Assessment of Cardiovascular Risk and Obesity

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ABSTRACT

Introduction: There are numbers of epidemiological studies that shows clear correlation between obesity and cardiovascular risk factors like systemic hypertension, diabetes, dyslipidemia. The primary aim of this study was to assess the absolute cardiovascular risk (ACR) and cardiovascular risk factors in obese patient.

Methods: A descriptive cross sectional study was conducted at this hospital in a population who came for preventive health checkup package. The study was done over a period of 2 years from April 2011 to march 2013. Hypertension was defined as per JNC-7 guidelines. Lipid profile was assess following the criteria of Third report of National Cholesterol Education. Cardiovascular risk assessment was done by Farmingham risk assessment calculator 2008.

Result: Total 197 people: male 95(55.5%), female 75(44.5%) participated in this study. Out of which 101 (59.4%) had high BMI with equal prevalence among gender. There was significant relation of BMI with high cholesterol and high triglyceride with p-0.021 and p-0.004 respectively. However there was no statistically significant relation with alcohol use, smoking, hypertension and diabetes .The study also revealed that 22% of population had moderate and 18% had high ACR but correlation between ACR and BMI was not significant statistically (p=0.091). .However in routine ultrasound finding there was strong association of fattyliver with high BMI 59% in overweight and in 22% obese which was statistically significant P<0.001

Conclusion: Prevalence of population with BMI above normal was high in this study though it did not show any clear relationship with ACR. However this study has formulated an important hypothesis that high cholesterol can be the only indicator that gives the clue towards cardiovascular risk.

Keywords: Absolute Cardiovascular Risk, Cardiovascular disease, Cardiovascular risk, Obesity

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INTRODUCTION

Obesity is one of the important risk factor for cardiovascular disease. Various studies have reported a strong correlation between obesity and cardiovascular risk factors.[1,2] The numbers of epidemiological studies that have showed clear correlation between obesity and cardiovascular risk factors like systemic hypertension, diabetes, dyslipidemia.[3,4] This study will help the primary care physician to arouse health awareness in public. The prime aim of this study was to assess the cardiovascular risk factors in obese population. The secondary aim is to see the inter relationship between different cardiovascular risk factors with obesity

METHODS

A descriptive cross sectional study was conducted at KIST Medical College in a population who came for preventive health checkup package. The study was done over a period of 2 years from April 2011 to march 2013. Data was recorded from predesigned health checkup form. All the participants gave their informed consent to be the part of study on explanation of the purpose of study. The study was approved by the hospital ethical review board.

Patient's weight was taken by stander and calibrated weighing machine with minimal clothes. Height was taken with standard scale and without shoes. Body mass index (BMI) was calculated. BMI was categorized underweight (<18.5), normal (18.5-24.9), overweight (25-29.9) and obese (>30).Here grade 1,2 and morbidly obese are merged in obese group.

Blood pressure was measured manually by aneroid sphygmomanometer. Hypertension was defined as per JNC-7 guidelines. Blood pressure of more than or equal to 140/90 mmHg was taken as hypertension.[5] In reference to the Expert Committee on the diagnosis and Classification of diabetes mellitus normal level of fasting blood glucose(FBS) and post prandial glucose (PP) are <110mg/dl and <140mg/dl respectively. FBS ≥ 126mg/dl and PP ≥200mg/dl were considered to be diabetic.[6]

Lipid profile was assess following the criteria of Third report of National Cholesterol Education Program,[7] For the comparative study we have combined high and very high in one group and has considered triglyceride >200mg/dl, cholesterol >240 mg/dl, LDL >130 mg/dl and HDL>60 mg/dl to be in high group.

Absolute Cardiovascular risk (ACR) assessment was done by applying Framingham risk assessment calculator 2008 QX calculator from Apple application as a assessment tool. Factors such as gender, age, smoking, diabetes, serum levels HDL and LDL and arterial blood pressure are used to calculate cardiovascular risk.[8] According to which they are categorized into low risk <10% moderate risk 10%-20% and high risk>20%. BMI is not taken in account in Framingham score although obesity is one of the key risk factor for cardiovascular disease. On routine ultrasonography scan incidence of fatty liver was correlated with BMI.

Descriptive and frequency data analysis were done by using Statistical Package of Social Sciences (SPSS) version 16 for windows. Chi Square and T test test was used and P values of < 0.05 were considered to be statistical significant.

RESULTS

During the study period of two years, 197 people underwent preventive health checkup packages. Among them 170 were included in the study excluding 27 incomplete files. Absolute cardiovascular risk (ACR) risk assessment was performed in 154 cases as 19 of them were under 30 years and were excluded. The age of population ranged from 19-81(mean of 46±12.4).Among them (male 56% and female 44%).

Regarding personnel habits 110(65%) denied to take alcohol at present, 35(20%) admitted to be social drinker and 25(15%) of them were frequent drinker. Similarly 110(65%) were nonsmoker, 40(24%) had past smoking history and 20(11%) of them were smokers. Total 123(72.4%) had no past history of hypertension, diabetes.

According to WHO classification BMI, 81(48%) subjects were overweight out of which male were 44(54%) and female were 37(46%); 26(15%) were obese out of which male were 12(46%) and female were14 (54%) and 60(35%) had normal BMI out of which male-63%, female-37%.

The difference in the subjects in group 30-40 and 41-50 (56.8% vs 27%; 57% vs 27% respectively) and the difference was statistically significant (p=0.03). The prevalence of obesity in <30 years, 30-40 years, 41-50 years, 51-60 years and >60 years age groups was 6.25%, 16%, 17.3%, 14.3% respectively.

There was no statistically significant relation seen between BMI and past history, alcohol use, and smoking. There was statistically significant relation seen between BMI and fatty liver in routine. So, furthermore, a comparison was done between BMI category and mean lipid level and other variables in each category.

Table 1: BMI Category and Dyslipidemia

Lipid profile	BMI					
	<18	18-24.5 N (%)	25-29.9 N (%)	≥ 30 N (%)	Total N (%)	P value
High cholesterol >200mg/dl	0	10/60 (16.7)	19/81 (23.5)	12/26 (46.1)	41/170 (24.11)	.021
High HDL >40	1	18/60 (30)	21/81 (25.9)	13/26 (50)	53/170 (31.17)	.146
High LDL>130	0	30/60 (50)	42/81 (51.9)	18/26 (69.2)	90/170 (52.94)	.094
high TG>150	0	20/60 (33.3)	49/81 (60.5)	11/26 (42.3)	80/170 (47.05)	.004

Fatty liver was found in 59% of overweight and 22% of obese (P = < 0.01)

Table 2: BMI category and ACR

ACR	BMI			
	<18	18-24.5	25-29.5	Total
Low	24/51 (47%)	50/77 (64.9%)	18/25 (72%)	92 (59.7%)
Moderate	13/51 (25.4%)	17/77 (22.1%)	3/25 (12%)	34 (22%)
Severe	14/51 (27.4%)	10/77 (12.9%)	4/25 (16%)	29 (18%)
Total	51 (33.1%)	77 (50%)	25 (16.2%)	154

Table 3a: Categorization of mean of different variable in relation to cardiac risk

Cardiac Risk	SBP mmHg	DBP mmHg
High	148.2	90.3
Moderate	142.2	88.2
Low	125.4	82.1
P Value	<0.05	<0.05

Further sub analysis of cardiac risk and different lipid level and other parameters is given in Table 5a

Table 3b: Categorization of mean of different variable in relation to cardiac risk

Cardiac Risk	FBS #	PP #	Cr #	Ch #	LDL #	HDL #	TG #
High	107.1	152.1	0.98	196.1	38.1	115.2	225.7
Moderate	88.2	113.6	0.97	182.2	37.7	107.8	232.2
Low	84.6	107.6	0.96	170.5	37.1	105.6	164.25
P Value	<0.05	<0.05	0.5	0.03	0.8	0.1	0.0059

#mg/dl, Cr=Creatinine, Ch=Cholesterol

DISCUSSION

In this study most of the participants 101 (59.4%)) were overweight with mean BMI of 26.02 Kg/M^2 and average age of the population was 46.03 years. This shows that obesity is not very much prevalent in our population. So in our population a hypothesis can be formulated that obesity is not the major cause of increase cardiovascular risk. This study did not show any relation between BMI and past history, alcohol, smoking and ultrasound findings. There was also no clear relationship between BMI and cardiovascular risk. The possible reason for this can may be due to small sample size.

When sub group analysis was done with BMI category with blood pressure, sugar, creatinine and lipid profile, obesity was associated with higher systolic and diastolic blood pressure, creatinine and HDL, this relation was not statistically significant. High level of HDL was seen in obese subjects which were though not statistically significant but this variation might again have been because of small sample size. The major bulk 75.9% of the population had normal cholesterol and nearly half of the people had high Triglyceride 47% (p=0.004) which was statistically significant. However, obesity was associated with comparatively higher cholesterol level, and higher LDL level which was statistically significant. So this study indicates an important parameter (Cholesterol and LDL) which are seen in higher values in obese subjects. A study done by Raj Padwal et al stated a continuous, strong and graded relation between blood pressure and cardiovascular disease but no clear threshold values were identified. The study also stated that numerous factors like age, male, sex, family history , raised cholesterol, smoking, diabetes, obesity, left ventricular hypertrophy as cardiovascular risk factors which was consistent with our study.[9]

So, the variables were again assessed against cardiac risk which were categorized as high, moderate and low. There was no relation seen between cardiac risk and past history, smoking, alcohol and ultrasound findings. However a study done by Anna Lettycia et al has suggested to smoking as one of the important parameters to of cardiovascular risk.[10]

Comparatively Higher systolic and diastolic blood pressure; fasting and post prandial blood sugar was associated with higher cardiac risk. The findings were statistically significant. Comparatively higher cholesterol and triglyceride was also associated with higher cardiac risk and the findings was also statistically significant. So analyzing the relation derived in above paragraph it seems that total cholesterol is common parameter which is seen be increased in obese participants and has also been a factor for higher cardiac risk at relatively high level. The firm relation of cholesterol as a single and important factor to assess obesity and cardiac risk cannot be formulated from this study. However this study leaves an important hypothesis of cholesterol as an important factor for obesity and cardiovascular risk.

Waist hip ratio has now been a more important indicator of cardiovascular risk factors. A study done by M Dalton et al showed that waist hip ratio had strongest correlation with cardiovascular risk. It is the most measure of obesity and to identify individuals with cardiovascular risk factors.[11]

CONCLUSION

This study did not show any clear relationship between obesity and cardiovascular risk, however this study has formulated an important hypothesis that high cholesterol can be the only indicator that gives the clue towards cardiovascular risk. However, this hypothesis needs to be tested with higher sample size and properly randomized controlled trials.

REFERENCES

1. Buse JB, Ginsberg HN,Bakris GL,Clark NG ,Costa F,Eckel R, etal.Primary prevention of cardiovascular diseases in people with diabetes mellitus:Circulation 2007;115:114-26.
2. National Institutes of Health .Clinical guidelines on the identification evaluation and treatment of overweight and obesity in adults.the evidence report.Obes Res 1998;6 Suppl 2:s51-209.
3. World Health Organisation, Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risk, World Health Organisation ,Geneva ,Switzerland ,2009
4. Calle EE, Thun MJ, Petrelli JM, Rodriguez C, Heath CW Jr. Body. mass index and mortality in a prospective cohort of US adults N Engl J Med. 1999;341(15):1097-105.
5. The Fifth report of the Joint National Committee on Detection, Education and Treatment of high Blood pressure(JNC V).Arch Intern Med 1993;153(2):154-83.
6. Report of the Expert Committee on the diagnosis and classification of diabetes mellitus. Diabetes care 1997;20:1183-97.
7. Ralph B. D Agostino , Sr Ramachandran ,S.Vasan,Micheael J Pencina, Philip A. Wolf,Mark Cobain,Josph M.Massaro and William B.Kannel.General Cardiovascular Risk Profile for Use in Primary Care: The Framingham Heart Study Circulation 2008,117:743-753
8. Executive summary of the third report of the National Cholesterol Education Program(NCEP) Expert Panel on detection, evaluation and treatment of high blood cholesterol in adults(Adult Treatment Panel III) JAMA.2001;285(19):2486-97.
9. Raj Padwal,clinical research fellow, Sharon E Straus, assistant professor.BMJ 2001 april; 332(7292):977-980.
10. Anna Lettycia Vieira dos Santos, Graziele Souza Lira Ferrari, Adenilda Cristina Honório-França, Eduardo Luzia França, Carlos Kusano Bucalen Ferrari. Biomedical Research Group, Institute of Biological Sciences and Health (ICBS), Federal University of Mato Grosso (UFMT),"Campus Universitário do Araguaia" II: Av. Gov. Jaime Campos, 6390, Distrito Industrial, Barra do Garças, 78.600-000, MT, Brazil.
    Int J Pharm Biomed Res 2011, 2(2), 124-127.
11. M. Dalton, A.J.Cameron, P.Z. Zimmet , J.E. Shaw, D. Jolley, D.W.Dunstan,T.A.Welborn.Waist circumference,waist-hip ratio and body mass index and their correlation with cardiovascular disease risk factors in Australian adults,Journal of internal Medicine 2003:254;555-563.