Original Article

ASSESSMENT OF WAIST/HIP RATIO AND ITS RELATIONSHIP WITH CORONARY HEART DISEASE IN COMMUNITY HOSPITAL OF DISTRICT SWAT

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ABSTRACT

Objective: To evaluate the relationship between central obesity (Abdominal adiposity), measured by Waist/Hip ratio and the development of Coronary Heart Disease in adult population of district Swat.

Methodology: The study comprised of 100 subjects, 34 Control, 33 Hypertensive subjects and 33 subjects with Coronary Heart Disease. Weight, Height, Waist/Hip ratio and Blood Pressure of subjects with Coronary Heart Disease (CHD) were compared with Hypertensive subjects and Control subjects.

Result: Patients with Coronary Heart Disease had higher Waist/Hip ratio and Blood Pressure than Hypertensive subjects, which in turn had higher values than control subjects.

Conclusion: Waist/hip ratio is the dominant risk factor predicting Coronary Heart Disease.

KEY WORDS: Waist/hip ratio, Blood Pressure, Coronary Heart Disease.

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INTRODUCTION

"Obesity" specifically refers to an excess amount of body fat. Most health care providers agree that men with more than 25 percent body fat and women with more than 30 percent body fat are obese.[1]

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The prevalence of obesity is rising in both developed and developing nations. Cited as an important risk factor for premature mortality,[2] obesity has strong associations with all-cause mortality, cardiovascular disease and diabetes[3] and is an important component of the insulin-resistance syndrome.[4]

The most commonly reported adiposity measures include weight, waist circumference, sub-scapular and triceps skin fold measures (as well as their sum), and indices such as body mass index (BMI), waist/hip (circumference) ratio (WHR), and various skin fold ratios. A recent review of different studies that examined the associations of adiposity to blood pressure found that the vast majority of them has reported significant relationships.[5]

Body mass index or BMI (weight in kilograms divided by the square of the height in meters) is promulgated by the World Health Organization as the most useful epidemiological measure of obesity. It is nevertheless a crude index that does not take into account the distribution of body fat, resulting in variability in different individuals and populations.[2]

Waist circumference has also been recommended as a simple and practical measure for identifying overweight and obese patients and population-specific criteria have been tabulated.[2] Waist/hip ratio is the preferred measure of obesity for predicting cardiovascular disease, with more universal application in individuals and population groups of different body builds.[2] Waist circumference is highly sensitive and specific measure of central obesity. Cut off values for risk are 102cm for adult males, 88cm for adult females and 71cm for pre-pubertal children.[6] Waist/Hip circumference ratio (WHR) greater than 0.9 determines Central Obesity.[7] It is obtained by dividing waist circumference by hip circumference and provides an indication of the predominance of fat storage in the abdominal region, relative to that in the gluteal region.[8]

In adults, high value generally above 0.8 in females and 1.0 in males, are associated with increased risk of impaired glucose tolerance, hyperinsulinaemia, hypertrigyceridaemia, hypertension and premature death.[9] WHR, a measure of central adiposity, is gaining increased use as a measure of etiologically significant obesity and is thought to be more closely related to pathology, especially Coronary Heart Disease, Diabetes Mellitus and Stroke.[10] Obesity assessed by waist/hip ratio is a better predictor of cardiovascular disease (CVD) and Coronary Heart Disease (CHD) mortality than waist circumference, which, in turn, is a better predictor than BMI.[11] Waist/hip ratio appears superior to blood pressure and lipid levels in predicting cardiovascular endpoints.[12]

SUBJECTS AND METHODS

The Study was conducted at the Department of Physiology Saidu Medical College and Department of Medicine Saidu Group of Teaching Hospitals, Saidu Sharif, Swat. A total of 100 subjects were taken, 34 Control, 33 Hypertensive and 33 subjects with Coronary Heart Disease. Control subjects were selected from staff members of Saidu Medical College, Saidu Sharif, Swat. Hypertensive subjects and subjects with Coronary Heart Disease were enrolled from department of Medicine Saidu Group of teaching Hospitals Saidu Sharif Swat. Weight, Height, Waist/Hip ratio and Blood Pressure of the subjects with Coronary Heart Disease were compared with Hypertensive and Control subjects. Both males and females between age 40-70 years were included in the study.

Subjects were excluded from study participation that had a medical history of diseases other than Overweight / Hypertension / Coronary Heart Disease or were taking any medication known to affect metabolism. Health Scale (Model ZT-120) was used to measure weight and height. Weight was assessed at 2 different points during interview, and the two were averaged for these analyses. It was measured to the nearest 0.5kg. Height was also assessed at two different points during interview, and the two readings were averaged for these analyses. It was measured to the nearest 0.1cm.[13]

Waist circumference was measured around the narrowest point between ribs and hips when viewed from the front after exhaling. Hip circumference was measured at the point where the buttocks extended the maximum, when viewed from the side. Two consecutive recordings were made for each site to the nearest 1-cm using a measuring tape on a horizontal plane without compression of skin. The mean of two sets of values was used. Waist-hip ratio (WHR) was obtained by dividing Waist circumference by hip circumference.[11]

Blood pressure (BP) data was obtained, after at least 5 minutes of rest, with subjects in seated position. A mercury sphygmomanometer (Model SM- 300), with an appropriate sized cuff covering two third of the upper arm was used. The onset of the first tapping sound was taken to indicate the systolic blood pressure, while the point of complete disappearance of the sound (Korotkoff V) was taken to indicate diastolic blood pressure. The mean of three reading was recorded. In adult population, hypertension is usually defined as blood pressure level that exceeds 145-150/ 90-95mmHg.[14]

RESULTS

Table-I shows comparison of Weight, Height, Waist / Hip Ratio, Systolic and Diastolic Blood Pressure between Control subjects and subjects with Coronary Heart Disease. Weight of the subjects with Coronary Heart Disease was greater than that of Control subjects (highly significant); while Height difference was non-significant. Waist / Hip ratio, Systolic and Diastolic Blood Pressure were higher in subjects with Coronary Heart Disease than Control subjects (highly significant).

Table-II shows comparison of Weight, Height, Waist / Hip Ratio, Systolic and Diastolic Blood Pressure between Control subjects and Hypertensive subjects. Weight of the Hypertensive subjects was greater than that of Control subjects (highly significant); while Height difference was non-significant. Waist-Hip Ratio difference between two groups was significant, while Systolic and Diastolic Blood Pressure were higher in Hypertensive subjects than Control subjects (highly significant).

Table-III shows comparison of Weight, Height, Waist / Hip Ratio, Systolic and Diastolic Blood Pressure between Hypertensive subjects and subjects with Coronary Heart Disease. Weight difference between two groups was significant; while Height difference was non-significant. Waist-Hip Ratio difference between two groups was significant, while Systolic and Diastolic Blood Pressure between two groups were highly significant.

Table-I: Comparison of weight, height, waist / hip ratio, systolic and diastolic blood pressure between control subjects and subjects with CHD

S. No.	*Parameters*	*Control subjects n=34*	*Coronary Heart Disease subjects n= 33*
1	Weight (Kg)	65 ± 7.27	85 ± 8.13 **
2	Height (M)	1.67 ± 0.08	1.65 ± 0.054
3	Waist / Hip Ratio	0.86 ± 0.04	0.95 ± 0.053 **
4	Systolic BP mmHg	120 ± 11.8	180 ± 9.2 **
5	Diastolic BP mmHg	80 ± 10.2	110 ± 10.3 **

The values are expressed as mean ± SD (standard deviation). * = P < 0.05 (significant) ** = P < 0.001 (highly significant).

Table-II: Comparison of Weight, Height, Waist / Hip Ratio, Systolic and Diastolic Blood Pressure between Control subjects and Hypertensive subjects

S. No	*Parameters*	*Control subjects n = 34*	*Hypertensive subjects n = 34*
1	Weight (Kg)	65 ± 7.27	80 ± 8.43 **
2	Height (M)	1.67 ± 0.08	1.66 ± 0.068
3	Waist / Hip Ratio	0.86 ± 0.04	0.91 ± 0.055 *
4	Systolic BP mm Hg	120 ± 11.8	160 ± 8.27 **
5	Diastolic BP mm Hg	80 ± 10.2	100 ± 6.79 **

The values are expressed as mean ± SD (standard deviation) * = P < 0.05 (significant) ** = P < 0.001 (highly significant)

DISCUSSION

The importance of the central distribution of body fat has been known since the 1950s. Morris described increased cardiac deaths in London bus drivers with large belt sizes, in contrast to leaner, more active bus conductors[15] and Vague suggested that android (central and upper body) distribution of fat contributed to diabetes and atherosclerosis.[16] The first longitudinal population studies from Gothenburg, Sweden, in 1984 showed that high waist / hip ratios were associated with stroke and ischaemic heart disease in men[17] and were the strongest anthropometric predictors of cardiovascular disease and death in women.[18,19]

Our study recorded a significant association of Central Obesity, evaluated by Waist / Hip Ratio, with Hypertension and Coronary Heart Disease. Our finding study consistent with findings from Benchmark studies of waist–hip ratio as a dominant cardiovascular risk factor reported in Swedish men and women in 1984.[18,19] Another study also reported that WHR and waist circumference were independently associated with risk of Coronary Heart Disease in women.[20]

Table-III: Comparison of Weight, Height, Waist / Hip Ratio, Systolic and Diastolic Blood Pressure between Hypertensive subjects and subjects with CHD

S. No.	*Parameters*	*Hypertensive subjects n = 33*	*Coronary Heart Disease subjects n = 33*
1	Weight (Kg)	80 ± 8.43	85 ± 8.13 *
2	Height (M)	1.66 ± 0.068	1.65 ± 0.054
3	Waist/Hip Ratio	0.91 ± 0.055	0.95 ± 0.053 *
4	Systolic BP mmHg	160 ± 8.27	180 ± 9.2 **
5	Diastolic BP mmHg	100 ± 6.79	110 ± 10.3 **

The values are expressed as mean ± SD (standard deviation) * = P < 0.05 (significant) ** = P < 0.001 (highly significant)

Some studies observed almost similar findings and reported that Obesity was strongly related to Hypertension in adults.[21] The Waist-Hip ratio has been found to be associated with blood pressure in some studies,[22] but with diastolic blood pressure and not systolic blood pressure in other studies.[23] Studies of obesity in Asian subjects showed that generalized obesity was the major determinant of cardiovascular risk in the Chinese and East Asian subjects while Central Obesity was associated with greater cardiovascular risk in South Asians.[24]

The INTERHEART case-control study of coronary risk factors in acute myocardial infarction has also recently reported that obesity, especially central obesity, is an important coronary risk factor in most of the developing countries of Asia, Europe, Africa and South America.[25]

We conclude that central obesity, evaluated by Waist/hip ratio is the dominant risk factor predicting Coronary Heart Disease and Cardiovascular end points. Thus, the recognition of central obesity is clinically important, as lifestyle modification is likely to provide significant health benefits.

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