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Research Article

Risk Factors of Cardiovascular Diseases and Cardiovascular Risk Assessment in the Bank Employees of Western Maharashtra – A Cross Sectional Study

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Abstract
Background: *In developed countries, cardiovascular diseases (CVDs) are responsible for up to 50% of the total deaths. There is evidence that job characteristics may be associated with CVDs, independently of the social status. Bank employees who deal with various types of customers, involves economic liabilities, high levels of accountability, greatly reduced physical activity, and sedentary mode of functioning may predispose for the development of various diseases like hypertension, obesity, and diabetes mellitus which are major risk factors for the CVDs. The easy and rapid calculation of a Framingham CVD risk score may assist the clinician and patient in demonstrating the benefits of treatment. Thus present study is carried out.*
Methods: *A cross-sectional study was conducted during January 2014 to December 2015 to study the prevalence of risk factors for CVDs and to assess the cardiovascular risk among the bank employees in Western Maharashtra. By using multistage sampling method, total 340 bank employees from 40 branches were included in the study after fulfilling the inclusion and exclusion criteria. After all ethical considerations, the data were collected by using pre-designed, pre-tested and semi-structured questionnaire and then analysed using MS Excel, SPSS-22 and Primer of Biostatistics.*
Results: *Out of total 340, 73.5% were males, 39.7% were hypertensives, 18.8% were known diabetics, 66.8% were obese, 80.7% were centrally obese, 48.5% were sedentary, 17.7% were taking alcohol and 5.0% were smokers. 13.3% had known to have heart disease. Out of 318 participants, 119 (37.4%) had low risk of developing CVDs in 10 years, 126 (39.6%) had intermediate risk and 73 (23.0%) had high risk. There is an increasing trend from low risk to high risk with increasing age.*
Conclusions: *Bank employees have high prevalence of CVD risk factors. Around 60 % had 10 year CVD risk as moderate to high making them a risk group which needs tailored intervention activities.*
Keywords: *Cardiovascular diseases, Risk factors, Bank employees, Risk assessment.*

Introduction

Globally, 17 million annual deaths which is nearly one third of the total are caused by cardiovascular diseases (CVDs).[1] In developed countries, CVDs are responsible for up to 50% of the total deaths.[2] In 2004, it was predicted that by the year 2020,

there will be an increase of almost 75% in CVD burden at the global level. Almost all of which, will be in the developing countries. The situation in India is more alarming.[3]

There is a evidence that job characteristics may be associated with CVDs, independently of the social status.[4] Bank employees who deal with various types of customers, involves economic liabilities, high levels of accountability, greatly reduced physical activity, and sedentary mode of functioning may predispose for the development of various diseases like hypertension, obesity, and diabetes mellitus which are the major risk factors for cardiovascular diseases.[5] Bank employees have high prevalence of risk factors for CVDs, thus they form a vulnerable population for cardiovascular diseases.[4]

Risk estimates can theoretically be used to raise population awareness of diseases (such as CVD) that cause a significant burden of morbidity and mortality, to communicate knowledge about that risk to individuals and subgroups, and to motivate adherence to recommended lifestyle changes or therapies.[6] Although South Asian populations have high CVD burden in the world, their patterns of individual CVD risk factors have not been fully studied.[6] So many individuals who are at high risk for CVD are not recognized and/or treated.[6]

Thus the present study is carried out to create awareness regarding the risk factors of cardiovascular diseases and to assess 10 year risk of cardiovascular diseases among the bank employees of Western Maharashtra.

Methods

Study setting: Present study is a cross sectional study carried out among the bank employees in Western Maharashtra during January 2014 to December 2015.

Sampling method: Multistage sampling technique was used in the study. A sampling frame of all nationalized banks in Western Maharashtra was prepared and one nationalized bank was selected randomly by using lottery method. The study was conducted in a single zone of the selected Nationalized Bank. After procuring the permission of the zonal level bank authority, a list of all the branches of that selected zone was obtained. A branch was selected from this list using lottery method. A list of all the employees working in the branch for the duration of more than 6 months was enumerated. All the eligible employees of next randomly selected branch of the bank were included until the adequate sample size was obtained.

Sample size calculation: The absolute error (d) of 5% and prevalence (P) of major risk factors were considered for the sample size calculation by using the formula $4PQ/d^2$.

For Diabetes (P) 28.4% based on a study among bank employees by Ganeshkumar et al,[7] the sample size obtained was 325.

For Hypertension (P) 30% based on a study on bank employees by Momin et al[8] sample size was 336.

For obesity (P) 72.6% based on a study by Ismail et al[9] sample size was 318.

336 was considered as sample size to be taken for the study.

Final sample size of 340 was taken as all the eligible bank employees from the last branch were included in the study.

Inclusion criteria: Bank employees involved in money related issues, who have served at least six months or more in the selected branches of the bank and those willing to participate.

Exclusion criteria: Bank employees of the cadre of peons and sub-staff, working for duration of less than six months, pregnant females and those who were unavailable for the study even after 3 visits.

Data collection: Pre-designed, pre-tested and semi-structured questionnaire was used to collect the data. All eligible study participants in the selected branch were willing to participate in the study because they felt that it provided an opportunity to get medical advice on work-related and personal problems. Confidentiality was assured to all participants. After getting the informed written consent, all the selected

employees were instructed collectively about filling the proforma and their queries were fulfilled. After this all the physical examinations were done as per the standard procedures. Data collected was compiled and analysed by using Microsoft excel, SPSS-22 and primer of biostatistics.

Measurements

The physical activity level was assessed using International Physical Activity Questionnaires (IPAQ) (Short).[10] IPAQ has been developed and tested for use in adults (age range of 15-69 years). It is reliable and reasonably valid instrument to assess and monitor habitual physical activity for older adults.[11,12]

Mental Stress level was assessed by using Perceived Stress questionnaire of the International Stress Management Association.[13] It consisted of 25 questions which were answered as yes or no by the participants. Participants were divided into three categories according to the score i.e. 4 points or less (category 1), 5-13points (category 2) and 14 points or above (category 3).[13] The stress score questionnaire had a good internal consistency, with Cronbach's $\alpha = 0.812$.

Height: After removal of foot wear, the subject was asked to stand with the back against the wall and heels touching the ground, arms on the side and the eyes in front parallel to the ground. Reading coinciding with the occipital edge was noted with the help of standard non-stretchable measuring tape.

Weight: Weight was recorded in kilograms (with minimal clothing and removal of foot wear) using a weighing machine with beam balance. (Sensitivity of scales was up to 500 grams).

BMI: Body Mass Index was calculated by using the formula (weight in Kg/ height in m^2) and classified according to the WHO defined BMI categories for Asian populations.[14]

Waist circumference (WC): It was measured at the midpoint between lower border of the rib cage and highest point of iliac crest with the subject standing, at the end of normal expiration.[15]

Hip circumference (HC): It was measured at the level of the greater trochanters with the subject wearing minimum clothes. The mean of two readings was taken in for calculating the waist-hip ratio (WHR).

Waist to hip ratio (WHR): It was calculated by dividing the waist circumference (cm) by the hip circumference (cm)[15] and classified as follows:

Central obesity: WHR ≥ 0.80 in women, WHR ≥ 0.90 in men.[14]

Normal WHR: WHR < 0.80 in women, WHR < 0.90 in men.[14]

Measurement of Blood pressure: Blood pressure was measured and classified as per the JNC7[16] guideline. Auscultatory method of BP measurement was used. Participants were seated quietly for at least 5 minutes in a chair with feet on the floor, and right arm was bared and supported at heart level. They were requested to avoid Caffeine, exercise, and smoking for at least 30 minutes prior to measurement. A standard sphygmomanometer and a standard stethoscope were used to ensure accuracy. Two measurements were taken 1 minute apart using right arm consistently and the average recorded. For manual determinations, palpated radial pulse obliteration pressure was used to estimate systolic blood pressure (SBP)—the cuff was then be inflated 20–30 mmHg above this level for the auscultatory determinations; the cuff deflation rate for auscultatory readings was 2 mmHg per second. SBP was recorded at the point at which the first of two or more Korotkoff sounds was heard (onset of phase 1), and the disappearance of Korotkoff sound (onset of phase 5) was used to define Diastolic Blood Pressure (DBP). The equipment was regularly inspected and validated. All subjects currently on anti-hypertensive medications were classified as "hypertensive", irrespective of their current blood pressure reading.

The same measuring tape, weighing machine and sphygmomanometer were used by a single person throughout the study.

10 year CVD risk: It was estimated by using Framingham Risk Score (FRS) for CVDs. Scoring

mechanism included offline calculator.[17] The FRS is based on age, gender, body-mass-index OR total cholesterol & HDL cholesterol, Systolic Blood Pressure, smoking status, diabetes, hypertensive treatment[17]. It was not applied to those already having heart attack or any heart disease. Based on the calculated risk score in percentage, the study subjects were divided into 3 categories as having: Low risk (<10%), Intermediate risk (10%-20%) and high risk (>20%) of developing Cardiovascular event as complication in next 10 years.[17] The predictive value of risk scoring using the Framingham equation is reasonable, with area under the receiver operated characteristic curve a little over 70%. Framingham non-laboratory based algorithms met most of the benchmarks outlined by Cooney and colleagues as hallmarks of a clinically robust risk assessment algorithm.[18] The FRS discriminates CVD risk very well as evidenced by C statistics that typically range from 0.75 to 0.80 and is well calibrated for a wide range of white and black populations in the United States.[18] For other populations such as Asian Americans, American Indians, Hispanic Americans, and native Chinese, discrimination remains acceptable. FRS can also be used to identify high cardiovascular risk in the Malaysian population.[6] As age plays determinant role of the CV risk in FRS, it is shown to underestimate CV risk in Indians, in whom CVD tends to occur at a younger age than the western populations.[19,20] However, with simple steps to recalibrate the FRS model, it performs quite well in both discrimination and calibration. Chow et al have proposed a calibration method to optimize CV risk estimates for Indians. According to their study, the 10-year risk derived from FRS can be recalibrated by multiplying the calculated risk with a correction factor.[20] For rural Indians, the suggested correction factor is 1.0 for men and 0.8 for women, whereas the same for urban Indians is 1.81 and 1.54 for men and women respectively.[20] One of the benefits of this approach is that recalibration of the FRS to a local population currently can help avoid the effort and expense of developing novel cohorts and awaiting information on risk factor relationships.[21]

Results

Total of 340 participants were included in the study, of which little over 2/5th were in the age group of 56-60 years (41.7%), 1/4th of them were in 51-55 years of age group(27.6%). The range of age varies from minimum 26 years to maximum 59 years. The mean age of the study population was 51.3 (±9.01) years. Majority of them were males (73.5%), Hindus (89.1%), married (92.1%), graduated (78.8%), belonging to upper socio-economic class(94.1%) according to Modified BG Prasad's classification.(May 2014)[22], residing in urban area (82.1%). 42.6% of them were managers (40 branch managers & 105 other (Zonal managers), 42.1% were clerks and 15.3% were cash handlers. (Table No.1)

It is seen from the table no. 2 that 39.7% were hypertensives, 18.8% were known diabetics, 66.8% were obese, 80.7% were centrally obese, 48.5% were sedentary, 17.7% were taking alcohol and 5.0% were smokers. Percentage of obese persons was higher and that of smokers is lower in the present study as compared to other studies in the bank employees.

In our study we have also assessed the mental stress level among the subjects. Out of 340, 59 (17.4%) had low stress, 251 (73.8%) had moderate stress and 30 (8.8%) had high level of stress. Bank employees have High prevalence of risk factors for CVD as shown in Table No.2 (85% of them were having >2 risk factors).

10 year risk for cardiovascular events

As FRS CVD risk assessment is not for those already having heart attack or any heart disease, all those with such history in the past (22) were excluded and 10 year risk of CVD was calculated for remaining 318 study subjects. The cardiovascular events predicted by FRS CVD risk assessment tool includes coronary death, myocardial infarction, coronary insufficiency, angina, ischemic stroke, hemorrhagic stroke,

transient ischemic attack, peripheral artery disease, heart failure.

Table no. 3 shows age and 10 year CVD risk wise distribution of the 318 study subjects. Out of 318 participants, 119 (37.4%) had low risk of developing CVDs in 10 years, 126 (39.6%) had intermediate risk and 73 (23.0%) had high risk. Out of those having high risk, majority (91.8%) were from the age group of 56-60 years followed by 8.2% from the age group of 51-55 years. When the risk was assessed decade wise it was observed that as age advances there is an increasing trend from low risk to high risk. All those with high risk were from 5th decade group.

Data is shown in figure 1 and figure 2 for males and females respectively. It is seen that all males and females below 40 years were at low risk. Number of females with intermediate risk and high risk was less in 4th and 5th decade as compared to their male counterparts. During 5th decade, more number of males is at HIGH risk for CVD-10.

To assess of impact of individual risk factors on overall CVD risk, categorization was done as shown in table no. 4. Out of 318 individuals, 119 (37.4%) had low risk, 126 (39.6%) with intermediate risk and 73 (23.0%) had high risk of developing CVD in 10 years. The results indicated that almost all the risk factors possessed increasing trend from low risk to high risk group. Among those having high risk (73), all had their BMI equal to or above 23 kg/m^2, 60 (82.2%) were centrally obese, 60 (82.2%) were hypertensives, 31 (42.5%) were diabetics, 13(17.8%) were smokers, and 12(16.4%) were taking alcohol.

Table No. 1: Socio-demographic variables of the study subjects

Sr. No.	Variables	Categories of the variables	Frequency N =340	%
1	Age (Years)	26-30	25	7.4
		31-35	8	2.3
		36-40	5	1.5
		41-45	25	7.4
		46-50	41	12.1
		51-55	94	27.6
		56-60	142	41.7
2	Sex	Male	250	73.5
		Female	90	26.5
3	Religion	Hindu	303	89.1
		Buddhist	25	7.4
		Jain	8	2.3
		Muslim	4	1.2
4	Marital status	Married	313	92.1
		Unmarried	19	5.6
		Widow/Widower	8	2.3
5	Education	Graduate	268	78.8
		Post Graduate	72	21.2
6	Residence	Urban	279	82.1
		Rural	61	17.9
7	Socioeconomic status	Class I	320	94.1
		Class II	20	5.9
8	Cadre	Manager	145	42.6
		Clerk	143	42.1
		Cash handler	52	15.3
Total			340	100

Table No. 2 Prevalence of risk factors for CVDs in bank employees as reported in various studies

Studies	Prevalence of the Risk Factors in %						
	HTN	DM	Smoking	Alcohol	Sedentary	Obesity	Male
Lokare et al[4]	38.0	10.0	10.0	4.0	80.0	56.0	76.0
Shivaramakrishna et al[2]	31.3	21.3	25.9	25.9	44.0	35.5	76.0
Ganesh kumar et al[7]	31.3	28.4	15.5	10.0	33.0	26.0	53.0
Parashar et al[27]	69.5	20.0	25.5	35.5	-	14.0	88.9
Nagammanavar et al[29]	48.8	9.4	7.4	13.8	62.9	50.6	81.2
Ganesh kumar et al[25]	44.3	11.5	5.7	30.2	32.3	49.5	66.7
Ismail et al[9]	39.3	13.7	10.3	42.7	72.6	35.9	76.9
Undhad et al[28]	69.5	20.0	25.5	35.5	-	14.0	88.0
Observed Range in above studies	31.3 to 69.5	9.4 to 28.4	5.0 to 25.9	4.0 to 42.7	32.3 to 80.0	14.0 to 66.8	53.0 to 88.8
Present Study	**39.7**	**18.8**	**5.0**	**17.7**	**48.5**	**66.8**	**73.5**

Table no. 3 Age &10 year CVD risk wise distribution of study subjects. (n=318)

S.N.	Age in years	Low risk (%)	Intermediate risk (%)	High risk (%)	Total n=318 (%)
1	26-30	25 (21.0)	0 (0.0)	0 (0.0)	25 (7.8)
2	31-35	8 (6.7)	0 (0.0)	0 (0.0)	8 (2.5)
3	36-40	5 (4.2)	0 (0.0)	0 (0.0)	5 (1.6)
4	41-45	17 (14.3)	8 (96.3)	0 (0.0)	25 (7.8)
5	46-50	25 (21.0)	16 (12.7)	0 (0.0)	41 (12.9)
6	51-55	31 (26.1)	48 (38.1)	6 (8.2)	85 (26.8)
7	56-60	8 (6.7)	54 (42.9)	67 (91.8)	129 (40.6)
Total		**119 (100.0)**	**126 (100.0)**	**73 (100.0)**	**318 (100.0)**

Table no.4: Categorization of study subjects (n=318) according to the Framingham Risk Score and presence of various risk factors

S.N.	Variables	Low Risk (%)	Intermediate Risk (%)	High Risk (%)
1	Hypertension	12 (10.1)	45 (35.8)	60(82.2)
2	Diabetes	0 (0.0)	28 (22.2)	31 (42.5)
3	Smoking	0 (0.0)	4 (3.2)	13 (17.8)
4	Alcohol intake	8 (6.7)	35 (27.8)	12 (16.4)
5	BMI ≥23	83 (69.8)	102 (81.0)	73 (100.0)
6	Central Obesity	77 (64.7)	101 (80.2)	60 (82.2)
Total (n=318)		**119 (37.4)**	**126 (39.6)**	**73 (23.0)**

Figure 1 :- Framingham's 10 year risk of CVDs in the Males according to age

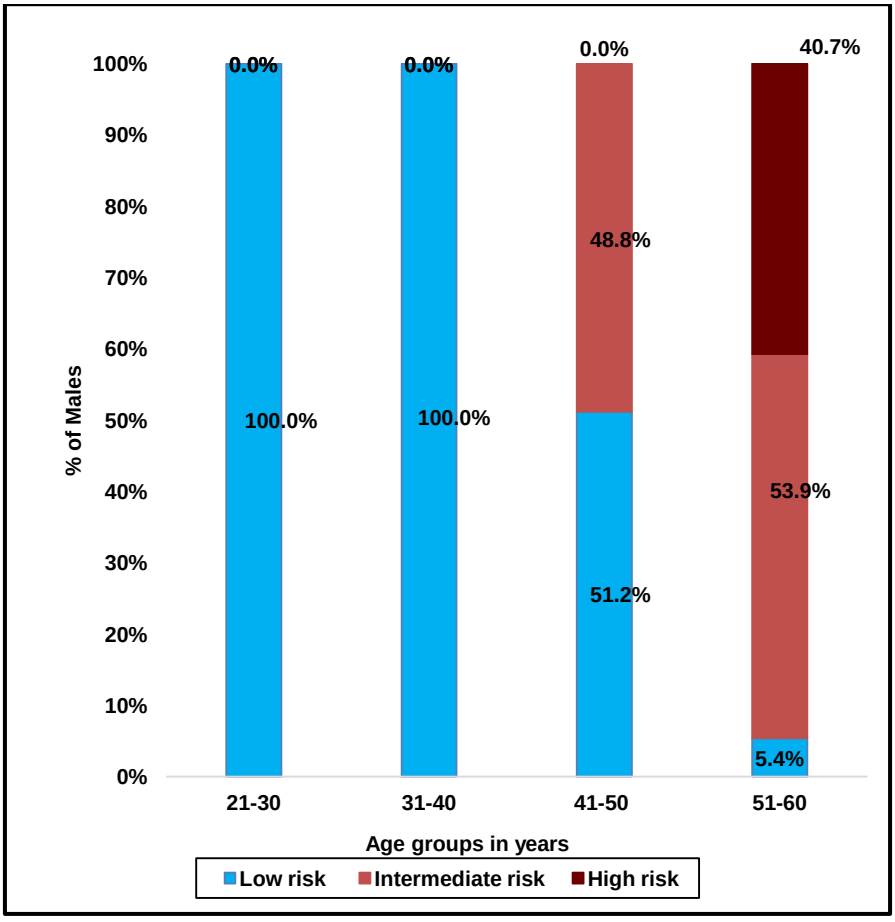
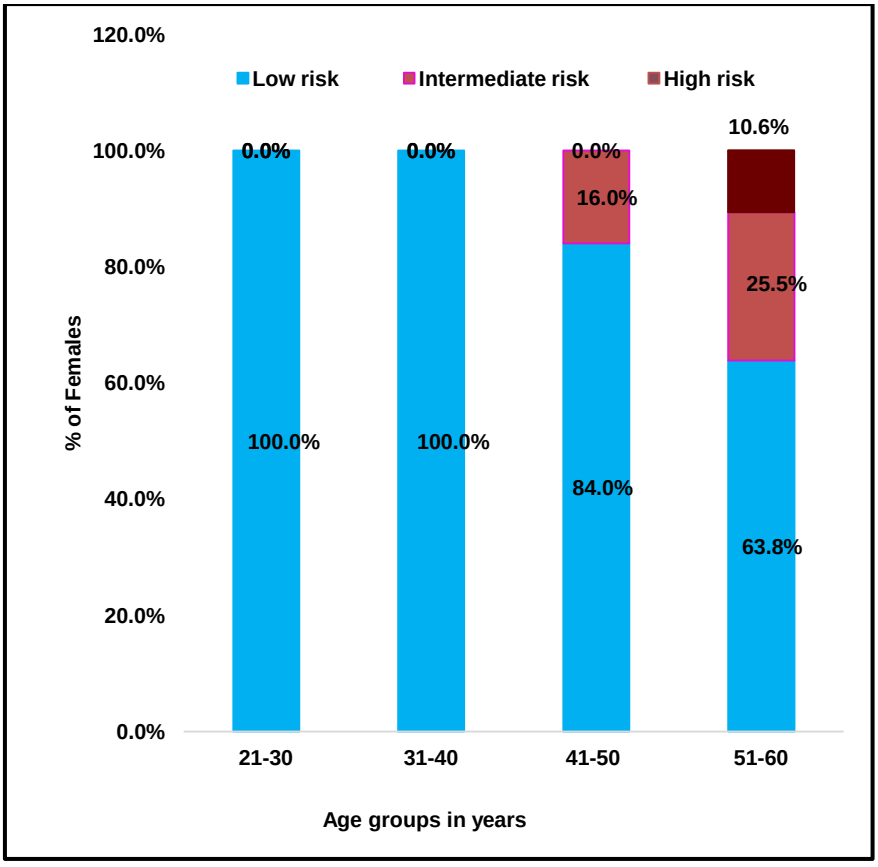


Figure 2 Framingham's 10 year risk of CVDs in the Females according to age



Discussion

Present study is carried out to find out the risk factors of cardiovascular diseases and CVD risk assessment present among the bank employees of Western Maharashtra in which a little over 80% of the participants were in the age group of 46-60 years. Majority of the participants were males, Hindus & married. The study group was homogenous as almost all were educated at least up to graduation and belonging to class I (94.1%) and class II (5.9%) of modified B.G Prasad's socio-economic classification because support staff from the banks was not included in the present study. Majority of them were from urban residence.

The finding of 39.7% of hypertensives in present study was in accordance with the studies by Lokare et al,[4] Ismail et al,[9] Prashanth et al.[23] It is higher as compared to the studies by Ganesh Kumar et al[7] Shivaramakrishna et al,[2] Mohmmedirfan et al[24] and lower as compared to the studies by Ganesh Kumar et al[25], Maroof et al,[26] Parashar et al[27] and Undhad et al.[28] This special variation could be because of the fact that hypertension is a life style disease and the prevalence is more when there is risk behaviour.

Findings of 18.8% diabetics was in accordance to other studies by Shivaramakrishna et al,[2] Prashanth et al.[23] Undhad et al.[28] while it was lower than that in studies by Ganesh Kumar et al[25] and higher than that in studies by Lokare et al,[4] Nagammanavar et al[29]and Ismail et al,[9]

Other factors had a wide range in various studies as shown in table no.2

In this study, 119 (37.4%) were at low risk of developing CVDs in 10 years, 126 (39.6%) were at intermediate risk and 73 (23.0%) were at high risk. In a study of a representative sample of the US population by Ford ES, less than 20% of men aged 60 years and older were classified as being at high risk.[30] 4.44% have shown high risk for CVD below the age of < 60 years in a study conducted in Brazil by Cesarino et al.[31] Total 83% of the study population was found to be at-risk for cardiovascular diseases in a study of bank employees by Vinod et al.[32] A study on Asian Indian population had found 65.4% having low risk of CVD event followed by 21.95% having intermediate and 12.65% showing high risk of CVD. The results indicated that almost all the risk factors possessed increasing trend from low risk to high risk group.[33]

Current study subjects showed higher risk as compared to these studies. This could be there as Bank employees are at higher risk for hypertension and Cardio-vascular diseases. The participant having intermediate / high CVD risk for 10 years were counselled regarding changes in lifestyle to modify their risk. Also they were counselled about regular treatment and follow-up for hypertension and diabetes.

Conclusions

Around 60 % of the study subjects had moderate to high 10 year CVD risk. So bank employees have high prevalence of CVD risk factors making them a risk group which needs tailored intervention activities.

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Declarations

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Conflict of interest: None declared

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