International Journal of Medical and Health Sciences

Journal Home Page: http://www.ijmhs.net ISSN:2277-4505

Original article

Cardiovascular Risk Factors Among Adults – A Cross Sectional Study In Urban Slums of Hyderabad, Andhra Pradesh, India

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ABSTRACT

Cardiovascular risk factors are a constellation of modifiable and non-modifiable factors. Dyslipidemia, hypertension and diabetes mellitus have been appropriately highlighted as established predictors of cardiovascular disease. Notably, lifestyle risk factors, including dietary habits, physical inactivity, and smoking strongly influence the established cardiovascular risk factors. Cardiovascular diseases are on the rise in developing countries like India and not much information is available about the risk factors in urban slums of Hyderabad. Hence this study was taken. Our objectives were to estimate the prevalence of cardiovascular risk factors among adults in urban slums of Hyderabad. A Community based Cross sectional study was done in Urban slums of Hyderabad for 6 months (April 1st to Sep 30th 2012). Mercurial sphygmomanometer (Diamond), Weighing machine, Measuring tape, Stethoscope, Eber-Mannhelm Autoanalyzer, a predesigned and prestructured questionnaire were used. With Random sampling procedure 560 individuals were chosen. Data was analyzed using Microsoft Excel 2007. The prevalence of hypertension was 25.3% and diabetes 16.07%. The proportion with elevated Triglycerides was 28.57% (males -19.1% and females 36.52%), elevated Total Cholesterol 30% (females 39.93% and males 19.1%) and Reduced HDL 41.25% (females 46.76% and males 34.46%). As per BMI, 53.39% were overweight (males 58.43% and females 48.81%). About 21.61% were obese (Males 18.35% and females 24.57%). A higher percent of females (44.37%) had abdominal Obesity compared to males (29.96%). Thus Cardiovascular Risk factors are highly prevalent in urban slums and needs immediate emphasis to prevent cardiovascular morbidity.

KEYWORDS: Cardiovascular risk factors, adults, urban slums, Hyderabad

INTRODUCTION

A global transition in the disease pattern has been observed, where the relative impact of infectious diseases is decreasing while chronic diseases like cardiovascular disease (CVD) and diabetes are increasing.[1] Cancer, cardiovascular diseases (CVD) and diabetes are becoming a serious concern, accounting for 52 percent of deaths and 38 percent of disease burden in the South East Asia Region (SEAR). [2] Global Burden of Disease (GBD) Study reported that in 1990 there were 5.2 million deaths from cardiovascular diseases in economically developed countries and 9.1 million deaths from the same causes in developing countries. In 1990, cardiovascular diseases (CVD) accounted for 63 per cent of all deaths and India contributed 17 per cent to the worldwide mortality. [3]

Several surveys conducted across the country over the past two decades have shown a rising prevalence of major risk factors for CVD in urban and rural populations in India and have also shown cardiovascular diseases assuming epidemic proportions**.** The Global Burden of Diseases (GBD) study reported the estimated mortality from coronary heart disease

(CHD) in India at 1.6 million in the year 2000. [3] A total of nearly 64 million cases of CVD are likely in the year 2015, of which nearly 61 million would be CHD cases (the remaining would include stroke, rheumatic heart disease and congenital heart diseases). Deaths from this group of diseases are likely to amount to a staggering 3.4 million. [4] It is estimated that by 2020, CVD will be the largest cause of disability and death in India, with 2.6 million Indians predicted to die due to CVD. [5,6]

The major risk factors that can predict the likelihood of CHD are heredity, being male, advancing age, cigarette smoking, high blood pressure, diabetes, obesity (especially excess abdominal fat), lack of physical activity, and abnormal blood cholesterol levels. The more risk factors a person has, the greater the likelihood of developing heart disease. Heredity, gender, and age cannot be modified, but the others can be influenced by the individual's behavior. Several of these risk factors are interrelated. Obesity, lack of exercise, and cigarette smoking can raise blood pressure and adversely influence blood cholesterol levels. Several studies suggest that exposure to environmental tobacco smoke ("passive smoking") also increases the risk of developing cardiovascular disease. [7,8]

While all these risk factors are prevalent in India, not much information about the prevalence of these risk factors is known from the urban slums of Hyderabad; hence this study has been taken.

Aims and Objectives: To estimate the prevalence of cardiovascular risk factors among adults above 20 years of age in the urban slums of Hyderabad, Andhra Pradesh.

MATERIALS AND METHODS

Study design and Subjects

It is a Community based Cross-sectional study. The list of slums was obtained from the Urban Health Centre in the field practice area of Osmania Medical College and three slums (Sundernagar, Nehrunagar and Moulana Azad nagar) were randomly selected. Each slum has a population of above one thousand with an average family size of five and 200 to 220 households. Starting from the urban health centre in the direction of east, every fourth house was systematically chosen.

Sample size was calculated by $4pq/L^2$ (p=5.3% for prevalence of diabetes, least of all the risk factor prevalence and L=2) which came to 501. A total of 560 adults aged above 20 years age who consented to participate in the study were included. Pregnant females, disabled subjects and acutely ill subjects were excluded. All the participants were informed about the purpose of the study and consent was taken with their voluntary will to participate. The study was carried out for six months from April to September 2012.

A detailed questionnaire incorporating demographic profile, socioeconomic data, relevant history and symptoms, physical activity pattern and food frequency questionnaire was used to collect data by face to face interview. Blood pressure was recorded in sitting position with a mercury sphygmomanometer according to standard guidelines. Average of the three readings five minutes apart was taken. If any reading was abnormal, another reading was taken after ten minutes of rest. Ethical clearance was obtained from the ethical committee of Osmania Medical College, Hyderabad.

Anthropometric Measurements

Weight was recorded in Kilograms using a Weighing machine and Height was recorded in centimeters to the nearest 0.1 cm using the height measuring rod. The Body mass index (BMI) was calculated by weight (kg)/ $height^2$ (m).Waist circumference was measured midway between iliac crest and lowermost margin of the ribs to the nearest 0.1 cm using a reinforced fiber elastic tape.

Biochemical Samples and Analysis

A Fasting venous blood sample was obtained after 12 hours of overnight fast for fasting blood glucose (FBS) and lipid profile. Estimation of total cholesterol (TC), serum triglycerides (TG) and high density lipoprotein cholesterol (HDL-c) was performed. FBS was estimated using Glucose Oxidase method and lipid profile using Eber-Mannhelm autoanalyzer.

Definitions

For BMI and abdominal obesity cut off ranges, consensus guidelines for Asian Indians were referred. A BMI of 18.5 to 22.9 was defined as Normal, 23 to 29.9 as Overweight and above 30 as Obese. Central (Abdominal) Obesity was defined as waist circumference above 90 cm in males and above 80 cm in females. [9] Fasting blood sugar >/= 126mg/dl was defined as Diabetes and 100 to125 mg/dl as Impaired Glucose Tolerance. [10] Blood pressure was defined as per the JNC VII criteria. [11] Dyslipidemias were defined by the criteria laid down by the National Cholesterol Education Programme Adult Treatment Panel III. [12]

Statistical Methods: Data were entered into an excel spreadsheet and double checked for any keyboard errors. It was analyzed using Epi-info version 3.5.2. For categorical variables, "Chisquare test" and for continuous variables, independent sample "t" test were used respectively. A p value of <0.05 was considered statistically significant.

RESULTS

Demographic profile: The study population included 267 (47.68%) males and 293 (52.32%) females. Age distribution was: 20-40 years, (39.64%), 41-60 years, (42.14%) and above 60 years (18.22%). Majority (41.07%) belonged to upper lower class followed by lower middle, (33.04%), upper middle (16.96%) and lower class (8.93%). In the study, 40.54% of the families were nuclear families while 17.5% were joint and 41.96% were three generation families. Illiterates were 24.47% and literates 75.53%. Majority (23.75%) were skilled workers (Table 1).

Table:1 Socio-Demographic profile of the study population

FACTOR	NUMBER (n=560)	PERCENTAGE
Sex		
Males	267	47.68
Females	293	52.32
Age distribution		
20-40 years	222	39.64
41-60 years	236	42.14
>/=61 years	102	18.22
Socioeconomic status		
Upper middle	95	16.96
Lower middle	185	33.04
Upper lower	230	41.07
Lower	50	8.93
Type of family		
Nuclear	227	40.54
Joint	98	17.5
Three generation	235	41.96
Literacy status		
Post graduate	0	0
Graduate	109	19.46
Intermediate	20	3.57
High school	236	42.14
Middle school	48	8.57
Primary school	10	1.79
Illiterate	137	24.47
Occupation		
Professional	27	4.82
Semiprofessional	85	15.18
Clerical/Shop Owner	107	19.11
Skilled worker	133	23.75
Semi-skilled worker	48	8.57
Unskilled worker	63	11.25
Unemployed	97	17.32

Risk factors :

Hypertension: The prevalence of Hypertension was 25.0%, with prevalence in men being 22.47% and in women being 27.3%. Grade II Hypertension is significantly more in women (10.24%) compared to men (1.49%) [Chi Square 18.72, p 0.0001]. Family history of Hypertension was present in 36.07% of the study subjects.

Diabetes was present in 16.07% subjects with the prevalence in males being 19.1% and in females 13.31% and the difference was statistically not significant [Chi Square 3.473, p 0.0624]. Family history of Diabetes was present in 13.57% of the subjects. Mean FBG level was significantly more in males (89.23 mg/dl) compared to females (80.0 mg/dl) (p <0.0001).

Elevated Triglycerides was seen in 28.21% subjects, (males -19.1% and females 36.52%) and it is significantly more in females [Chi Square 20.92, p 0.00001].

Elevated Total Cholesterol was seen in 30% of the study subjects with a significantly higher prevalence in females (39.93%) compared to males (19.1%) [Chi Square 28.87, p 0.00001]. Mean total cholesterol was significantly more in females (193.46 mg/dl) compared to males (165.0 mg/dl) (p <0.0010).

Reduced HDL cholesterol: was present in 41.25% of the subjects, of which it was significantly higher among Females (46.76%) compared to males (34.46%) [Chi Square 8.745, p 0.003].

BMI: Mean BMI was significantly more in males (24.26) compared to females (23.82) (p 0.005). As per BMI, 53.39% of the subjects were overweight with a significantly higher percent of males (58.43%) being overweight compared to females (48.81%) [Chi Square 5.197, p 0.02]. About 21.61% were obese (Males 18.35% and females 24.57%). A higher percent of females (44.37%) had abdominal Obesity compared to males (29.96%) [Chi Square 12.37, p 0.0004]. Mean waist circumference was significantly more in males (89.79 cms) compared to females (81.39 cms) (p 0.00001)

Tobacco consumption: The percentage of subjects consuming tobacco in any form was 20.89% (23.22% males and 18.77% females). The prevalence of metabolic syndrome was 23.75 %, (Males-17.23% and females-29.69%) and it was significantly more in females [Chi Square 11.98, p 0.0005]. Mean age of initiation of tobacco use was significantly earlier in males (17.16 yrs) compared to females (21.32 yrs) (p<0.00001) (Table 2).

Table:2 Prevalence of Cardiovascular Risk Factors in Men and Women

FACTOR	MEN (n=267)	WOMEN (n=293)	Total
Tobacco usage	62 (23.22%)	55 (18.77%)	117 (20.89%)
Mean age at initiation of tobacco use in years	17.16	21.32	
Ever consumption of alcohol	169 (63.29%)	66 (22.53%)	235 (41.96%)
% subjects reporting physical inactivity			
Work			
Transportation	111 (41.57%)	51(17.41%)	162 (28.93%)
Leisure time	37 (13.86%)	67 (22.87%)	104 (18.57%)
	197 (73.78%)	241 (82.25%)	438 (78.21%)
Mean BMI (Kg/m)	24.26	23.82	
Proportion with BMI			
23-29.9	156 (58.43%)	143 (48.81%)	299 (53.39%)
>30	49 (18.35%)	72 (24.57%)	121 (21.61%)
Mean waist circumference (cm)	89.79	81.39	
% with increased waist circumference	80 (29.96%)	130 (44.37%)	210 (37.5%)
Mean Blood Pressure (SBP/DBP mm Hg)	129.14/85.22	131.64/86.82	
Grades of Blood pressure			
Normal	120 (44.94%)	122 (41.64%)	142 (25.36%)
Pre-Hypertension	87 (32.59%	91 (31.06%)	178 (31.79%)
Grade I	56 (20.98%)	50 (17.06%)	106 (18.93%)
Grade II	4 (1.49%)	30 (10.24%)	34 (06.07%)
Mean FBG levels (mg/dl)	89.23	80.0	
Proportion with blood glucose >126 mg/dl	51 (19.10%)	39 (13.31%)	90 (16.07%)
Mean Fasting Total Cholesterol (mg/dl)	165.00	193.46	
Proportion with total cholesterol >200 mg/dl	51 (19.10%)	117 (39.93%)	168 (30.0%)
Proportion with total triglycerides >150 mg/dl	51 (19.10%)	107 (36.52%)	158 (28.21%)
Proportion with reduced HDL- Cholesterol	92 (34.46%)	137 (46.76%)	231 (41.25%)
Metabolic syndrome	46 (17.23%)	87 (29.69%	133 (23.75%)

DISCUSSION

The prevalence of tobacco smoking in this study was 20.89% which is comparable to 23.9% in a study by Gupta et.al. [13] Hypertension was prevalent in 25.0% with 22.47% prevalence in men and 27.3% in women. This is comparable to a study by Gupta R et al [14] in whose study the prevalence in males was 29.5% and in females it was 33.5%. A comparison with data published recently from a random sample population from Jaipur in north India revealed the following: the prevalence of smoking was higher in north India (37%) as compared with the present study (20.89%), the prevalence of hypertension in the present study was lower (25%) when compared with the north Indian study (37%), and the prevalence of diabetes was higher (12% in the north Indian study *vs.* 16.07% in the present study).

Obesity was less prevalent in the current study (21.61%) when compared with the north Indian study (27%). Another cross-sectional study conducted on a study population aged 20-59 years old in an industrial population in Delhi, [15] when compared with the present study showed a prevalence of hypertension (30% *vs.* 25%), diabetes (15% *vs.* 16.07%), current smoking (36% *vs.* 20.89%), obesity (35% *vs* 21.61%). Another study conducted in Andhra [16] when compared with the present study showed a prevalence of diabetes (24% *vs.* 16.07%), hypertension (28% *vs.* 25%), smoking (24% *vs.* 20.89%), positive family history of diabetes (14% *vs.* 13.57%), and obesity (36% *vs* .21.61%).

The regional differences in various parameters in the different studies are interesting. In a rural community in a northern state of Punjab, [17] 7.1% of subjects had hypercholesterolemia while in the present study it was 30% with 19.1% in males and 39.93% in females. Reddy et al [18] have reported prevalence of hypercholesterolemia (200 mg/dl) in industrial, urban and rural populations in Delhi. In men the prevalence was 30.9%, 36.8%, and 16.3% and in women it was 21.7%, 39.7% and 16.3% respectively.

Secular trends in the age-adjusted mean serum cholesterol levels of adults aged 20-74 years have been reported. In 1962 the mean cholesterol was 217 mg/dl in men and 223 mg/dl in women. It was 214 mg/dl and 216 mg/dl in 1974, 211 mg/dl and 215 mg/dl in 1980 and 206 mg/dl and 208 mg/dl in 1991 for males and females respectively. In the present study mean cholesterol was 165 mg/dl in men and 193.46 mg/dl in women. Reddy et al [18] reported high prevalence of truncal obesity (waist hip ratio (WHR); men >0.95, women >0.85) in both urban subjects (men 39.1%,

women 70.9%) as well as rural subjects (men 32.4%, women 42.3%) in Delhi.

In the present study high prevalence of truncal obesity was seen in men (29.96%) and women (44.37%). Metabolic syndrome has recently been defined by the US National Institutes of Health using clinical and biochemical criteria and includes truncal obesity, high normal blood pressure, impaired fasting glucose or diabetes, low HDL cholesterol and borderline high triglycerides. [12] The prevalence of metabolic syndrome in the present study was 23.75%, (17.23% in men and 29.69% in women) which is similar to a study in Jaipur (urban north Indian population) that reported the age-adjusted prevalence of Metabolic Syndrome to be 24.9%, 18.4% in men and 30.9% in women [19].

CONCLUSION

The present study shows that the risk factors for cardiovascular diseases are highly prevalent in the urban slum dwellers and hence highlights the need for early action against risk factors for non communicable diseases.

Recommendations

The people should be made aware of the risk factors through health education. Dietary modifications, regular physical activity and stress relieving measures are to be inculcated into the lives of the people. The need for Regular health check-ups is to be emphasized among people. This gains importance especially since many of the risk factors like smoking, obesity, dietary pattern; physical inactivity, etc. are modifiable. Urgent measures based on primordial and primary prevention need to be taken especially from the school level to modify the lifestyle and behavior of the people of the slum community otherwise the epidemic of non communicable disease particularly the cardiovascular diseases may get out of hand

Acknowledgements

I acknowledge the Department of Biochemistry, Osmania Medical College, Hyderabad. I also acknowledge the people in the community. My heartful acknowledgements to the journal group which published my valuable research work.

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