

# Study Nutritional Status by Waist Circumference and Waist Hip Ratio

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## Introduction

Anthropometric evaluation is essential feature for assigning nutritional status of Adolescent. To measure body composition mid upper arm circumference, body weight, height, skinfolds those measurements are most essential. Men and prone to heart disease when their waist circumference goes beyond 94 cm in men and 80 cm for women. This measurement is widely used in the classification of obesity. Waist to hip ratio can predict mortality. Changes in body composition and changing in every stage of life is reflected in measurement. The WHR has been used as an indicator or measure of health, and the risk of developing serious health conditions. WHR correlates with fertility (with different optimal values for males and females). WHR is used as a measurement of obesity, which in turn is a possible indicator of other more serious health conditions [1-5]. Receiver-Operating Characteristic (ROC) analysis is a very useful tool for central obesity and relation with waist-hip ratio and CED (Chronic Energy Deficiency).

WHR when goes above 80 in women and 1 in men is sign of health risk in men, this is cause due to excess fat deposition [6-8]. Waist circumference is tool to assessing abdominal fat and health status. For overweight 85<sup>th</sup> percentile is threshold point of overweight and 95<sup>th</sup> percentile is threshold of obesity.

## Materials and Methods

### Area of study and sample size

Subjects are adolescent girls aged 10-19 years. They belong to Salboni Block which is one of blocks of Paschim Medinipur, West Bengal.

Participants of socioeconomic data are collected through structured questionnaire, anthropometric data are collected through different instruments and cross section study is done on 1009 girls.

Height was measured to the nearest 0.1 cm by using a stadiometer (Holtain Ltd., Crymch, UK) when the subjects stood wearing socks and with their heads in the Frankfurt horizontal plane. Weight was measured to the nearest 0.1 kg with an electronic portable scale (Secadelta, Model 707). BMI was calculated as weight (kg) divided by height (m) squared [9-12]. A metal tape was used to measure the circumference of the buttocks. Waist circumference was measured at a level midway between the lowest rib and the crista iliaca superior. The measurement was carried out at the end of a normal expiration while the subject stood upright with feet together and arms hanging freely at the sides. Hip circumference was measured at the maximum point below the waist, without compressing the skin. WHR was calculated by dividing the waist measurement by the hip measurement.

Derivation of the ROC curves was based on a method by Obuchowski for continuous-scale gold standards. ROC analyses were performed in order to evaluate the general performance of the BMI, WC and WHR. The percentage of body fat was considered as the reference standard for the ROC curve analysis of BMI for girls.

WC and WHR were performed by employing a non-parametric approach, which was implemented in Statistical Packages for Social Sciences (SPSS) Two-sided p values were considered statistically significant at  $p < 0.05$ .

## Results

In this study mean waist circumference is 78.32(6.32) and mean Hip circumference is 84.64(6.57). In late adolescent phase girls are found centrally obese. 827 girls in overall study are centrally obese (Tables 1-3). Table 4 represents that at age [13-15] girls are centrally obese, 90 girls centrally obese at age 15 years. 80 girls are under nutrient among 1009 girls.

## Discussion

ROC curves to evaluate obesity from BMI, WC and WHR data. They also found that BMI and WC indices were suitable for diagnostic tests; however, WHR was less useful. This trend observed in our study is in line with that observed during previous investigations by the above mentioned authors.

Nutrient needs during adolescence are higher than at any other time in the lifecycle, and failure to consume a healthy balanced diet during this time can have adverse effects on young people's well-being, energy and health. In addition to the impact on growth and development, a poor diet during this life stage can cause a number of immediate health problems, such as being overweight and obese in the short-term.

## Conclusion

Central obesity had significant effect on chronic heart disease, those girls have shown centrally obese in his study; they have chances to experience heart disease in future (Tables 1-5; Figure 1).

Variables	Minimum	Maximum	Mean	Std. Deviation	Variance
Waist circumference (cm)	51.40	97.40	78.32	6.351	40.34
Hip circumference (cm)	62.00	100.00	84.85	6.573	43.29

Table 1: Descriptive Statistics represent waist and hip circumferences.

Descriptive statistic	Waist hip ratio	Waist height ratio
	1009	1009
Mean	0.92	0.51
Std. Deviation	0.061	0.04

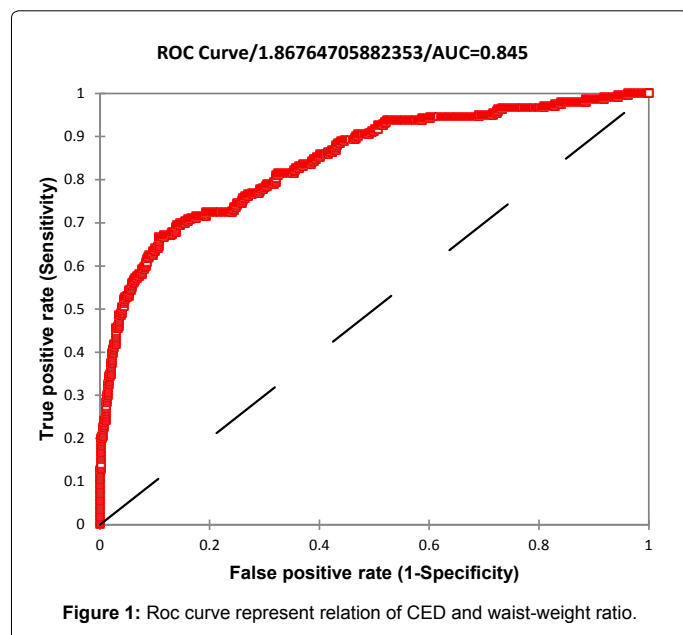
Table 2: Represents mean and standard deviation of waist-hip ratio and waist-height ratio.

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Age	Different types of CED					Total
	1.00	2.00	3.00	4.00	5.00	
10	18	9	28	45	0	100
11	9	8	18	64	1	100
12	6	8	27	59	0	100
13	2	8	25	65	0	100
14	5	3	15	77	0	100
15	1	2	16	80	1	100
16	0	1	11	86	2	100
17	0	0	7	93	0	100
18	0	0	12	88	0	100
19	0	0	5	104	0	109
Total	41	39	164	761	4	1009

**Table 5:** Age wise presentation of nutritional status of present study.

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Age	Waist circumference cut off		Total
	1.00	2.00	
10	100	0	100
11	100	0	100
12	99	1	100
13	98	2	100
14	96	4	100
15	89	11	100
16	89	11	100
17	85	15	100
18	85	15	100
19	92	17	109
Total	933	76	1009

**Table 3:** Age wise present frequency of central obesity of studied girls.

Age(years)	WHR cut off		Total
	1.00	2.00	
10	20	74	94
11	17	74	91
12	19	70	89
13	7	92	99
14	13	82	95
15	4	90	94
16	4	86	90
17	1	91	92
18	7	77	84
19	7	91	98
Total	99	827	926

**Table 4:** Represents comparison of age wise waist-hip ratio. 1: Normal, 2: Centrally obese, WHR: Waist Hip Ratio.