. Kumar SG, Unnikrishnan B, Nagaraj K. Self-reported chronic diseases and occupational health risks among bank employees of southern Karnataka city, India. Indian J Community Med. 2013;38 (1):61–2.

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