Research Article

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The HDD study (hypertensive, diabetes & dyslipidemia) -cardiovascular risk factor epidemiology in desk job workers - a preliminary study

Abstract

Cardiovascular Disease (CVD), a downside of urbanization and industrialization, is associated with higher mortality in urban Indian population. The purpose of this study was to carry out a preliminary study exploring the epidemiology of three major CVD risk factors, i.e., Hypertension, Diabetes, and Dyslipidemia (HDD) in desk job workers in Chennai, India. Hence a retrospective study was carried out utilizing health records from a week long onsite medical health screening camp held at a corporate organization in Chennai, India in 2014. The data were then statistically analyzed comparing the group with HDD and those without for frequencies of BMI and certain behavioral-demographic factors (age, gender, smoking, and alcohol consumption status). The prevalence of HDD was 12.9%, 7.4% and 14.4% respectively. Hypertension status seem to be related to age, gender, BMI and alcohol consumption status, while diabetes status to be related to age and BMI alone, and dyslipidemia status to be related to age, gender and smoking status. Though the data needs cautious interpretation, it stresses the need for a strong public health education program propagating and inculcating healthy lifestyle, like regular physical activity and healthy, balanced diet, among the population keeping the weight in check, and thereby translating in to reduction of chronic disease burden both nationally and globally.

Keywords: diabetes, hypertension, dyslipidemia, BMI, CVD risk, workplace; desk job

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Abbreviations: BMI, body mass index; CVD: cardiovascular; HDD, hypertension diabetes and dyslipidemia; NCD, non communicable diseases; NHANES, national health and nutritional examination survey; SD, standard deviation; WHO, world health organization

Introduction

Non Communicable Diseases (NCD) poses a global health challenge and is the top cause of mortality in those aged under 70years.[1–3] NCD has been termed to be a “double burden” in most of the developing countries adding to communicable, maternal, perinatal and nutritional disease burden2. In India, mortality due to non-communicable diseases is the predominant cause of death exhibiting an incline accounting for 49.2% in 2010-13 in contrast to 42.4% in 2001-03.[4] Globally as per WHO, cardiovascular disease (CVD) is the top killer accounting for about 46% of all NCD deaths and 37% of premature NCD deaths in under 70years.[1] Similar picture exists in India, with CVD being the most dominant NCD cause of death irrespective of gender,[4] and specifically in those under 70years accounting for almost every third death[4] in that age group. Further deaths due to CVD have been projected to rise by 104-115% in females and by 124 to 127% in males by 2020 in India.[2]

Various risk factors that includes chronic diseases and also modifiable behaviors have been identified leading to CVD.[3,5,6] Diabetes, hypertension, dyslipidemia and tobacco consumption are proven causal risk factors for CVD,[2,5] while obesity has been considered to predispose to CVD.[2,5] CVD has been shown to be a peril as a result of urbanization and industrialization,[7,8] with death due to CVD reported to be higher in urban Indian population.[4] In urban world, work occupies the major part of an individual’s waking hours[9] and has been shown to exhibit causal relation with CVD.[7,10] Hence the purpose of this study was to carry out a preliminary study exploring the epidemiology of three major CVD risk factors, i.e., Hypertension, Diabetes, and Dyslipidemia (HDD) in desk job workers in Chennai, India. This would help prioritize and to identify prospects for improved workplace interventions to control CVD and prevent CVD related complications, further forming the base for policy development, as workplace wellness programs have been shown to improve health, lifestyle and hence performance and productivity.[11–13]

Materials and methods

A retrospective study was carried out utilizing health records from a week long onsite medical health screening camp held at a corporate organization in Chennai, India in 2014. A structured in-person interview was carried out by medical personnel at the camp and data were collected on behavioral-demographic (age, gender, smoking and alcohol consumption) characteristics, and medical history including cardiovascular disease risk factors (HDD status). Anthropometric measures (weight and height) were measured according to the NHANES Anthropometric Standardization Reference manual.[14]

Strata for the presentation of statistics include gender (male or female), age group (under 30, 30 to 49, 50 to 59, or 60 and above years), body mass index (BMI) status (underweight, normal weight, overweight, and obese), alcohol consumption status (yes or no), smoking status (yes or no), hypertension status (yes or no), diabetes status (yes or no) and dyslipidemia status (yes or no). Participants who reported current alcohol drinking or smoking (at least once per month) were defined as drinkers or smokers, while participants who are on drug therapy for or have self-reported HDD were recorded as having the respective risk factor. BMI was then calculated from Quetelet's index (Kg/m2), with the weight status classified[15] as underweight (BMI below 18.5), normal weight (BMI between 18.5 and under 25), overweight (BMI between 25 and under 30) and obese (BMI above 30). The study was approved by the hospital CSR Ethics committee.

Statistical analysis

The statistical analysis was done using SPSS 16.0 software (SPSS Inc., Chicago). Descriptive analyses were conducted to determine the distribution of behavioral-demographic and CVD risk factors. The group with CVD risk factors (HDD) and those without were compared for frequencies of BMI and certain behavioral-demographic factors. The Chi-square and Fisher's exact tests were applied with significance level set at $P<0.05$. The mean values were reported as the mean±standard deviation (SD).

Results

3422 individuals were identified in the study through health records, with the mean age of 42.45years and mean BMI of 25.86. Descriptive statistics is shown in Table 1. Results of statistical tests to determine association between each risk factor and age, gender, BMI, smoking and alcohol status is presented in Table 2.

Table 1 Descriptive summary of the study participants

Characteristics	Sample Size (%)
Total participants	3422 (100%)
Age (in years)	
18-29	357 (10.4)
30-39	983 (28.7)
40-49	1127 (32.9)
50-59	927 (27.1)
≥60	28 (0.8)
Gender	
Male	2192 (64.1)
Female	1230 (35.9)
Body Mass Index (in kg/m^2)	
Underweight (<18.5)	81 (2.4)
Normal Weight (18.5-24.99)	1401 (40.9)
Overweight (25-29.99)	1467 (42.9)
Obese (≥30)	473 (13.8)
Smoking Status	
Smoker	295 (8.6)
Non-Smoker	3127 (91.4)
Alcohol Consumption Status	
Alcoholics	390 (11.4)
Non-Alcoholics	3032 (88.6)

Table 2 BMI and behavioral-demographic characteristic distribution by HDD status

Overall n (%)	H[a] n (%)	NH[a] n (%)	P	Dia[b] n (%)	NDia[b] n (%)	p	D[c] n (%)	ND[c] n (%)	P
	443	2979 (87.1)		493 (14.4)	2929 (85.6)		254 (7.4)	3168 (92.6)	
	-12.9								
Age (in years)									
18-29	10 (2.3)	347 (11.6)	<0.05*	13 (2.6)	344 (11.7)	<0.05*	18 (7.1)	339 (10.7)	<0.05*
30-39	47 (10.6)	936 (31.4)		40 (8.1)	943 (32.2)		63 (24.8)	920 (29.0)	
40-49	164 (37)	963 (32.3)		190 (38.5)	937 (32)		83 (32.7)	1044 (33)	
50-59	216 (48.8)	711 (23.9)		239 (48.5)	688 (23.5)		89 (35)	838 (26.5)	
≥60	6 (1.4)	22 (0.7)		11 (2.2)	17 (0.6)		1 (0.4)	27 (0.9)	
Gender									
Male	334 (75.4)	1858 (62.4)	<0.05*	332 (67.3)	1860 (63.5)	0.1	197 (77.6)	1995 (63)	<0.05*
Female	109 (24.6)	1121 (37.6)		161 (32.7)	1069 (36.5)		57 (22.4)	1173 (37)	
Body Mass Index (in kg/m2)									
Underweight (<18.5)	1 (0.2)	80 (2.7)	<0.05*	1 (0.2)	80 (2.7)	<0.05*	1 (0.4)	80 (2.5)	0.06
Normal Weight (18.5-24.99)	141 (31.8)	1260 (42.3)		177 (35.9)	1224 (41.8)		96 (37.8)	1305 (41.2)	
Overweight (25-29.99)	209 (47.2)	1258 (42.2)		224 (45.4)	1243 (42.4)		123 (48.4)	1344 (42.4)	
Obese (≥30)	92 (20.8)	381 (12.8)		91 (18.5)	382 (13)		34 (13.4)	439 (13.9)	
Smoking Status									
Smoker	42 (9.5)	253 (8.5)	0.49	44 (8.9)	251 (8.6)	0.79	32 (12.6)	263 (8.3)	<0.05*
Non-Smoker	401 (90.5)	2726 (91.5)		449 (91.1)	2678 (91.4)		222 (87.4)	2905 (91.7)	
Alcohol Consumption Status									
Alcoholics	69 (15.6)	321 (10.8)	<0.05*	56 (11.4)	334 (11.4)	0.98	32 (12.6)	358 (11.3)	0.53
Non-Alcoholics	374 (84.4)	2658 (89.2)		437 (88.6)	2595 (88.6)		222 (87.4)	2810 (88.7)	

*Statistically significant
aH: Hypertensive; NH: Non-hypertensive; bDia: Diabetics; NDia: Non-Diabetics; cD: Dyslipdemics, ND: Non-dyslipidemics

Discussion

In the present study the prevalence of HDD was 12.9%, 7.4% and 14.4% respectively. Hypertension status seem to be related to age, gender, BMI and alcohol consumption status, while diabetes status to be related to age and BMI alone, and dyslipidemia status to be related to age, gender and smoking status. The prevalence of smokers (8.6%) was lower than the self-reported Indian prevalence,[16] while that of alcoholics (11.4%) was higher than the self-reported Indian prevalence.[16] Further in the present study smokers and alcoholics were predominantly males, as reported across studies.[16–19] The prevalence of overweight (43%) and obesity (14%) is higher in the present study than that reported across studies in India,[17,19,20] while lower than that reported in specific occupational group.[21] Females were predominantly overweight to obese in comparison to males in the present study (67% against 51%), consistent with other studies.[16,19]

Prevalence of diabetes (14.4%) was higher than that reported in 2008 within Chennai,[19] but lower than that reported across specific occupational group in India,[21,22] while prevalence of hypertension (12.9%) and dyslipidemia (7.4%) was lower than that reported in Tamil Nadu and other states in India,[16,18,23,24] with diabetic prevalence being lower than that reported in specific occupational group in India.[21] In the present study age appeared to be an important factor associated with hypertension, diabetes and dyslipidemia, with prevalence of all the three increased with age, with majority being over 40years.

The finding was consistent with those reported across studies.[25–27] Hypertension and dyslipidemia was found to be predominant in males in our study consistent with other studies.[17,18,27,28] While diabetic prevalence has been reported to vary with gender based on various studies involving different racial and ethnic subgroups across the globe,[25,29,30] no such association was found in our study. Hypertension and diabetes was found to increase with increasing BMI with 68% hypertensive's being overweight to obese and 64% diabetics being overweight to obese in the present study. This is consistent with other studies.[25,26,31,32] While dyslipidemia has been reported to vary with increasing BMI with little age and gender variation,[25,31] no such association was found in our study.

Smoking has been considered to be associated with diabetes and to predispose to diabetes related complications across studies,[25,33–35] while its association with dyslipidemia and increased blood pressure has been inconclusive in literature[36–40] with a large scale population based, long-term follow up study reporting smoking to be an independent risk factor for CVD with clinically little effect on blood pressure and cholesterol, especially in those above 46years of age.[35] But in our study we found no significant association of smoking status with hypertension, diabetes and dyslipidemia. Picture similar to smoking status was seen with alcohol consumption status, with no significant association of alcohol consumption with hypertension, diabetes and dyslipidemia found in the current study. No association between diabetes and alcohol consumption in the present study is consistent with other studies.[25,41] Though hypertension is shown to be associated with heavy drinking (3 or more drinks per day)[42] and dyslipidemia to be associated with daily and chronic drinking,[43] this couldn't be explored in the present study because of lack of data on drinking frequency and duration.

Further there seems to exist a complex interaction between hypertension, diabetes and dyslipidemia with a study from India reporting diabetics to be more prone to other cardiovascular risk factors including hypertension and lipid disorders,[34] while another study showed hypertension to be twice common in diabetics and to be responsible for majority of CVD in the group.[44] No such interaction was explored in the current study, thereby presenting as a study limitation. NCD have been associated with increased out of pocket expenditure in India,[19,45] with chronic conditions like diabetes reported to be associated with increased sick absenteeism, physical and mental disability, decreased productivity for employees, and greater expenditure and hence economic impact for employers.[13,46,47] Even low intensity of active workplace interventions have been associated with healthy dietary habits, increase physical activity participation, improved blood pressure control and improve awareness and knowledge,[12,13] apart from reducing time, cost and travel barrier.[13]

The current study is limited by retrospective study design with sampling bias, temporal ambiguity and sample heterogeneity restricting generalizability. The self-reporting nature of the disease add on to reporting bias leading to over or under estimation of the prevalence. Further the study lacked controlling of confounding factors, evaluation of interaction of one risk factor with other and consideration of other risk factors (marital status, socioeconomic status, ethnicity, race, dietary habits, physical activity).[2,3,5,6] However the risk factors weren't studied due to the time-restricted camp setting of the study. Finally the lack of data on types or stages of disease (diabetes type I or type II, type of dyslipidemia and stage of hypertension) also adds to the limitation.

Conclusion

The prevalence of HDD in desk job workers seems to be high, with age and BMI appearing to be likely associated factors. However, the data needs cautious interpretation. Further multi-center studies are planned including follow-up utilizing more refined and standardized sampling techniques with laboratory assessment to evaluate the prevalence and incidence of CVD risk factors and CVD per se in working population, understanding the complex interaction of various demographic, socio-economic, nutritional and life style factors with the risk factors. Based on the current study, maintaining of a healthy weight (BMI) stands out to be critical for improving health outcomes, as age is a non-modifiable factor, demanding and stressing the need of strong public health education program for adoption of healthy lifestyle (regular physical activity and healthy, balanced diet) at various level from the grass root, like the workplace in the present study, to global level. Thereby aiding in reducing the burden of chronic diseases, and hence overall national and global health care delivery demand.

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Conflict of interest

The author declares no conflict of interest.

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