Research Article

Cross sectional study on obesity prevalence in cardiovascular risk factors

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Received: 09 September 2016

Accepted: 16 September 2016

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ABSTRACT

Background: Obesity has become a chronic disorder affecting the larger population than any other disease in the world in both developed and developing countries, which lead to both increase in mortality and morbidity. Aim of the study was to study the Central obesity prevalence as cardiovascular risk factor in rural population.

Methods: A total of 734 subjects aged 30 years and above of both sexes were selected for the study.

Results: Very high prevalence of central obesity was found in males 27.6% compared to that in females 6.1% and the difference is also statistically significant. Subjects with Stress had higher prevalence of central obesity compared to those with no stress 15.4% and the difference is also found to be statistically significant. Subjects with current smoking had higher prevalence of central obesity 25.8% than non-smokers 15.2%. Similarly, subjects with current alcohol intake had higher prevalence (28.8%) than those who were not taking alcohol currently (14.1%). The differences in both the situations are statistically significant. Higher prevalence was found in those with physical exercise (32.8%) than those who do not perform regular physical exercise (13.5%) and the difference is also found to be statistically significant. It is found that the prevalence of medium and high risk was found to be significantly higher in males (41.8%) than in females (5.5%).

Conclusions: Obesity is major health hazard leading to both increases in mortality and also major risk factor in other non-communicable diseases. Prevention of obesity should begin from early childhood itself. Early detection can prevent the incidence of major complications. Lack of awareness is found to be major factor which should be stressed upon.

Keywords: Central obesity, Cardiovascular diseases

INTRODUCTION

The cardiovascular disease (CVD) burden of India is expected to double in the next two decades, making it the single largest cause of death and the second largest cause of disability by the year 2020.¹ Obesity is one of the modifiable risk factor in cardiovascular diseases.² Prospective epidemiological studies have shown a

relationship between overweight or obesity and cardiovascular morbidity, CVD mortality.³ Obesity is strongly related to major cardiovascular risk factors, such as raised blood pressure, glucose intolerance, type 2 diabetes, and dyslipidaemia. Meta-analyses of RCTs have shown that a weight-reducing diet, combined with exercise, produces significant weight loss, reduces total cholesterol and LDL-cholesterol, increases HDL-cholesterol, and improves control of blood pressure and

diabetes.⁴ The current research was undertaken to study the Central obesity prevalence as a modifiable risk factor along with some other associated parameters in cardiovascular diseases.

METHODS

A total of 734 subjects in the age group of 30 years and above age group were selected from the study areas to estimate the prevalence in rural area of Tirupati. Subjects were included in the cross-sectional study by using 20 cluster sampling technique. Thus all the sectors, all the sub centers within the sectors and all the villages/habitations within the sub centres are listed in alphabetical order and cumulative population. The study subjects were explained the purpose of the study and informed consent was taken from the subjects. Within each village/habitation the investigator went to the centre of village and all houses to the right side are included until the required number covered. One subject from each house aged 30 years and above is interviewed who is selected randomly from those available at home at the time of study. On an average four families were examined during each day of visit. Reassurance was given regarding the confidentiality of their responses. Ethical clearance for this study was accorded by Institutional ethical committee, Sri Venkateswara Medical College, Tirupati. Body mass Index was calculated by using the formula: weight (kg)/height (m²). Waist was measured using a properly calibrated tailor measuring tape. The subjects were asked to stand erect in a relaxed position with both feet together on a flat surface; one layer of clothing was accepted. Waist girth was measured as the smallest horizontal girth between the costal margins and the iliac crests at minimal respiration. Overweight and Obesity was assessed using classification recommended by WHO (Table 1).

As per the cardiovascular risk categorization by the American Heart Association, 2008 based on the prevalence of risk factors like age, smoking, systolic blood pressure treated and not treated, and body mass index which were given points for cardiovascular risk was recorded. We have considered socio-economic status, extra salt intake and cooking oil, stress, physical exercise and some other parameters to study the obesity prevalence in cardiovascular risk diseases.

Table 1: WHO classification of Adults according to BMI.

Classification	BMI
Under weight	<18.50
Normal weight	18.50-24.99
Over weight	≥25.00
Pre obese	25.00-29.99
Obese class I	30.00-34.99
Obese class II	35.00-39.99
Obese class III	≥ 40.00

RESULTS

Higher prevalence of central obesity was found in less than 50 years (18.9%) compared to that in 50 and above years' group (13.1%) but the difference is not statistically significant. A comparatively very high prevalence was found in males (27.6%) compared to that in females (6.1%) and the difference is also statistically significant. Those with secondary and above level of education had higher level of central obesity (22.1%) compared to those with illiterate and primary level of education (12.2%) and the difference is also found to be statistically significant. Similarly those with other than unskilled occupation had significantly higher prevalence (25.7%) than those with unskilled occupation 11.9% (Table 2).

Table 2: Relationship between central obesity and various socio-demographic factors.

Risk factor	Prevalence of central obesity (%)	Odds ratio and 95% CI	Statistical significance
Age group			
Less than 50 years	94/497 (18.9)	1.55 (0.98-2.46)	$\chi^2=3.86$; P=0.051; NS
50 and above years	31/237 (13.1)		
Sex			
Male	103/373 (27.6)	5.87 (3.61-9.56)	$\chi^2=60.1$; P<0.001; S
Female	22/361 (6.1)		
Level of education			
Secondary and above	79/358 (22.1)	2.03 (1.36-3.02)	$\chi^2=12.5$; P<0.001; S
Up to primary	46/376 (12.2)		
Occupation			
Not unskilled	70/272 (25.7)	2.56 (1.73-3.79)	$\chi^2=23.2$; P<0.001; S
Unskilled	55/462 (11.9)		

Married subjects had higher central obesity (17.7%) than unmarried/divorced/separated group (12.6%) but the difference is not statistically significant. Higher prevalence was found in Hindus than non-Hindus (17.4% compared to 11.4%), Joint/extended families than nuclear families (19.3% compared to 14.7%) but the differences are not statistically significant. Other castes and backwards castes had higher prevalence (18.7%) than scheduled caste and tribe (11.1%) while upper and middle socioeconomic status subjects had higher prevalence (21.0%) than lower socioeconomic status (12.5%) and the differences are also statistically significant (Table 4). Higher prevalence was found in those with previous history of cardiovascular or cerebrovascular events (19.0%) compared to those without history of events (17.0%) but the difference is not statistically significant (Table 3). Those with current

smoking had higher prevalence of central obesity (25.8%) than non-smokers (15.2%). Similarly, those with current alcohol intake had higher prevalence (28.8%) than those who were not taking alcohol currently (14.1%). The differences in both the situations are statistically significant (Table 5). Those with extra salt intake had higher prevalence of central obesity (26.3%) than those

with no extra salt intake (16.2%) but the difference is not statistically significant. Contrastingly, higher prevalence of central obesity was found in those taking oils rich in PUFA (21.0%) compared to other oils (15.6%) but the difference is however not statistically significant (Table 6).

Table 3: Relationship between central obesity and family history in study subjects.

Risk factor	Prevalence of Central Obesity (%)	Odds ratio and 95% CI	Statistical significance
Previous CVS/cerebral events			
Yes	4/21 (19.0)	1.15	Fisher's P value=0.76;
No	121/713 (17.0)	(0.32-3.72)	NS

Table 4: Relationship between central obesity and various socio-demographic factors.

Risk factor	Prevalence of central obesity (%)	Odds ratio and 95% CI	Statistical significance
Marital status			
Married	113/ 639 (17.7)	1.49 (0.76-2.97)	χ^2 =1.49; P=0.22; NS
Unmarried/Divorced/Separated	12/ 95 (12.6)		
Religion			
Hindu	120/ 690 (17.4)	1.64 (0.60-4.84)	χ^2 =1.06; P=0.30; NS
Others	5/44 (11.4)		
Type of family			
Joint/Extended	51/264 (19.3)	1.28 (0.86-1.89)	χ^2 =1.52; P=0.21; NS
Nuclear	74/470 (15.7)		
Social status			
Other castes and Backward castes	107/572 (18.7)	1.84 (1.05-3.26)	χ^2 =5.15; P=0.02; S
Scheduled Caste and tribe	18/162 (11.1)		
Social Economic status			
Upper and Middle	82/391 (21.0)	1.85 (1.23-2.76)	χ^2 =9.20; P=0.002; S
Lower	43/343 (12.5)		

Those with various Holmes' categories of stress had higher prevalence of central obesity compared to those with no stress (15.4%) and the difference is also found to be statistically significant (Table 7).

Figure 1: Cardiovascular risk categorization between male and female subjects.

Table 5: Relationship between central obesity and smoking, alcohol intake.

Risk factor	Prevalence of central obesity (%)	Odds ratio and 95% CI	Statistical significance
Current smoking			
Yes	32/124 (25.8)	1.93	$\chi^2=8.13$; P=0.004; S
No	93/610 (15.2)	(1.19-3.13)	
Current alcohol			
Yes	42/146 (28.8)	2.460	$\chi^2=17.7$; P<0.001; S
No	83/588 (14.1)	(1.57-3.85)	

Slightly higher prevalence of central obesity was found in those with sedentary type of work (18.4%) compared to those in moderate and severe work (14.8%) but the

difference is not statistically significant. Contrastingly higher prevalence was found in those with physical exercise (32.8%) than those who do not perform regular physical exercise (13.5%) and the difference is also found to be statistically significant (Table 8).

Cardiovascular risk categorization by the American Heart Association, 2008 in which the next 10 year risk assessment was done based on the prevalence of central obesity as risk factor and recorded (Figure 1).

Table 6: Relationship between central obesity by extra salt and type of cooking oil.

Risk factor	Prevalence of central obesity (%)	Odds ratio and 95% CI	Statistical significance
Extra salt intake			
Yes	15/57 (26.3)	1.84 (0.94-3.57)	$\chi^2=3.77$; P=0.052; NS
No	110/677 (16.2)		
Type of cooking oil			
Others	84/538 (15.6)	0.69 (0.46 - 1.05)	$\chi^2=2.96$; P=0.08; NS
Oil rich in PUFA	41/195 (21.0)		

Table 7: Relationship between central obesity and Holmes stress categories.

Holmes stress category	Prevalence of central obesity (%)	Statistical significance
Nil	97/630 (15.4)	$\chi^2=10.2$; df=2; P=0.006; S
Mild	26/90 (28.9)	
Moderate	2/12 (16.7)	
Severe	0/2 (0.0)	

Table 8: Relationship between central obesity and nature of work and physical exercise.

Risk factor	Prevalence of central obesity (%)	Odds ratio and 95% CI	Statistical significance
Nature of work			
Sedentary	83/451 (18.4)	1.29 (0.85 -1.98)	$\chi^2=1.56$; P=0.21;NS
Moderate and Severe	42/283 (14.8)		
Physical exercise			
No	81/600 (13.5)	0.32 (0.21 -0.49)	$\chi^2=28.9$; P<0.001; S
Yes	44/134 (32.8)		

DISCUSSION

The prevalence of central obesity based on the WHO cut off levels of waist circumference, was found to be 17.0%. A comparable prevalence of 15.7% was reported in a rural community in Pune and rural north India study 12.1%.^{5,6} A higher level was reported in Delhi industry study (40%) due to a different cut off levels taken in the study.⁷ In the current study, the prevalence was found to be significantly higher in current alcoholics (28.8%), males (27.6%), stress (26.9%), family history of hypertension (26.7%), extra salt intake (26.3%), current smoking (25.8%), family history of diabetes (25.4%), secondary and above level of education (22.1%), upper and middle socio-economic status (21.0%) and other castes and backward classes (18.7%). A higher prevalence was also reported in a study in Jaipur.⁸ The ICMR study has found a higher level in females (29.2%) than in males 12.2%.⁹ The prevalence was also found to be higher in those living in joint families (19.3%), aged less than 50 years (18.9%), married (17.7%) and Hindu religion (17.4%). Contrastingly significant higher prevalence is found in those who exercise daily (32.8%) which can be explained in the similar way for hypertension and diabetes in the current study. Similarly higher prevalence was found in those taking oils rich in PUFA (21.0%) which however was not statistically significant. This finding may be mostly due to the fact that those already had central obesity may be doing physical exercise and consuming oils rich in PUFA much more commonly than those without central obesity. A higher prevalence (60.7%) was reported in Jaipur study.¹⁰ A very low prevalence was reported in a study in Andhra Pradesh (21.3%) and rural north Indian study 16.1%.^{6,11} In the current study, the overweight and obesity has been found to be higher in those aged less than 50 years, female sex, secondary education and above, unskilled occupation, married, Hindu religion, nuclear family, other castes and backward classes and those belonging to upper and middle socioeconomic status. However statistical significance was found only with regard to female sex and unskilled occupation. A study by ICMR also found a slightly higher level of in females (14.0%) than in males 9.4%.¹² It can be seen that the prevalence of both medium and high risk (15.5% and 26.3% respectively) are found to be significantly higher in males than females (P<0.001; S). In a 14-year prospective study, middle-aged women with a BMI >23 but <25 had a 50% increase in risk of nonfatal or fatal coronary heart disease, and men aged 40 to 65 years with a BMI >25 but <29 had a 72% increased risk.^{13,14}

CONCLUSION

Our study suggests that modifiable risk factors like central obesity and other associated parameters plays major role in early management of cardiovascular risk factors with proper awareness in treating Cardiovascular Diseases.

ACKNOWLEDGEMENTS

Authors acknowledge Faculty of Department of Community Medicine, SV Medical College, Tirupathi for their valuable suggestions during this work.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Murray CJL, Lopez AD. Global health statistics: Global burden of disease and injury series. Vols. I and II. Boston: Harvard School of Public Health; 1992.
2. Kumar NP, Shankaregowda HS, Revathy R. An assessment of preventable risk factors for chronic non communicable diseases in an adult population. Asian J Epidemiol. 2011;4(1):9-16.
3. Zhou BF. Effect of body mass index on all-cause mortality and incidence of cardiovascular diseases-report for meta-analysis of prospective studies open optimal cut-off points of body mass index in Chinese adults. Biomed Environ Sci. 2002;15(3):245-52.
4. Wilson P, D'Agostino RB, Sullivan L, Parise H, Kannel WB. Overweight and obesity as determinants of cardiovascular risk: the Framingham experience. Arch Intern Med. 2002;162(16):1867-72.
5. Agrawal VK, Basannar DR, Singh RP, Dutt M, Abraham D, Mustafa MS. Coronary risk factors in a rural community. Indian J of Pub Health. 2006;50(1):19-23.
6. Singh RB, Sharma JP, Rastog V, Raghuvansi RS, Moshiri M, Verma SP, et al. Prevalence of coronary artery disease and coronary risk factors in rural and urban populations of north India. European Heart J. 1997;18:1728-35.
7. Prabhakaran V, Shah P, Chaturvedi V, Ramakrishnan L, Manhapra A, Reddy KI. Cardiovascular risk factor prevalence among men in a large industry of northern India. Natl Med J India. 2005;18(2):59-65.
8. Gupta R, Kaul V, Bhagat N, Agarwal M, Gupta VP, Misra A, et al. Trends in prevalence of coronary risk factors in an urban Indian population: Jaipur Heart Watch-4. Indian Heart J. 2007;59(4):346-53.
9. Gupta R. Burden of coronary heart disease in India. Indian Heart J. 2005;57:632-8.
10. Gupta R, Gupta VP, Sarna M, Bhatnagar S, Thanvi J, Sharma V, et al. Prevalence of coronary heart disease and risk factors in an urban Indian population: Jaipur Heart Watch-2. Indian Heart J. 2002;54:59-66.
11. Chow C, Cardona M, Raju PK, Iyengar S, Sukumar A, Raju R, et al. Cardiovascular disease and risk factors among 345 adults in rural India-the Andhra Pradesh Rural Health Initiative. Int J Cardiol. 2007;116(2):180-5.
12. Shah B, Mathur P. Surveillance of cardiovascular disease risk factors in India: The need and scope. Indian J Med Res. 2010;132(5):634-42.
13. Manson JE, Willett WC, Stampfer MJ, Colditz GA, Hunter DJ, Hankinson SE, et al. Body weight and mortality among women. N Engl J Med. 1995;14;333(11):677-85.
14. Rimm EB, Stampfer MJ, Giovannucci E, Ascherio A, Spiegelman D, Colditz GA et al. Relation of body weight to development of ischemic heart disease in a cohort of young North American men after a 26 year observation period: the Manitoba Study. Am J Epidemiol. 1995;141:1117-27.

Cite this article as: Yamasani B, Pattubala SSR, Raviprabhu G. Cross sectional study on obesity prevalence in cardiovascular risk factors. Int J Community Med Public Health 2016;3:2729-33.