VOLUME-7, ISSUE-5, MAY-2018 • PRINT ISSN No 2277 - 8160

Original Research Paper

Medicine

A CORRELATION OF LEFT VENTRICULAR HYPERTROPHY(ECCENTRIC) WITH ANTHROPOMETRIC MEASUREMENTS OF OBESE ADULTS

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ABSTRACT

INTRODUCTION :- Obesity represent a state of adipose tissue mass and is a precursor of many diseases . Obesity is a independent risk factor for stroke MI, Arrhythmias. structural and functional changes in the heart appears long before the detection of these overt clinical diseases. And these changes are better visualized by Echocardiography. The Echo diagnosis of LVH in obese help to prevent life threatening complication of obesity.

AIM/OBJECTIVE:-[1]To study a correlation of left ventricular hypertrophy(eccentric) with anthropometric measurements of obese adults as an independent prognostic marker for Obesity. [2] To study LVH as represented by Left Ventricular Mass and its comparison with (a)BMI (Body Mass Index), (b)BSA(Body Surface Area) and (c)WHR(Waist To Hip Ratio).

MATERIAL & METHOD:- All adults patient attending the Medicine OPD in two year duration were enrolled in the study. Anthropometric data collection :-Weight(Kg), Height(cm), Waist Circumference(cm), Hip Circumference(cm). Echocardiography was performed after anthropometric measurements. Two dimensional targeted M-mode measurement of LVM as recommended by American Society of echocardiography(ASE).

RESULT:- The BMI was found higher in the experimental group 42.48(+/-7.35)than control group 21.69(+/-3.32). BSA & WHR both were significantly higher in experimental than control group. LVM is significantly higher in experimental group than control group.

CONCLUSION:- Reduction in BMI , marker of Obesity will lead to improvement of Echocardiographic parameters of Obesity & will likely to prevent further cardiovascular morbidity & Mortality"

KEYWORDS : LVH, BMI, BSA, WHR, Obesity

INTRODUCTION

The global epidemic of overweight & obesity- "globesity"(1). In 2014, more than 1.9 billion (39%) adults, 18 years and older, were overweight. Of these over 600 million (19%) were obese(2) and Prevalence is increasing not only in the developed countries but also in developing countries like India(3).Obesity represent a state of adipose tissue mass(4). Adipose tissue , recently been recognized as active participant in numerous physiological & pathological process and central adiposity (visceral fat) contributes to chronic subclinical inflammation which is linked to endothelial dysfunction & early development of cardiovascular diseases(5). Currently overweight and obesity are classified by Body Mass Index (BMI) which is considered as "Gold Standard" by WHO as measure of fatness in children and adult .

The Echocardiography (Echo) diagnosis of LVH in obese help to prevent life threatening complication of obesity(6). LVH is present in a consistent fraction of the obese population and that eccentric hypertrophy prevails over the concentric phenotype. As obesity-related LVH is a powerful risk factor for systolic/diastolic dysfunction, the prevention/treatment of obesity may have a strong, favourable impact on incident heart failure.(7) In Obesity the cardiac output is elevated due to increase blood volume causing a chronically elevated preload condition which in turn increases ventricular size, wall stress and left ventricular mass (LVM) leading to development of eccentric ventricular hypertrophy.(8)

AIMS /OBJECTIVE

To study a correlation of left ventricular hypertrophy(eccentric) with anthropometric measurements of obese adults as an independent prognostic marker for Obesity.

To study LVH as represented by Left Ventricular Mass and its comparison with (a)BMI (Body Mass Index), (b)BSA(Body Surface Area) and (c)WHR(Waist To Hip Ratio).

Inclusion Criteria

1. Consent was taken from all patient included in study
2. All patient with age between 20years to 60years
3. Obese as Cases with BMI ≥30kg/m^2
4. Non Obese as Controls - with BMI 18.5kg/m^2 to 24.9kg/m^2

Exclusion criteria

1. Who are not willing to give consent
2. All Diabetic Subjects
3. Patients with history of heart disease
4. All Patient who are overweight - with BMI of 25.0kg/m^2 to 29.9kg/m^2
5. Women with pregnancy

MATERIAL & METHOD

All adults patient attending the Medicine OPD of Sri Aurobindo Medical College and Post graduate, Indore in two year duration were enrolled in the study. Total of 200 patients were included in study, out of them 100 as Cases and 100 as Controls. It was a prospective Cross sectional study . Anthropometric data collection was done for all cases and controls as Weight in Kg, Height in cm, Waist Circumference in cm and Hip Circumference in cm, three readings were taken for each and mean of these readings was taken.Pulse & Blood pressure were recorded for all and FBS, PPBS and ECG was done for all cases and controls . Echocardiography was performed after anthropometric measurements,two dimensional targeted M-mode measurement of LVM as recommended by American Society of echocardiography was done, BSA was calculated by Echo machine (by Du Bois formula =BSA =0.007184 x W0.425 x H0.725)and Left ventricular mass(LVM) was calculated using ASE modified formula also called"The Deverux-Modified ASE Cube Formula"(9) (LVM (g) =0.8 (1.04(IVSd + LVIDd + PWTd)3 - LVIDd 3)+0.6)

STATISTICAL ANALYSIS & RESULT

A total of 200 subjects were included in study. Out of these 200 subjects, 100 were taken in experimental group which was consisted of obese patients and 100 subjects were taken as control group, which was consisted of non-obese patients. Obesity was defined on the basis of BMI. In both the groups, the mean age was comparable (mean age of cases was 42.5 ± 10.9 and of controls was 47.03 ± 13.28). BMI was higher in cases with mean value of 42.48 ± 7.35 as compared to control with mean value of 21.69 ± 3.32.(Table-1).

Table -1 MEAN BMI IN BOTH THE GROUPS

Characteristic	Experimental Group (Mean ± SD)	Control Group (Mean ± SD)
BMI (kg/m2)	42.48 ± 7.35	21.69 ± 3.32

In this study, we found that mean waist hip ratio (WHR) was 0.97 ± 0.13 in study group and 0.92 ± 0.07 in control group which was significantly higher in cases as compared to controls with p value of 0.001. Mean body surface area (BSA) was also found significantly higher in study group as compared to control with mean value of 2.19 ± 0.22 & 1.68 ± 0.23 respectively and p value 0.001 (Table-2). We also found that mean Left ventricular mass(LVM) was 222.94 ± 89.25 in study group and 165.17 ± 55.45 in control group which was also significantly higher in cases as compared to controls with p value of 0.001.(Table-3)

Table-2 Mean Anthropometric data (WHR & BSA) of both the groups

Characteristic	Experimental Group (Mean ± SD)	Control Group (Mean ± SD)	'Z' test	P value
WHR	0.97 ± 0.13	0.92 ± 0.07	3.39	0.001***
BSA (m2)	2.19 ± 0.22	1.68 ± 0.23	16.02	0.001***

Table-3 MEAN LVM IN BOTH THE GROUPS

Characteristic	Experimental Group (Mean ± SD)	Control Group (Mean ± SD	'Z' test	P value
LVM (g)	222.94 ± 89.25	165.17 ± 55.45	5.50	0.001***

In our study, we found that among males LVM was showing positive correlation with BMI with r value 0.339 & p value 0.001 (significant) and also with BSA with r value 0.438 & p value 0.001 (significant) but not with WHR with r value 0.113 & p value 0.236 (insignificant). In females we found that LVM was showing positive correlation with all the three parameters BMI,WHR & BSA with r value 0.328 (P value 0.002), 0.231 (p value 0.030) and 0.340 (p value 0.001) respectively.(Table-4)

Table- 4 Correlation between the measures of obesity and LVM in both the groups (Pooled Data N=200)

CHARACTERISTIC	MALE/FEMALE	BMI r value (P value)	WHR r value (p value)	BSA r value (p value)
LVM(g)	MALE	0.339(0.001***)	0.113 (0.236)	0.438(0.001***)
	FEMALE	0.328(0.002***)	0.231 (0.030)*	0.340(0.001***)

DISCUSSION

In our study of 200 subjects we found that the BMI was significantly higher in the experimental group 42.48(+/-7.35)than control group 21.69(+/-3.32) and this was also supported by Oliver J et al in 2009 they also found BMI (37.8 ± 6.9 kg/m2) higher in cases than in controls (BMI 21.7 ± 1.8 kg/m2) in their study. (10)

We also found BSA & WHR both were significantly higher in experimental than control group and this was also supported by Okpara IC et al in 2009 and they also found that BSA & WHR were significantly higher in the obese subjects than control group ($p<0.05$)(9).

In our study we also found that LVM is significantly higher in experimental group than control group. Amongst three parameters of anthropometry, significant correlation of LVM was seen with BMI in males & females both , with BSA in males & females both, but with WHR only in females ; this was supported by studies done by Okpara IC et al in 2009 & Rider et al in 2009 ; showed that BSA, WHR & BMI have a significant positive correlation with LVM (9,11)

CONCLUSION

WHR & BSA is a equivalent anthropometric marker of Obesity like BMI. LVM estimation is an independent predictor of eccentric LV Hypertrophy in Obesity. "Thus, Reduction in BMI , marker of Obesity will lead to improvement of Echocardiographic parameters of Obesity & will likely to prevent further cardiovascular morbidity & Mortality".

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