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Original Article

Cardiovascular Disease Risk Factors among Group C Employees in a Tertiary Health Care Centre in Puducherry: A Cross-sectional Study

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ABSTRACT

Background: Settings based approach for health promotion at workplaces is surveillance of employees for CVD risk factors, which will help to estimate the prevalence of CVD risk factors and monitor CVD risks among the employees. It was planned to calculate the prevalence of CVD risk factors among group C employees of tertiary care hospital in south India. **Materials and Methods:** A hospital based cross-sectional survey was conducted among 324 group C employees aged ≥18 years as per the WHO "STEP wise approach to surveillance of non-communicable diseases" (STEPS) methodology. Standardized international protocols were used to measure behavioural risk characteristics (smoking, alcohol consumption, fruit and vegetable consumption, physical activity) and physical characteristics (weight, waist circumference, height and blood pressure). Multivariate analysis was done to know the factors, which carry independent risk of hypertension. Risk factor profiling of the employees was done using WHO/ISH risk prediction chart to estimate the 10 year risk of a fatal or non-fatal major cardiovascular events (myocardial infarction or stroke), according to age, gender, blood pressure, smoking status and presence or absence of self-reported status of diabetes mellitus. Data entry was done using Epi-data version 4.4.2.1. Data cleaning and analysis was done using Statistical Package of Social Sciences (SPSS) version 20. **Results:** Mean age in years was 34.3 (±8.26) and men contributed 79.3% of study participants. Prevalence of major cardiovascular risk factors was as follows: Current smokers 25.3% men, regular alcohol intake 29.01% between men, overweight (≥23 kg/m^2) 26.4%, central obesity 16%, hypertension 13.7% and a past history of diabetes mellitus 15.6%. Almost 3/4th of the participants were following unhealthy diet and living sedentary life style. The relationship between socio-demographic factors and selected risk factors of CVD (tobacco use, alcohol use, unhealthy diet and physical activity) was found significant associated with gender, age, educational status and years of work experience. Around four percent participants had a >10% risk of developing CVD in next 10 years. **Conclusion:** The prevalence of CVD risk factors is high in the sample population. Employee health and wellness program must be regulated and implemented in the institute, to overcome the burden of cardiovascular diseases.

Key words: Employee, Cardiovascular disease, Risk factor profile, Prevalence, Tertiary Health Care.

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INTRODUCTION

Cardiovascular disease (CVD) is a wide, umbrella term used to present all factors affecting the heart and circulatory system, including coronary heart disease, stroke, heart attack and aortic disease. They account for an estimated 17.5 million deaths annually and more than 75% of those deaths occur in lower-middle-income countries (LMIC).[1] In India, CVDs account for more than a quarter of all deaths caused by the Non-communicable diseases (NCD). The premature mortality in terms of life lost to CVDs in the country has increased by 59% during the years 1990 to 2010. The Global Thurst of Disease (GBD) study estimates that 52% of CVD deaths occur below the age of 70 years in India as compared to 23% in EME, resulting in a profound adverse impact on its economy. It is predicted that in 2020, 2.6 million Indians would die due to coronary heart disease which contributes 54.1% of all CVD deaths.[2] One key component in implementing health promotion at workplaces is surveillance of employees for CVD risk factors, which will help to estimate and monitor the prevalence of CVD risk factors and predict CVD risks among the employees. By estimating the level of CVD risk factors and identifying at high-risk employees for a cardiovascular event could help initiating specific health interventions and thereby reducing the CVD morbidity and mortality among the employees. There is also scant evidence regarding the prevalence of CVD risk factors between the Group C staffs of tertiary care hospitals in the country. Group C employees are those working in non-supervisory/

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non-administrative roles e.g., clerks, assistants, typist, stenographer, telephone operator, multi-tasking staffs, etc.[3-6] In addition, JIPMER being a health promoting hospital, it is ideal to take a step towards CVD risk factors surveillance for improving the employee welfare.

MATERIALS AND METHODS

Study setting

A hospital based cross-sectional study was conducted in JIPMER, Puducherry in the September and October 2018. A sample size of 293 was calculated using OpenEpi (version 3.01) by assuming the prevalence of hypertension among the study population as 25.6%,[3] 5% absolute precision and 95% confidence interval.

Expecting a non-response of about 10% the required sample size is raised to 326.

All Group C employees aged 18 years and above working in JIPMER within the study period were involved in the study after taking informed written consent. The study was permitted and approved by administrative and institute ethics committee

Study procedure

The study was initiated after obtaining the administrative, scientific and ethical clearances from JIPMER. For data collection, the investigator visited all departments in each of the six blocks where Group C employees were posted. Each of the blocks was given a code number between one and six. In each department, the investigator met all the group C employees present in the ward at the time of visit. Each Group C employee was contacted twice for data collection. The first contact was to know their willingness to participate, getting written informed consent and handing over the self-administered questionnaire. The second contact was to get back the filled questionnaire and assess the physical measurements. Upon expressing willingness to participate, a written informed consent was obtained. Then, the questionnaire was handed over to the participant. The questionnaire was collected back from the participant on the next day and the participant's weight, height, waist circumference, hip circumference and blood pressure was measured on the same day. Physical measurements were done in a separate room in the department to ensure the privacy of the participant. Blood pressure, Height, weight, waist and hip circumference were be calculated using conventional procedures as prescribed by the STEPS guidelines.[7] Employee who could not be contacted during the three visits were excluded from the study.

Statistical analysis

Data entry was done using Epi-data version 4.4.2.1. Data cleaning and analysis was done using Statistical Package of Social Sciences (SPSS) version 20. Continuous variables like household income, duration and quantity of smoking, quit attempts, binge drinking, consumption of salt and processed food high in salt, physical activity and physical measurements were presented as mean (SD) or Median (IQR).

Categorical variables like gender, residence, education, current and past smoking, control of salt intake, past events of raised blood pressure, diabetes, raised total cholesterol and cardiovascular diseases, lifestyle advice was presented as proportions.

The prevalence of selected Cardiovascular Disease Risk factors was summarized as percentages with 95% confidence interval.

The association between socio-demographic variables and CVD risk factors was assessed using binary logistic regression and expressed as prevalence ratio with 95% confidence interval. *P*-value of less than 0.05 was considered statistically significant. For risk assessment of a participant, the LI versions of SEAR D chart were chosen based on the presence or absence of diabetes in the participant. Each participant was classified into one of the five risk levels and the CVD risk among the study participants were summarized using proportion

RESULTS

The study comprised of 326 participants, of whom 324 (99.4% response rate) consented for participation. The mean age of study population was 34.3 (±8.26) years with majority being males 79.3% (n = 257). Selected socio-demographic parameters of the participants are presented in Table 1.

Prevalence of behavioural risk factors

One-fourth 25.3% (82/324) participants were current smokers and 29.01% (94/324) have consumed alcohol during the last one year. Among 324 participants, 10.2% (33) were engaged in vigorous-intensity physical activity for work that caused large increase in breathing/ heart rate continuously for at least 10 min. About 14.2% (46/324) cycled or walked for at least 10 min continuously to reach or return from a place. Out of 324 participants, 12.3% (40/324) did vigorous intensity fitness / sports / recreational activities that caused large increase in breathing or heart rate for at least 10 min continuously. More than one-third 36.1% (117/324) participants have visited any health care provider (HCP) or a doctor in the past 1 year.

The median (IQR) number of days of eating fruits and vegetables per week among the study participants was $2^{2,3}$ days and $4^{4,5}$ days respectively (not shown in Table). Almost everyone took at least one serving of vegetable each day. When asked to the subjects to describe about their salt intake, Nine out of ten 89.2% (289/324) participants added salt in food before eating and majority 95.3% (307/322) participants ate processed foods high in salt.

More than half 52.8% (171/324), 55.9% (180/322) participants added salt before eating food and ate salt rich processed foods respectively.

Table 1: Socio-demographic profile of group C employees in a tertiary care centre in Puducherry (N= 324).

Variables	Frequency (N)	Percentage (%)
Age categories (in years)		
18-29	106	32.7
30-44	175	54.0
45-60	43	13.3
Gender		
Male	257	79.3
Female	67	20.7
Educational status (*n*=74)#		
Upto Secondary School	10	2.7
Higher Secondary	14	10.8
Graduate and above	50	86.5
Residence		
Urban	288	88.9
Rural	36	11.1
Years of work experience		
≤ 5	137	42.3
6-15	139	42.9
≥16	48	14.8

#*n*=74 is due to non-response to the question by participants

Of the 326 subjects, 15.6%, 27.1% and 5.6% have had history of diabetes, hypertension and CVD mortality, respectively. (Table 2)

Nearly one-fifth 19.4% (63/324) were having normal BMI. Four out of five participants 78.6% (225/324) were either over-weight or obese. The mean BMI (SD) of study the participants were 25.46 (9.5). Majority 67% (217/324) participants were having optimal or normal systolic and diastolic blood pressure levels. About one-fifth 19.7 (64/324) and one-tenth 13.3 (43/324) participants were pre-hypertensive and hypertensive respectively. The Mean (SD) systolic and diastolic BP were 123.1 (15.1) and 79.2 (9.5) mm of Hg respectively. Abdominal obesity was present in less than one-tenth 8.9% (23/257) male and 43.3% (29/67) female employees. The mean (SD) waist circumference of the participants was 80.5 ± 8.4 (Table 3).

Risk profiling of group C employee

WHO/ISH risk assessment chart was used to predict the CVD risk among group C employee. Out of total 225 participants provided complete information for cvd risk profiling. (Table 4) Risk score was based on the age, tobacco use, gender and blood pressure level of the individual. Risk assessment showed that 3.2% subjects had >10% risk of developing cardiovascular disease in next 10 years. About one percent (3/225) had more than 30% risk of a CVD event in the next ten years among the participants.

DISCUSSION

India is witnessing a steady rise in the morbidity and mortality due to cardiovascular diseases (CVDs). The age-standardized death rates due to CVDs in India, stands at 272 deaths per lack population versus the global average of 235 deaths /lack population[2] and 52% CVDs deaths before 70 years of age in India, versus 23% in the developed countries[1] signifies the health burden of CVDs in India. To tackle this rising burden of CVDs in populations, the World Health Organization (WHO) advocates for 'Healthy Workplace Settings' to target the working population of 18-69 years old who are the vulnerable group to develop CVD risk factors and the consequent disease manifestation. The preliminary requisite to establish a Health workplace is to understand the magnitude of CVD risk factors among the workers group.[3] This cross-sectional study conducted among Group C employees of JIPMER revealed that one-fourth (25.3%) and one-third (29%) participants were current smokers and alcohol users respectively. Unhealthy diet and sedentary lifestyle was found in almost nine out of ten employees and about 14% and 15% were hypertensive and diabetic respectively. Majority (95.5%) employees had >10% risk of developing a fatal/ non-fatal CVD in the next 10 years.

Table 2: Prevalence of risk factors among study participants.

Variable	Total (n)$	Frequency (n)	Percentage (95% CI)
Current smoking*	324	82	25.3 (20.8 - 30.26)
Alcohol use in last 1 year	324	94	29.01 (24.34 – 34.18)
Vigorous-intensity activity	324	33	10.2
Walk or use of Bicycle	324	46	14.2
Vigorous fitness or recreational activity	324	40	12.3
Visited any HCP# in last 1 year	324	117	36.1
History of Raised Blood Pressure	239	65	27.1
History of Diabetes	179	28	15.6
History of Raised Total Cholesterol	162	32	19.7
History of Cardiovascular Diseases	324	18	5.6

**Current smoking is one who has smoked cigarettes (including hand rolled cigarettes, cigars, cigarillos etc) in the last 28 days.*

#HCP = Health Care Provider

$n changes due to non-response to the questions by the participants

Prevalence of Tobacco use

In the study, one out of four participants 25.3% (male 31.5, female 1.5%) was a current smoker. This prevalence is much higher when compared to a study done among the group C employees of JIPMER, which showed a smoking prevalence of 12%[3] This difference in the prevalence could be attributed to the non-probability sampling method followed in the present study whereas the compared studies utilized probability sampling methods. In comparison to this, 25.3% smoking prevalence in the present study is relatively higher which requires immediate targeted health intervention in the form of health education, encouraging quitting by referring the employees to the smoking cessation services at the hospital.

Prevalence of alcohol use

The study showed that more than one-fourth 29% employees were current alcohol users. In contrast to this, the study conducted by Ashwin *et al.* in the same study setting showed a lesser prevalence of 16.2%[3] Although the higher prevalence in the present study could be substantiated by change

Table 3: Physical measurements of the study participants (*n* = 324).

Body mass index* (kg/m²)		Frequency (n)	Percentage
Under weight (<18.50)		6	1.9
Normal (18.50 - 22.99)		63	19.4
Over weight (23.00 – 24.99)		86	26.4
Obese (≥ 25.00)		169	52.2
Blood pressure ** (mmHg)			
Systolic	Optimal (<120)	133	41.0
	Normal (120 - 139)	124	38.3
	Pre-hypertension(130 – 139)	47	14.5
	Hypertensive (>140)	20	6.2
Diastolic	Optimal (<80)	197	60.8
	Normal (80 – 84)	77	23.8
	Pre-hypertension (85 – 89)	20	6.2
	Hypertensive (>90)	30	9.3
Variables		**Mean ± SD**	
Systolic blood pressure		123.1 ± 15.1	
Diastolic blood pressure		79.2 ± 9.50	
Body mass index		25.46 ± 4.03	
Waist circumference		80.49 ± 8.41	

*Body mass index classification according to WHO and Asia-Pacific guidelines

**Blood pressure classified according to WHO/ISH classification of blood pressure

Table 4: 10-year risk of cardiovascular disease according to WHO/ISH risk prediction chart. (*n*=225)*.

Risk score (%)	No. of participants	Percentage
< 10	215	95.5
10 to 20	6	2.6
20 to30	1	0.4
30 to 40	1	0.4
>40	2	0.8
Total	225	100

**n*=225 as 81 participants did not respond to the question

in behaviour of participants with change in time as both studies were conducted in a time gap of eight years, the prevalence found in both the studies need to be interpreted with caution as both studies used non-probability sampling methods. Although current alcohol use of 29% in the present study was comparatively lesser than most of the studies done among similar job profile groups and industrial workers.

Prevalence of unhealthy diet

More than nine out of ten 96.3% employees were eating unhealthy diet in the current study. This prevalence is marginally higher when compared with other studies done in India, which recorded at least an 80% in unhealthy diet intake prevalence irrespective of worker group (tertiary care institute/bank employees, IT professionals, school teachers/industrial workers).[4] In the study conducted by Ashwin *et al*. mean number of days of fruits and vegetables intake per week was higher (fruits 3.4±2.5, vegetables 6.5±1.4) than the current study findings (fruits 2.32±0.96, vegetables 4.39±1.35).[8] This higher prevalence of unhealthy diet intake among the study participants in comparison to similar workers groups emphasizes the need to promote healthy eating behaviour among the employees through awareness generation and healthy workplace initiatives like providing healthy food options at institute canteens.

Prevalence of Physical inactivity

The physical inactivity among the study participants was 87.7% which was much higher when compared to the study conducted in the same institute showing 57%.[3] The prevalence of inactivity was also higher when compared to three other studies conducted among tertiary care institutes in India which showed physical inactivity ranging between 33% and 75.2%.[4,6,9] The studies done by Achidi Eric *et al*. and Divya Sharma *et al*. among employees of teaching institutes also showed similar results.[4,9]

Prevalence of Diabetes

The self-reported prevalence of diabetes among the current study participants was 15.5%. This prevalence was higher when compared to three other studies conducted in tertiary care institutions across India which showed prevalence ranging from 2.2% (Mysore study 2016) to 7.95%.[6] The higher prevalence observed in the present study when compared to other tertiary care settings and industrial settings could be attributed to variations in food habits and geographical settings where these studies were conducted.

Prevalence of Hypertension

Hypertension was present in 13.7% of the study participants. In the study by Ashwin *et al.* the prevalence of hypertension was 38.8% which was higher than the current study.[3] Other studies done among employees of tertiary care centres showed a prevalence ranging from 10.6% to 38.8%[4,6,10] Although it is good to note that the prevalence of hypertension was less in among the employees of the current study. The institute shall initiate hypertension screening initiatives for early detection and management so as to prevent by lifestyle modifications or delay the progression of the condition.

Prevalence of 10-year risk for a CVD event

In the study, majority (95.5%) participants had < 10% risk of developing a fatal / non-fatal CVD event over the next 10 years. About 4% participants had more than 10% risk of developing CVDs. This result was in line with the study conducted by Ashwin *et al.* in the same study setting which showed 96.3% had less than 10% risk of a CVD event. Another study by Savitharani B *et al.* conducted among employees of a tertiary care hospital at Mysore also reported that about 98% employees had less than 10% risk of CVDs which was similar to the current study finding[3,6]

CONCLUSION AND SUMMARY

Nearly 1/3rd of the population were smokers (25.3%) and alcohol consumption was (34.9%). Almost 3/4th of the participants were following unhealthy diet and living sedentary life style. 20.1% were hypertensive and 15.5% were diabetic. The majority participants had < 10% risk of developing CVD over the next ten years, more than one-tenth participants ate unhealthy diet, 1/3rd were hypertensive and diabetic and 3/4th followed a sedentary lifestyle which could be considered as the indicators for an impending CVD event. The relationship between sociodemographic factors and selected risk factors of CVD was found significant associated with gender, age, educational status and years of work experience. Among those employees who have not yet experienced a CVD event, the risk of developing a fatal/non-fatal CVD event during the next 10 years was less than 10%. The higher prevalence of CVD risk factors among the study participants emphasizes the need for the change in lifestyle behaviours of participants and institutionalizing routine screening for CVD risk factors among the employees. This emphasizes the need for institutionalizing annual health check-up for all the employees of the hospital through incorporating it into hospital health promotion policy.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

CVD: Cardiovascular disease; **CHD:** Coronary heart disease; **NCD:** Non-communicable disease; **HCP:** Health care provider; **WHO:** World health organization; **EME:** Established market economies; **SEAR:** South east asia region; **BMI:** Body mass Index; **SD:** Standard deviation; **IQR:** Interquartile range; **LMIC:** Lower-middle-income countries; **ISH:** International society of hypertension.

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