ORIGINAL ARTICLE

PERCENT BODY FAT AND ITS RELATIONSHIP WITH OBESITY AND HYPERTENSION IN ADULT POPULATION OF MINGORA SWAT

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ABSTRACT

Background: The importance of fat distribution as a risk factor for cardiovascular diseases in adults is well documented. This study was conducted to evaluate the percent body fat and its relationships with prevalence of obesity and hypertension in adult population of Mingora city, Swat.

Material & Methods: The study comprised of 200 participants. Percent body fat and the prevalence of obesity according to age and sex distribution was studied. Out of 200 subjects, 75 cases were selected and divided into three groups (age and sex matched). Weight, height, body mass index, percentage of body fat and blood pressure of obese normotensive and obese hypertensive subjects were compared with control subjects.

Results: In adult males, percent body fat and prevalence of obesity were 13.26% and 21.9% respectively, while in adult females, percent body fat and obesity were 22% and 25.6% respectively. It was observed that the percentage of body fat was significantly higher in obese hypertensive than obese normotensive persons, while significant differences were found as compared to control subjects.

Conclusion: Percentage of body fat is significantly related with obesity and hypertension.

KEY WORDS: Body mass index, Obesity, Body fat.

INTRODUCTION

In normal individuals, the percentage of adipose tissue varies by gender (greater in post-pubertal females than males) and age (about 12% at birth, increasing to 25% at 5 months, decreasing to 15-18% during puberty).[1] The changes in body composition that occur during adolescence have been well described. In boys, fat-free mass tends to increase, body fat as a percentage of body weight decreases, and fat tends to be deposited abdominally. In girls, both fat and fat-free mass increases, fat-free mass as a percentage of body weight decreases, and fat tends to be deposited in the buttocks. In both sexes, factors that contribute to the quantity of body fat and abdominal fat distribution appear to increase the risk of subsequent complications.[2] The term obesity, specifically refers to excess amount of body fat. Some people, such as bodybuilders or other athletes can be overweight without being obese.

Everyone needs a certain amount of body fat for stored energy, heat insulation, shock absorption, and other functions. As a rule, women have more body fat than men. Most health care providers agree that men with more than 25% and women with more than 30% body fat are obese.[3]

The most commonly reported adiposity measures include weight, waist circumference, subscapular and triceps skin fold measures (as well as their sum), and indices such as body mass index (BMI), waist-to-hip (circumference) ratio (WHR), and various skin fold ratios. A recent review of studies that examined the associations of adiposity and BP found a significant relationship between the two.[4]

The importance of fat distribution as a risk factor for cardiovascular diseases in adults is well documented. A pattern of excess fat in the central region (truncal fat) is associated with increased cardiovascular risks, such as elevated BP, compared with a pattern of fat deposits in the limb region (peripheral fat).[5]

The role of environment in the development of obesity is suggested by the rapid increase of the prevalence of obesity accompanying the rapid changes in the lifestyle of the population. Early experiences with food, feeding practices and family food choices affect children's nutritional habits.[6]

A number of medical conditions may be associated with obesity. These are hypothyroidism, cushing syndrome, generalized hypothalamic dysfunction, Laurence-Moon-Biedl, Prader-Willi, and Alstrom syndromes. Other important complications and associations include pulmonary (asthma, obstructive sleep apnea syndrome, pick-wickian syndrome), orthopedic (genu varum, slipped capital femoral epiphysis), and gastrointestinal /hepatic (nonalcoholic steatohepatitis) complications and mental health (depression and low self-esteem).[7] Obesity is a potent risk factor for several urinary symptoms after pregnancy and delivery.[8]

This study was conducted to evaluate percent body fat and its relationships with prevalence of obesity in the adult population of Mingora city, Swat.

MATERIAL AND METHODS

The study comprised of 200 participants of both genders, aged 21-50 years from 10 randomly selected clusters in the city of Mingora, District Swat.

Out of 200 subjects, 75 were selected and divided into the three groups (age and sex matched) for the assessment of the relationship of percent body fat with obesity and BP. Subjects were excluded from study if they had a medical history of disease other than obesity and hypertension or were taking any medication known to affect metabolism.

Group "A" Control group (non-obese and normotensive (n = 25), Group "B" Obese and normotensive (n = 25) and Group "C": Obese and hypertensive (n = 25).

Weight and height were measured with health scale. Body mass index (BMI) was determined by dividing weight (wt) in kilogram by height (ht) in meters squared (BMI=kg/m^2). BMI >27.8 in men and >27.3 in women were used to determine obesity.[9]

Skin folds thickness was measured with vernier caliper (Model 920717 Germany) at targeted sites of the body such as over triceps, subscapular, and suprailiac. Measurements were taken on the right side of the participant.[10] Percentage of body fat was determined using nomogram prepared for calculation of percent body fat from skin fold thickness.[11]

BP was obtained, after at least 5 minutes of rest, with subjects in seated position. A mercury sphygmomanometer, with an appropriate sized cuff covering two third of the upper arm, was used.[12]

RESULTS

Tables 1-3 show the comparison of anthropometric parameters and BP of the three groups. The values are expressed as mean±SD.

Table 1: Anthropometric parameters and blood pressure of group A compared with group C.

Parameters	Group A (Control, Non-obese normotensive) (n=25)	Group C (Obese & hypertensive) (n=25)
Weight (kg)	64±7.27	87±8.13**
Height (m)	1.66±0.08	1.63±0.054
BMI (kg/m^2)	23±1.29	33±2.41**
Percent body fat	18±4.77	29±3.88**
Systolic BP mmHg	120±11.8	160±8.27**
Diastolic BP mmHg	80±10.9	105±6.79**

*p<0.05 (significant).

**p<0.001 (highly significant).

Table 2: Anthropometric parameters and blood pressure of group A compared with group B.

Parameters	Group A (Control, Non-obese normotensive) (n=25)	Group B (Obese & hypertensive) (n=25)
Weight (kg)	64±7.27	81±8.43**
Height (meter)	1.66±0.08	1.64±0.068
BMI (kg/m^2)	23±1.29	31±1.41**
Percent body fat	18±4.77	27±5.3**
Systolic BP mmHg	120±11.8	140±6.75*
Diastolic BP mmHg	80±10.9	90±7.4*

*p<0.05 (significant).

**P<0.001 (highly significant).

Table 3: Comparison anthropometric parameters and blood pressure of group B and C

Parameters	Group B Obese & normotensive) (n=25)	Group C (Obese & hypertensive) (n=25)
Weight (kg)	81±8.43	87±8.13*
Height (m)	1.64±0.068	1.63±0.054
BMI (kg/m²)	31±1.41	33±2.41*
Percent body fat	27±5.3	29±3.88*
Systolic BP mmHg	140±6.75	160±8.27**
Diastolic BP mmHg	90±7.4	105±6.79**

*p<0.05 (significant).

**p<0.001 (highly significant).

DISCUSSION

Prevalence of obesity varies amongst countries depending upon the environmental and behavioral changes brought about by economic development, modernization and urbanization. The variation in prevalence of obesity epidemic in various races and communities of the world may be attributed to heredity, age, sex, diet, eating patterns, life style and/or behavior. Extensive literature exists that documents the relationship between BP and measures of body fat and fat distribution.[13] Most studies report significant association for men and women both within and between populations. Recent studies suggest this relationship has early beginning, perhaps from birth or even prenataly.[14]

Obesity does not seem to have spared developing countries either. Thailand, Iran, Nigeria and Brazil have all reported unprecedented levels of obesity with trends substantially rising every year.[15]

Roberts et al[16] reported that United States has one of the highest obesity rates in the world. The obesity epidemic is also increasing in Europe, Asia and throughout the Americas. *Obesity also plagues Middle Eastern countries, with 35% of Egyptians considered obese, a greater proportion than in the USA at 20%.*

Gerber et al[17] found that of the 7 adiposity measures examined, all were significantly related to BP except the WHR. Subscapular skin fold thickness was the best adiposity predictor of blood pressure, but BMI was also found to be a good predictor.

Studies of obesity in Asian subjects show that generalized obesity is the major determinant of cardiovascular risk in the Chinese and East Asian subjects while central obesity is associated with greater cardiovascular risk in South Asians.[18]

CONCLUSION

Percent body fat has direct relationship with the prevalence of obesity and hypertension.

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