Original Research Article

Prevalence of cardiovascular risk factors among municipality workers in Chitradurga, South India

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ABSTRACT

Background: Cardiovascular disease (CVD) is the single largest cause for mortality and morbidity in the world. In India, non-communicable diseases (NCDs) were responsible for 53% of deaths and 44% of disability adjusted life years lost. Appropriate assessment and management of cardiovascular risk is vital to prevent fatal and non-fatal heart attacks and strokes and to improve health outcomes in individuals at high risk of cardiovascular events. Diabetes mellitus (DM) and HT are common diseases in adulthood, pre-disposing to many cardiovascular complications, posing a major public health challenge.
This study aims to assess the prevalence of cardiovascular risk factors such as diabetes, HT, smoking, alcohol intake, dyslipidaemia and obesity among Municipality workers.
Methods: A cross-sectional study was carried out between Jan 2019-June 2019 among 100 Municipality workers in Chitradurga, South India. Socio-demographic details and some of the risk factors such as alcohol intake and smoking history were obtained using a pre-tested, structured questionnaire. Blood pressure & waist circumference were measured by standard methods. Fasting blood sugar & lipid profile were measured.
Results: Mean age of study participants was 38.03 years (SD ± 10.9). Out of the study subjects, 21% were known diabetic and 22% were known hypertensive. 34% of the participants had cholesterol level higher than the desirable level of 200 mg/dL. Around 72% had a history of alcohol consumption and 13% had a history of tobacco smoking during the last 1 month. The prevalence of overweight based on BMI (BMI >23) is higher among Municipality workers (56%) compared to the general population (35.4%).
Conclusions: Burden of cardiovascular risk factors such as diabetes and HT were high among Municipality Workers of Chitradurga.

Keywords: Cardiovascular risk factors, Diabetes, Dyslipidaemia, Hypertension, Municipality workers, Obesity

INTRODUCTION

Cardiovascular disease (CVD) is the single largest cause for mortality and morbidity in the world. With the epidemiologic transition, the CVD burden continues to rise in developing countries including India.[1]

In India, non-communicable diseases (NCDs) were responsible for 53% of deaths and 44% of disability adjusted life years lost.[2] Appropriate assessment and management of cardiovascular risk is vital to prevent fatal and non-fatal heart attacks and strokes and to improve health outcomes in individuals at high risk of cardiovascular events. Risk factors such as hypertension

(HT), diabetes, smoking, high blood lipids, physical inactivity, obesity, and a positive family history often occur together and need to be treated comprehensively. Diabetes mellitus (DM) and HT are common diseases in adulthood, pre-disposing to many cardiovascular complications, posing a major public health challenge.

Of the several risk groups for these NCD, Municipality personnel are certainly one, suffer from disrupted sleep patterns, stress, and have high rates of tobacco and alcohol consumption than the general population. Studies have reported increased prevalence of CVD risk factors and type 2 diabetes in this occupational group. Epidemiological studies have been carried out on prevalence on cardiovascular risk factors such as diabetes and HT among general population in India.

Very few studies have documented the prevalence of cardiovascular risk factors among Municipality Workers. Hence, this study aims to assess the prevalence of cardiovascular risk factors such as diabetes, HT, smoking, alcohol intake, and obesity among Municipality Workers.

METHODS

Inclusion criteria

Workers between age of 18 to 60 years were selected

Exclusion criteria

Known case of Isthmic heart disease, Cardio Myopathy and Congenital heart diseases.

Study design and setting

A cross-sectional study was carried out among 100 Municipality workers residing in Chitradurga during 2018-2019.

Sample size calculation and sampling technique

There was a total of 500 Municipality workers working in Chitradurga. 100 Municipality workers were selected by simple random sampling.

Socio-demographic details and some of the risk factors such as alcohol intake and smoking history were obtained using a pre-tested, structured questionnaire.3 During the course of the interview, the individual survey physician made two measurements of blood pressure on each study participant with a mercury column sphygmomanometer (Diamond Co., Industrial Electronics and Allied Products, Electronics Cooperative Estate, Pune, Maharashtra, India) using a standardized technique.4 Height and weight of the individual using a weighing machine and stadiometer were measured to the sensitivity of 0.1 cm and 100 g, respectively. Waist circumference was measured using a non-stretchable measuring tape.

Fasting blood sample was also collected to measure the serum cholesterol and Fasting Blood sugar for all the participants. Blood samples were analysed for serum cholesterol and lipid profile. The study was conducted in compliance with Institutional Ethical Committed. Confidentiality of each participant was ensured.

Diagnostic criteria

FBS of 126 mg or more was considered as DM and fasting blood glucose between 110 and 125 was considered as impaired glucose tolerance.5 For HT, mean of two readings of blood pressure measurements was considered.6 HT was defined as either systolic blood pressure of 140 mm of Hg or more or diastolic blood pressure of 90 mm of Hg or more.7

Statistical analysis

Data were entered Microsoft excel spread sheet. Data analyses were carried out using SPSS 17.0. Mean and proportions were calculated. Chi-square test was used to compare proportions and multivariate analysis was conducted to identify the risk factors for diabetes and HT.

RESULTS

Table 1: Prevalence of cardiovascular risk factors among Municipality Workers (N=100).

Cardiovascular risk factors	Number	Percentage
History of alcohol consumption		
Absent	28	28
Present	72	72
Smoking History		
Absent	87	87
Present	13	13
Diabetes mellitus		
Yes	21	21
Impaired glucose tolerance	17	17
No	62	62
Hypertension		
Yes	22	22
No	78	78
Body mass index (kg/m)2		
Normal (18.5–22.9)	65	65
Overweight (23.0–24.9)	13	13
Obese (25.0 and above)	22	22
Waist circumference – Male		
Normal (<90 cm for men and <80 cm for women)	24	24
High (≥90 cm for men and ≥80 cm for women)	35	35
Waist circumference – Female		
Normal (<90 cm for men and <80 cm for women)	14	14
High (≥90 cm for men and ≥80 cm for women)	27	27
Total cholesterol		
Normal (<199 mg/dL)	56	56
High (≥200 mg/dL)	34	34

A total of 100 Municipality personnel were included in the study. The mean age of study participants was 38.03 years (SD±10.9) and 59% of the study participants were males and 41% were Females.

Out of the study subjects, 21% were known diabetic and 22% were known hypertensive. About 67% of diabetics were in the age group of 40–59 years. Prevalence of diabetes was low as expected in the 20–29 years age group. With age, prevalence of diabetes increased from 19% in the 30–39 years age group to 67% in the 40–59 years age group; this increase is statistically significant (P < 0.001). Seventeen percent of participants had impaired glucose tolerance.

Prevalence of HT among study participants was 22%. Thirty-five percent were newly detected and 65% were known hypertensive. Prevalence of HT was highest among Municipality personnel who were below 50 years of age.

Using body mass index (BMI) cut off values for Asian Indians, 22% of Municipality workers were found to be obese (BMI ≥25 kg/m) and 13% were overweight (BMI 23.0-24.9). 34% of the participants had cholesterol level higher than the desirable level of 200 mg/dL. Waist circumference is also an important measurement of central obesity. Among the study participants, 62% had waist circumference suggestive of central obesity based on their gender-specific values.

Of the study personnel 72% had a history of alcohol consumption during the last 1 month and 13% had a history of tobacco smoking at least for a period of 1 month from the date of interview (Table 1).

In Table 3, variables with a minimum p value of 0.25 in univariate analysis were considered for multinomial logistic regression analysis. But in multinomial logistic regression age in LVH group shows significant association with cardiovascular diseases.

Table 2: Risk factors for diabetes by multivariate analysis (Reduced model).

Variables	p value	Adjusted odds ratio	95.0% C.I.	
			Lower	Upper
SBP	0.016	1.035	1.006	1.064
AGE	0.025	1.063	1.008	1.122
HDL	0.168	0.989	0.974	1.005

in reduced model SBP and age shows significant association with diabetes

Table 3: Risk factors for cardiovascular diseases by multinomial logistic regression analysis.

ECG[A]	variables	p value	Adjusted odds ratio	95% Confidence Interval	
				Lower Bound	Upper Bound
COPD	AGE	0.803	1.011	0.929	1.100
	BMI	0.255	0.866	0.675	1.110
	[BP1=0]	8.769E7	8.769E7	8.769E7	8.769E7
	[SEX=0]	0.143	3.370	0.663	17.125
	[DM=0]	0.530	0.529	0.073	3.851
LVH	AGE	0.023	1.135	1.018	1.266
	BMI	0.107	1.222	0.957	1.560
	[BP1=0]	0.626	0.580	0.065	5.188
	[SEX=0]	0.650	1.716	0.167	17.639
	[DM=0]	0.826	1.314	0.115	15.085
IHD	AGE	0.429	1.027	0.962	1.097
	BMI	0.204	1.102	0.949	1.279
	[BP1=0]	0.640	0.739	0.208	2.629
	[SEX=0]	0.286	1.893	0.585	6.120
	[DM=0]	0.749	1.293	0.268	6.242

Reference category is normal

Multiple logistic regression analysis was carried out to determine the association between diabetes (new and old) and independent variables such as age, gender, HT, BMI and waist circumference. Initially, each independent variable was regressed against each dependent variable. Variables with a minimum P value of 0.25 were considered for multiple logistic regression analyses. In multivariate analysis, non-modifiable risk factors such as

age (adjusted odds ratio 1.063) and was significantly associated with diabetes (Table 2).

Similarly, in multivariate analysis, non-modifiable risk factor such as age (adjusted odds ratio 1.063) and modifiable risk factors such as BMI (adjusted odds ratio 0.86) and Hypertension (adjusted odds ratio 0.023) were significantly associated with Cardiovascular Diseases (Table 3).

DISCUSSION

This study has shown a high prevalence of cardiovascular risk factors in this specific occupational group. Prevalence of DM and HT was 21% and 22%, respectively. Around 72% had a history of alcohol consumption and 13% had a history of tobacco smoking during the last 1 month. More than half of Municipality workers were obese.

The prevalence of diabetes among Municipality workers in this study was 1.5 times that of the prevalence reported in southern India: 13.5% in Chennai, 12.4% in Bangalore, and 16.6% in Hyderabad (as per National Urban Diabetes Survey) based on WHO criteria.[8,9] Diabetes is a risk factor for CVD and stroke; it increases the risk of ischemic heart disease by 2-4 times.[10] Therefore, regular screening for DM and its risk factors will help identify the disease early and help in preventing or delaying the complications of diabetes.

In the present study, the prevalence of hypertension (HT) among Municipality workers was 22%. In India, the prevalence of HT among adults more than 20 years old was estimated to be 15.9%.[11] Prevalence of HT among Municipality workers in the present study was found to be 1.5 times higher than that of the general population. HT increases the risk of CVD by 4.57 times, stroke by 10 times, end-stage renal disease by 1.65 times, and congestive cardiac failure by 2-4 times.[12,13] One of the cornerstones of the primary prevention of CVD has been screening for high blood pressure and anti-hypertensive drug treatment.[14] This approach has to be implemented in this high-risk occupational group of Municipality workers too.

The prevalence of overweight based on BMI (BMI > 23) is higher among Municipality workers (56%) compared to the general population (35.4%). Prevalence of overweight based on a BMI cut off greater than 23 kg/m in our study was similar (56%) to that in the study of Shabana et al (62.9%).[2]

Working under tremendous pressure and stress may make Municipality workers alcohol and smoking dependent.[15] The present study also showed alcohol and smoking habits to be highly prevalent in Municipality workers. The prevalence of smoking and alcohol consumption (13% and 72%, respectively) in the present study was higher than the prevalence among the general population

(20.7% and 11.0%, respectively).[16] Similar to other Indian studies carried out among the general population, the present study also did not show a statistical association of history of smoking and alcohol consumption with diabetes.[17-20] However, research has established evidence beyond doubt that smoking is a leading cause for coronary artery disease and is related to glucose intolerance and diabetes.[21] More than 65% have a moderate range of occupation-related stress, although it was not statistically associated with diabetes among Municipality workers. However, Norberg et al, and Agardh et al reported an association between work-related stress and significantly increased risk of diabetes. It is important to take appropriate prevention strategies to reduce the stress associated with this occupation. This can be done by periodically monitoring the mental health component of the Municipality Wokers and implementing relaxation exercise or sanctioning the rotation of duty hours.

This study has tried to comprehensively assess cardiovascular risk factors in an occupational group by assessing bio-chemical parameters such as blood sugar and total cholesterol along with behavioural and anthropometric risk factors. Information on behavioural risk factors and anthropometric risk factors was collected by a trained public health person, which adds to the credibility of the study.

After recruitment into the Municipality department, it was observed that annual or biannual health checkups were not given emphasis. NCDs are expensive to treat. Strategies have to focus on prevention and health promotion as key to reduce disease burden among Municipality Workers. Health education programs that promote exercise, weight reduction, early diagnosis, and screening are some of the key interventions that need to be promoted. The National Program for Prevention and Control of Cancer, Diabetes, CVD and Stroke, which is in the implementation phase in selected districts of India, will benefit this high-burden group.

CONCLUSION

The burden of cardiovascular risk factors such as diabetes and HT was high among Municipality workers of Chitradurga. Other risk factors such as obesity, smoking, and alcoholism also need attention in this occupational group.

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