

A survey to predict the incidence of coronary artery disease amongst group c employee's of Brihanmumbai Municipal Corporation using ACSM risk factor stratification

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Abstract

Background: The present study aims to find out the incidence of coronary artery disease (CAD) risk factors based on the American College of Sports Medicine (ACSM) risk factor guidelines among group C employees of Brihanmumbai municipal corporation. A cross-sectional survey with a sample size representing the target population was conducted. The study employed a structured questionnaire, ascertaining the risk factors of family history, lifestyle, and physiological parameters. The ACSM risk factors are significantly correlated with the incidences of CAD and are good indicators to predict the likelihood of suffering from CAD. It further illuminates that cardiovascular health for the bmc sector, especially for the identified risks, would need specially targeted intervention programs. Despite numerous researches carried out on the risk factors of coronary artery disease (CAD) in the general population, some specific occupational groups have unique influences that affect their cardiovascular health. Group C employees form one such group with potential stressors linked to their work environment, lifestyle choices, and physiological parameters.

Method: 103 group C Employees were included according to inclusion and exclusion criteria between the age group of 20-60 years. Group C employees were interviewed for demographic details, perceived stress questionnaire & ACSM risk factor stratification

Result & Conclusion: The present study demonstrated high incidence (97.08%) of CAD risk factor amongst group C employees of Brihanmumbai Municipal Corporation in Mumbai. It was observed that group c employees were exposed to a volley of problems in all three domains of health viz. Physical, mental & social owing to their demanding job profile. Sedentary lifestyle was found to be the commonest risk factor amongst their entire population study; followed by stress, age and hypertension

Keywords: Coronary Artery Disease (CAD), Risk Factors, ACSM, group C employees, Cardiovascular Health

Introduction

Cardiovascular disease (CVD) is a class of disease that involves heart or blood vessels CVD includes coronary artery disease (CAD) such as angina and myocardial infarction or commonly called as heart attack, as well as stroke, heart failure, cardiomyopathy, peripheral vascular disease valvular heart disease and venous thrombosis. [1] CAD is a common type of heart disease that affects the main blood vessels that supply blood to the heart, called coronary arteries. In CAD there is reduced blood flow to the heart muscles due to buildup of plaque (fats, cholesterol and other substances) in and on artery walls. Atherosclerosis is the condition which usually causes CAD. [2, 4] The prevalence of risk factors for CAD found through a systemic review study yielded the risks as smoking, hypertension, diabetes mellitus, alcohol consumption and sedentary lifestyle. [1, 2] Group C employees, who often have jobs involving prolonged sitting and high-stress environments, may be at an increased risk for coronary artery disease (CAD). This risk is linked to factors like job strain, long working hours, and a sedentary lifestyle. [1, 2, 3, 5] Cardiovascular death accounts about 30 % of deaths worldwide amongst which the burden of CAD in India is proposed to be highest in 2020 study with patients below 50 years of age. [5]

Group C employees most often lead sedentary lifestyles due to prolong hours and limited opportunities for physical activity during work hours. Prolonged sitting is linked to increased risk of metabolic syndromes and CAD. [1, 2] Tasks

performed by the employees include clerical, managerial and administrative duties that mainly involve writing, dictating, ledger keeping, cash handling, receipts and mental activities. These are usually classified as sedentary activities. [2, 5] Employees here deal with various in-house staff, public customers, economic liabilities, higher accountability, highly reduced physical activity, and sedentary mode of functioning are predisposed to development of cardiovascular diseases such as hypertension, obesity and diabetes mellitus along with non-communicable diseases such as ischaemic heart disease, myocardial infarction & high levels of stress. [6, 7] Lifestyle changes, work-life balance, altered food habits, sleep deprivation, addictions, and related disorders, primarily due to work settings are major risk factors for the development of CAD. [6, 9, 11] As there is a consistent correlation between sedentary lifestyle and CHD based on epidemiology studies thus explaining the higher prevalence of CHD reported in sedentary workers. Thus, for clerical staff risk estimates can theoretically be used to spread awareness increase motivation and to get a better adaptability to treatment screening and lifestyle changes or therapies [8-10]

Methodology

Study Design and Setting

The current research design of the cross-sectional study was applied to predict the risk of incidence of coronary artery disease amongst group C employees of Brihanmumbai Municipal Corporation in Mumbai suburban area

Data Sources and Study Population

The study population was group C employees of BMC in Mumbai suburban areas where 103 voluntary participants amongst age groups 21 to 58 of both genders were selected who had job experience of at least 1year, excluding participants who are a known case of CAD or have undergone PTCA and those participants who have been diagnosed with either neurological or musculoskeletal conditions/diseases.

Ethical Considerations

Study has been approved by Institutional Ethics Committee of TMV's Lokmanya Tilak College of Physiotherapy, Kharghar. The participants received an explanation regarding the goals and procedure of the study before data collection. All participants provided written and informed consent. Participation was non-compulsory and the

participants' data were kept confidential and anonymous during the study.

Methodology

Informed consent was taken from all subjects, demographic history of each subject was noted which included their personal details, job classification, designation, and work schedule details. Height, weight, and blood pressure were measured and Body Mass Index (BMI) was derived by Quetelet's index $\text{Weight (kg)} / \text{Height (m)}^2$. The subjects were then interviewed with the already validated questionnaire ACSM risk factor stratification scoring. The subjects were then interviewed for Stress using the Cohen Perceived Stress Scale.

Statistical analysis

Demographic details

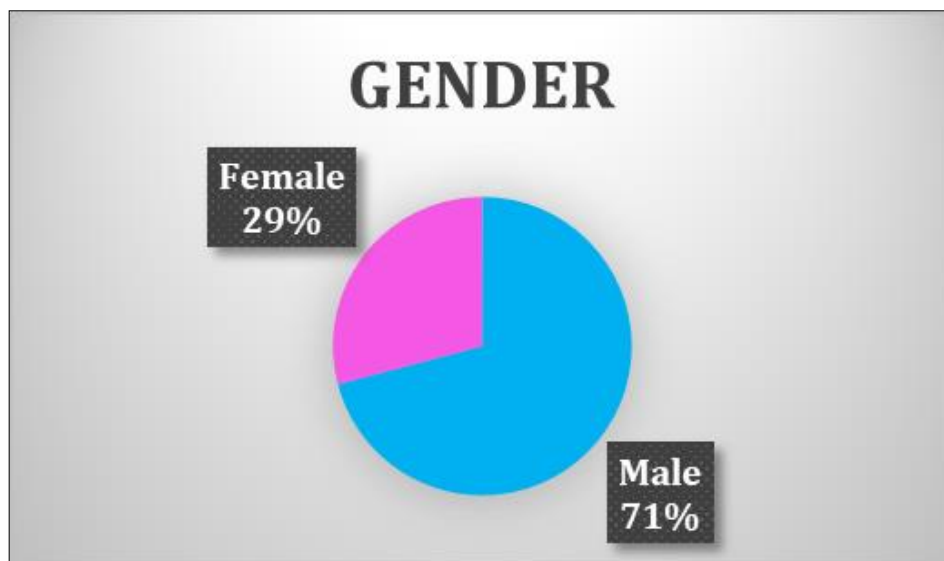


Fig 1: Pie Chart representing Gender distribution

Table 1: Sex wise distribution of the respondents.

Gender	Number	Percentage
Male	73	71%
Female	30	29%

Interpretation: Majority of the respondents were male (71%)

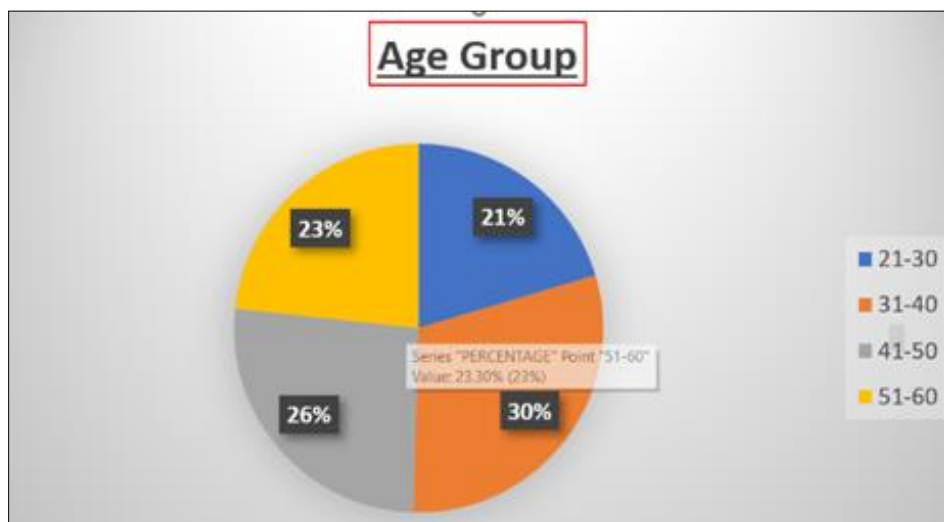


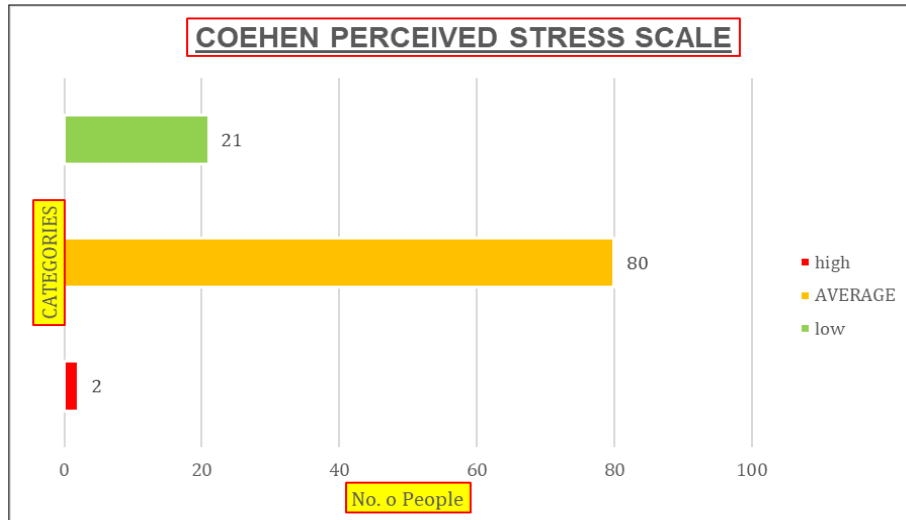
Fig 2: Pie Chart Representing Age Group Distribution

Table 2: Age wise distribution of the participants

Age range	Number	Percentage
21-30	21	20.38%
31-40	31	30.09%
41-50	27	26.21%
51-60	24	23.30%

Interpretation: Majority of the respondents belonged to age group of 31-40(30.09%)

Perceived stress scale



Graph 1: Cohen perceived stress scale scoring

Interpretation: Amongst the participants we see 2% of total study population has high levels of stress while 77.66% has average cohen perceived stress score

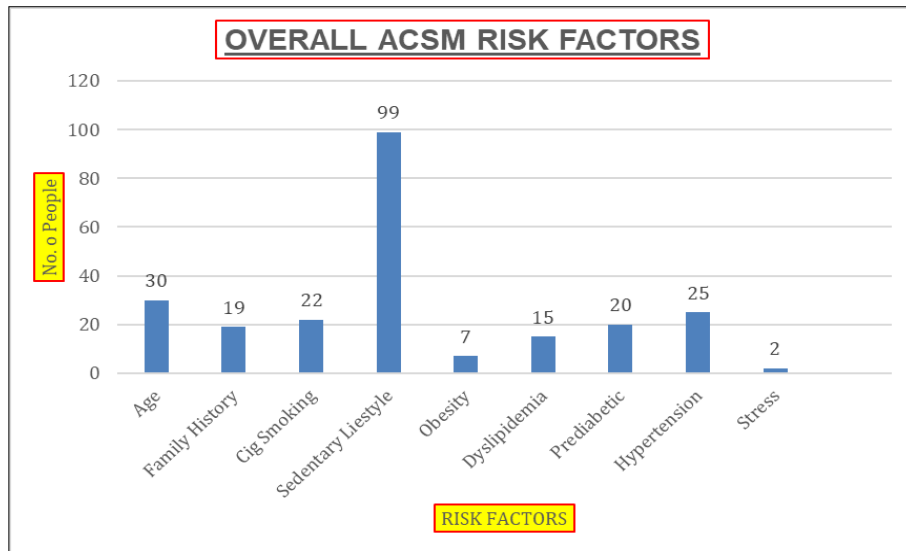


Fig 3: Graphical representation of Overall ACSM risk factors

Table 3: Represents the overall ACSM risk factor categories

Overall ACSM	Frequency	percentage
Age	30	29.12%
Family History	19	18.44%
Cig Smoking	22	21.35%
Sedentary Lifestyle	99	96.11%
Obesity	7	6.79%
Dyslipidaemia	15	14.56%
Prediabetic	20	19.41%
Hypertension	25	24.27%
Stress	2	1.94%

Interpretation: the most common risk factor in the study population was “Sedentary Lifestyle” (96.11%). Age is a risk factor for 30 in this group, which is 29.12%. Family history affects 19 individuals, or 18.44%. Cigarette smoking is a risk for 22 individuals, or 21.35%. A sedentary lifestyle is the most widespread risk factor: it can be put down as 99 individuals or 96.11%. Seven persons, equivalent to 6.79%,

have obesity as a risk factor. Fifteen persons, or 14.56%, suffer from dyslipidemia. There are twenty persons with prediabetes as a risk factor, accounting for 19.41%. twenty-five persons, who make up 24.27%, have hypertension. But the most surprising aspect of the particular categories shows high stress markers based of cps score as 2 individuals or viz. 1.94%

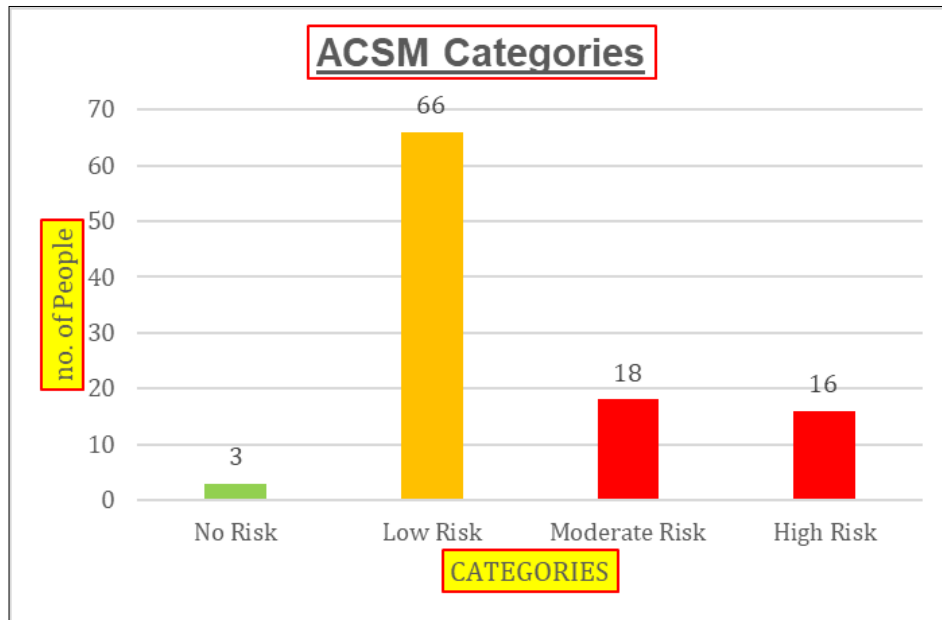


Fig 4: Graphical representation of ACSM risk factor stratification.

Table 4: ACSM Risk factor stratification

ACSM	frequency	percentage
No Risk	3	1.10%
Low Risk	66	64.07%
Moderate Risk	18	17.47%
High Risk	16	15.53%
total	103	100%

Interpretation: The majority (64.07%) of the study population had low-risk development of CAD. The table presents the ACSM risk categories, the number for each, and their percentage. In the 'no risk' category, there are 3 individuals, which is 1.10% of the total study population. 'Low risk' has 66 individuals, making up 64.07%. 'Moderate risk' encompasses 18 individuals, representing 17.47%. 'High risk' includes 16 individuals, accounting for 15.53% of the total study population.

Discussion

- This study investigated the incidence of risk factors of CAD amongst group c employees of Brihanmumbai Municipal Corporation.
- The present study consisted of 103 group c employees out of which 73 were Males and 30 were Females
- On evaluation of results as per ACSM Stratification we noted that 3 employees (1.10%) had no risk, 66 employees (64.07%) had low risk, 18 employees (17.47%) had moderate risk and 16 employees (15.53%) had high risk of developing CAD [2]
- As per Cohen Perceived Stress, 2 employees (1.94%) had high stress levels, 80 employees (77.66%) had average stress levels and 21 employees (20.38%) had low stress levels. [2, 3, 5, 11]

Risk Factor Category wise discussion:

- Sedentary lifestyle:** 96.11% of the total study population had sedentary lifestyle as a risk factor. Working hours were mostly spent sedentary by the employees by sitting for prolonged period of time (approx. 10hrs). Interestingly, the main hobby of most of the employees was to sleep for as long as they could due to high fatigue levels of their jobs. [5, 11]
- Stress:** It was found that more than half of the population (77.66%) had stress. Hours of monotonous work, working under pressure, high responsibilities, documentation etc. makes them prone to experience burnout and stress. [2, 3, 5, 11]
- Age:** 29.12% of the total study population was age as a risk factor, where the number of males is greater than number of females [5, 11]
- Hypertension:** 24.27% of the total study population had hypertension as a risk factor. This could be attributed to the hectic schedules, work related stress, sleep deprivation, lack of exercises and prone to smoking. [6, 8, 9, 10]
- Cigarette smoking:** 21.35% of the total study population had smoking as a risk factor. With high disposable income at young age, they easily resort to smoking and it was considered as a quick fix solution to manage stress. [1, 3, 5, 11]
- Prediabetes:** 19.41% of the total study population had prediabetes as a risk factor that might be due to family history, genetic predisposition, physical inactivity and stress. [3, 5, 7, 11]

- **Family History:** 18.44% of the total study population had family history as a risk factor. Familial predisposition to CAD was related to other risk factors like diabetes, hypertension and history of cardiovascular surgery. [3, 4, 5, 7, 11,]
- **Dyslipidemia:** 14.46% of the total study population had dyslipidemia as a risk factor, this may be due to low physical activity this may be due to low physical activity level, increased fast food consumption, excessive alcohol consumption etc. [3, 4, 5, 11]
- **Obesity:** 6.79% of the total study population had obesity as a risk factor i.e. due to higher BMI that may be due to inactivity, stress eating etc [3, 8, 10]

Overall, the study highlights the significant impact of lifestyle and occupational stress on CAD risk amongst group C employees, emphasizing the need for interventions to promote physical activity and stress management.

Limitations and future directions

The cross-sectional survey was confined to a single ward of Brihanmumbai Municipal Corporation; thus, it covered a relatively small number of participants. The study can be conducted on a larger scale including a greater number of wards in BMC or other group of employees excluding group C employees. As the study included only group C employees it could also be conducted by creating more stratifications or by either adding more participants to add further diversity with respect to their job profile.

As the study population was representative of the people working in the same sector so the incidence of CAD is likely to increase further because of rapid urbanization and its accompanying life style changes.

Therefore, it is crucial to raise awareness amongst them about these risk factors, promote proper dietary habits and physical activity, there is also a need for de-stressing facilities like games, meditation and counselling facilities at respective work places and at the same time develop guidelines for screening and preventive therapeutic programs to identify and manage individuals at risk for developing CAD.

Conclusion

The study highlights significant CAD risk factors among officer-grade bank employees, emphasizing a sedentary lifestyle as the most incident, affecting 96.11% of participants. This aligns with findings that prolonged sedentary behaviour significantly elevates CAD risk due to decreased physical activity and increased work-related fatigue. Stress was the second most common risk factor, impacting 77.66% of the employees, which is consistent with research linking occupational stress to higher burnout rates and CAD risk. Cigarette smoking was identified in 21.35% of the participants, often used as a coping mechanism for stress, highlighting the need for targeted smoking cessation programs within this demographic. Family history accounted for 18.44% of the risk, underscoring the genetic predisposition to CAD. Other notable risk factors included obesity [6.79%], dyslipidemia [14.46%], hypertension [24.27%], and prediabetes

[19.41%], each contributing to the overall risk profile due to lifestyle and genetic factors. These findings advocate for workplace health interventions, promoting physical activity and stress management to reduce CAD risk amongst group C employees. Overall, addressing these modifiable risk factors through comprehensive wellness programs is crucial for improving cardiovascular health in this population. The present study demonstrated high [97.08%] incidence of CAD risk factor amongst group C employees of Brihanmumbai Municipal Corporation in Mumbai. It was observed that group c employees were exposed to a volley of problems in all three domains of health viz. Physical, mental & social owing to their demanding job profile. Sedentary lifestyle was found to be the commonest risk factor amongst their entire population study; followed by stress, age and hypertension

Abbreviations

CAD – coronary artery disease

BMC – Brihanmumbai Municipal Corporation

CVD – Cardiovascular disease

CHD – Coronary heart Disease

PTCA – Percutaneous transluminal coronary angioplasty

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