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Anthropometric Measurements of Android and Gynoid Obesity and Their Association with Cardiovascular Diseases Risk Factors in Obese Young Adults

Rafiah Doi[1], Dr. Sweety Shah[2]

[1]Postgraduate student, SBB College of Physiotherapy, VS General Hospital, Ahmedabad, India
[2]PT, Ph.D., SBB College of Physiotherapy, VS General Hospital, Ahmedabad, India

Corresponding Author: Rafiah Doi

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ABSTRACT

Background- Obesity is the leading risk-factor of cardiovascular-diseases, which accounts for 23% of Ischemic Heart-Diseases burden. Several studies are done to correlate the effect of BMI on cardiovascular risk-factors. But only few studies are done to compare the effect of obesity on cardiovascular risk-factors. Therefore, this study is to identify the effect of android & gynoid-type of obesity on CVD risk-factors.

Method- Study conducted on 60 obese-adults; Age:20-45 years; BMI 25-29.9kg/m2 (Obese-class I WHO-Asian Classification) Demographic and anthropometric data regarding WC, HC, and WHR were recorded. CVD risk-factors by ATP-III definition: High-BP, Low-HDL-C, High-triglycerides, Fasting-glucose. Thus, to observe association of CVD risk-factors between android-obesity & gynoid-obesity.

Result- Result has been obtained from SPSS20. Mean-age & Mean-BMI in Android-obesity were (33.06+7.8) (27.33+1.24) and in Gynoid-obesity were (33.9+7.54) (27.26+1.15) respectively. Comparison between two groups found using independent t-tests. There was significant difference of Triglycerides, Fasting-glucose, Blood-pressure & HDL-C between both groups. Triglycerides (M=158.27), Fasting-glucose (M=121.30), Blood-pressure (SBP; M=132.69, DBP; M=89.03) were higher while HDL-C (M=35.10) is lower in Android-obesity than that of Gynoid(M=110.53), (M=95.77), (SBP; M=116.97, DBP; M=75.50) and (M=46.03), having significant difference $p<0.05$

Conclusion & Clinical-implications- This study concludes that CVD risk-factors are significantly associated with Android-obesity as compared to Gynoid-obesity.

Keywords: Android-Obesity, Gynoid-obesity, CVD risk-factors, waist-hip-ratio

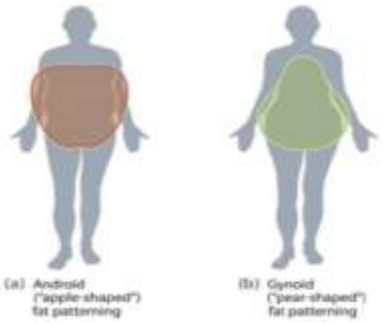
INTRODUCTION

Obesity is a growing public health concern in the Western world that is caused by a combination of sedentary life-style and excessive caloric intake. (1) Obesity is one of the leading risk factors of cardiovascular diseases, estimated to account for 23% of the ischemic heart disease burden. (2) Excess adipose tissue contributes to the cardiovascular and other risks associated with being obese. (2)

Adiposity markers like Body Mass Index, Waist Circumference, Waist Hip Ratio, and Hip Circumference help in better prediction of Body Fat between Android and Gynoid Pattern (3)

The World Health Organization (WHO) adopted body mass index (BMI), which is calculated by Dividing the body weight in kilograms (Kg) by the square of the height in metres (m), as a surrogate Measure of total body fat. Body Mass Index is the most

commonly used parameter to determine obesity [4]



The GE Healthcare systems define the android region as the area between the ribs and the pelvis that is totally enclosed by the trunk region. The gynoid region includes the hips and upper thighs and overlaps both the leg and trunk regions. [5] Android obesity is often referred to as the "apple" shape since the increased fat is in the trunk. Gynoid obesity is referred to as the "pear" shape with increased fat in the hip and thigh areas. [6]

Body Mass Index (BMI) is the widely used measure of obesity. However, the BMI is unable to differentiate between lean mass and fat mass, and hence, it is limited by differences in body adiposity for a given BMI across age, gender and ethnicity In addition, the BMI does not consider body fat distribution Hence, other measures of adiposity, which consider body fat distribution, like waist circumference (WC), waist-to-hip ratio (WHR) have been developed and studied [7]

Waist-to-hip ratio is the ratio of Waist Circumference to Hip Circumference (WHR, android-type obesity > 0.9 in men, > 0.8 in women, gynoid-type obesity below these limits) [8]

CVD risk factors reported by the ATP III definition is High blood pressure (systolic blood pressure >130 mmHg and/or diastolic blood pressure>85 mmHg), low HDL-C (men <1.03 mmol/l; women <1.30 mmol/l), high triglycerides (>1.70 mmol/l) and fasting glucose (>6.1 mmol/l). [9]

Several studies are done to correlate effect of BMI on cardiovascular risk factors. But only few studies are done to compare the effect of obesity on cardiovascular risk factors.

Therefore, this study is to identify the effect of android and gynoid type of obesity on cardiovascular risk factors, so that proper intervention can be taken for fat re-distribution and early preventive measures can be done in regards to obesity to reduce future cardiovascular diseases risks. The aim of the study is to assess the associations between android and gynoid obesity anthropometric measures with cardiovascular diseases risk factors.

MATERIALS & METHODS

A study was conducted in 60 obese young adults of age between 20 to 45 years. Participants of both sexes having BMI range from 25 to 29.9 kg/m^2 (obese class 1) were included. Participants taking cardiovascular drugs and having medical history of HTN and DM were excluded. Ethical committee approval was taken. Basic demographic data was taken. Prior consent was taken of all participants. Body Mass Index was calculated – weight(kg)/ height (m^2) [was classified according to WHO-ASIAN Classification]. Weight was measured using digital weight scale. Height was measured using stadiometer.

Subjects were divided into two groups based on fat deposition.

Group 1 (n=30): consist of participants of android type obesity (WHR>0.9 in men and >0.8 in women).

Group 2(n=30): consist of participants of gynoid type obesity (WHR < 0.9 in men and <0.8 in women).

Waist-to-hip ratio is the ratio of Waist Circumference to Hip Circumference. The Waist Circumference was measured from the front at the narrowest point between the rib cage and iliac crest after full expiration while the Hip Circumference was measured from the side at the maximal extension of buttocks by one observer using a metal tape.

Association of both groups with cardiovascular diseases risk factors i.e., High blood pressure (systolic blood pressure >130 mmHg and/or diastolic blood pressure>85 mmHg), low HDL-C (men <1.03 mmol/l; women <1.30 mmol/l), high triglycerides (>1.70 mmol/l) and fasting glucose (>6.1 mmol/l).

STATISTICAL ANALYSIS

Statistical analysis was done using SPSS version 20. Data was checked for normal distribution using Shapiro-Wilk test.

As data was normally distributed, Data analysis was performed using the unpaired t-test for comparison between two groups.
P < 0.05 was considered as statistically significant

RESULT

The 30 participants having android obesity in the present study had a mean age of (33.06+7.8) year at baseline, whereas the 30 participants having gynoid obesity had a mean age of (33.9+7.54) year (P > 0.05 for comparison). The descriptive characteristics of both the groups are shown in Table 1 respectively.

Table 1. Descriptive characteristics

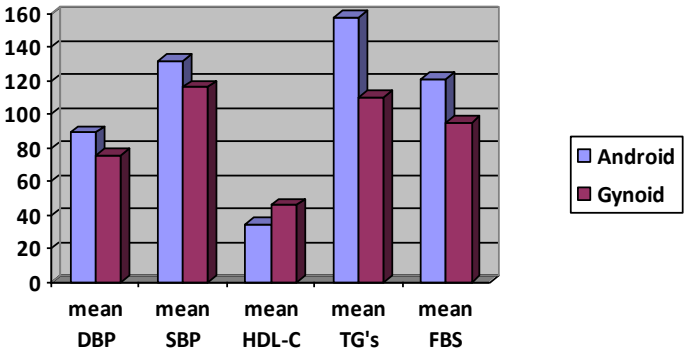
	Android Obesity (n= 30)	**Gynoid Obesity** (n= 30)
	Mean ± SD	**Mean ± SD**
Age (year)	33.06+7.8	33.9+7.54
Weight(kg)	61.49	62.15
Height (cm)	150.72	151.12
BMI (kg/m^2)	27.33+1.24	27.26+1.15

Comparison between two groups found using independent t-tests. Table 2 shows the comparison between the group 1 and group 2 examined in this study. There was significant difference of Triglycerides, Fasting-glucose, Blood-pressure & HDL-C between both groups. Triglycerides, Fasting glucose, Blood-pressure were higher while HDL-C is lower in Android-obesity than that of Gynoid obesity, having significant difference p < 0.05.

Table 2. Comparison between both groups

	Android Obesity (n= 30)	**Gynoid Obesity** (n= 30)
	Mean ± SD	**Mean ± SD**
Systolic BP	132.69 ± 6.73	116.97 ± 6.62
Diastolic BP	89.03 ± 5.49	75.50 ± 6.38
HDL-C	35.10 ± 10.12	46.03 ± 6.0
Triglycerides	158.27 ± 10.78	110.53 ± 22.49
FBS	121.30 ± 9.30	95.77 ± 9.22

P < 0.05



DISCUSSION

In the present study, we used WHR to investigate the relationship between regional adiposity and cardiovascular risk factors in a large cohort of men and women. From this study finding, there is significant association of cardiovascular risk factors with android obesity as compared to gynoid obesity.

Abdominal obesity is a bioactive mediator, capable of promoting the secretion of cardiometabolic risk substances, including free fatty acids (FFA), adipokines and inflammatory mediators (i.e., TNF a and IL-6), which are predictors of atherothrombotic events and adverse cardiovascular outcomes. Acute exposure of skeletal muscle to elevated levels of FFA induces insulin resistance, whereas chronic exposure of the pancreas to elevated FFA impairs b-cell function. Insulin resistance will develop type 2 diabetes or coronary heart disease (CHD) and promotes the atherogenic dyslipidemia that is characterized by elevated TG, low HDL-cholesterol. Increased systemic inflammation and the activation of the sympathetic nervous system caused by inflamed adipose tissues, which could be important factors for the development of hypertension. Whereas adipocytes in the gynoid obesity are less sensitive to hormonal stimulation of lipolysis, and more sensitive to the antilipolytic, esterification-promoting effects of insulin, thus less prone to release FFA. Mechanistically, such an effect has been attributed to the greater lipoprotein lipase activity and more effective storage of free fatty acids by gynoid adipocytes compared with visceral adipocyte

In one report, Wu et al. [(10)] studied 1088 men and women and showed that the ratio of android to gynoid fat mass and the waist-to-hip ratio were the best predictors for cardiovascular risk factors, consistent with the results of our study.

Only two previous studies have investigated the relationship between gynoid fat and risk factors CVD. Caprio et al. [(11)] showed that in a cohort of 24 adolescent girls, gynoid adipose mass was inversely related to triglyceride and low-density lipoprotein cholesterol levels. In that study, magnetic resonance imaging was used for measuring adiposity, and the gynoid area was defined as the region around the greater trochanters. In the second study, Pouliot et al. [(12)] measured visceral and subcutaneous fat by CT in a cohort of 58 obese male cases and 29 nonobese male controls. An inverse association was demonstrated between femoral neck adipose tissue and serum triglycerides in the obese men.

Thus, cardiovascular risk factors are associated with android obesity while these risk factors are lower with higher gynoid obesity.

CONCLUSION

This study concludes that cardiovascular diseases risk factors are significantly associated with Android-obesity as compared to Gynoid-obesity. Hence proper exercises intervention can be taken for fat-redistribution & early preventive measures can be done in regards to obesity to reduce future CVD-risks

Declaration by Authors

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