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## Relationship of waist hip ratio with selected biochemical parameters of middle aged males of Punjab

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### Abstract

The objective of the study was to find out the Relationship of waist hip ratio with selected biochemical parameters of middle aged males of Punjab. The study was conducted on middle aged males (aged 40 to 45 years) of Punjab. A total fifty (N=60) middle aged males of Punjab was selected as subject. All the subjects were selected from different region of Punjab having no medical history. These Subjects were selected in terms of cluster sample from the all the region of Punjab. The necessary data on selected biochemical parameters (Total Cholesterol, Triglycerides, High Density Lipoprotein (HDL) and Low Density Lipoprotein (LDL)) were collected by administration of laboratory tests for selected biochemical parameters. The tests were administered after giving them instruction and taking consent from the subjects. Biochemical parameter test were taken place after 8 to 10 hours of fasting. The data pertaining to each of the selected biochemical parameters (Total Cholesterol, Triglycerides, High Density Lipoprotein (HDL) and Low Density Lipoprotein (LDL)) were examined by Person's Product Moment Correlation in order to observe the significant relationship, if any. The level of significance to test the hypothesis was 0.05.  $P < 0.05$ . The analysis of the data revealed that there was significant relationship existed between blood cholesterol and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and blood cholesterol was  $0.95^*$  which was more than the required value (0.25). P value (0.0001) was less than significant value (0.05). In case of Triglycerides levels, there was significant relationship existed between Triglycerides and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and Triglycerides was  $0.95^*$  which was more than the required value (0.25). P value (0.0001) was less than significant value (0.05). It is also evident that there was significant negative relationship existed between HDL and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and HDL was  $-0.95^*$  which was more than the required value (0.25). P value (0.0001) was less than significant value (0.05). In other case it is evident that there was significant Positive relationship existed between LDL and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and LDL was  $0.99^*$  which was more than the required value (0.25). P value (0.0001) was less than significant value (0.05). On the basis of finding of the study I was concluded that there was significant positive relationship of waist hip ratio with total cholesterol level, triglyceride level and Low density lipoprotein level of middle aged males of Punjab. It shows high association between waist hip ratio and total cholesterol level, triglyceride level and Low density lipoprotein level. There was significant negative relationship of waist hip ratio with High density lipoprotein level of middle aged males of Punjab.

**Keywords:** Waist hip ratio, lipid profile, HDL, LDL, cholesterol

### Introduction

Obesity is defined as an excess body fat resulting from a chronic imbalance between food intake and energy expenditure, (Hubert *et al.* 1983) <sup>[11]</sup>. It is a rapidly growing health problem in both developed and developing countries. From the clinical point of view, visceral adipose tissue is known to generate diabetogenic substances (De Fronzo, 2004) and may provide more information than total fat for diagnostic evaluation. Visceral obesity which is approximated by Waist Circumference (WC) or Waist-Hip Ratio (WHR) is typically seen in overweight and obese men. It is closely linked with insulin resistance, hypertension, and dyslipidemia, and causally related to increased risk of type 2 diabetes mellitus (DM) and cardiovascular disease, (Kahn and Flier, 2000). The various risk factors for the development of type 2 DM are obesity, ethnicity, sedentary lifestyle, sex, family history, hypertension, and smoking. However, there

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is now overwhelming evidence from experimental, epidemiological and intervention studies that obesity is a major risk factor for Type 2 DM among all risk factors. High Waist Circumference (WC), Waist-Hip Ratio (WHR), Body Mass Index (BMI) and age are risk factors as well as predictors of type 2 DM. The higher risk of type 2 DM in males with a high WHR and WC has been attributed to increased visceral fat accumulation. Among various anthropometric measurements used to measure the obesity, WC and WHR have been used as measures of visceral obesity whereas BMI as general obesity, (Molarius and Seidell, 1998). A lipid profile is a blood test that measures the amount of cholesterol and fats called triglycerides in the blood. High-density lipoproteins (HDL) are known as good cholesterol and low-density lipoproteins (LDL) is known as bad cholesterol. High-density lipoprotein carries cholesterol to the liver from various parts of the body. Cholesterol and triglycerides in the blood can clog arteries making you more likely to develop heart disease. Thus, these tests can help predict your risk of heart disease and allow you to make early lifestyle changes that lower cholesterol and triglycerides. Mallick A. K, *et al.* (2018) [15] inspected and said that Central or abdominal obesity is related with metabolic clutters, for example, hypertension, diabetes mellitus and cardio vascular diseases (CVD). Anthropometric apparatuses particularly BMI is ordinarily used to arrange obesity. BMI, determined from the weight and height of an individual, speaks to summed up fat conveyance. Waist hip ratio (WHR) is progressively solid anthropometric apparatus for estimating abdomen obesity as it thinks about abdomen outline. Along these lines, this study was attempted to think about the relationship of dyslipidemia with BMI and WHR and close if WHR could be utilized as a solid apparatus for recognizing high hazard patients. Two hundred members aged between 35 to 45 years were arbitrarily picked. Lipid pro-index of the considerable number of members was resolved. These members were partitioned into three groups dependent on their BMI. Same members were additionally partitioned dependent on their WHR into two groups—Low hazard and high hazard. Mean of lipid pro-index was examined for essentialness by ANOVA and autonomous t test utilizing SPSS 23.0. Relationship of dyslipidemia and BMI and WHR was investigated utilizing Pearson Coefficient.  $P < 0.05$  was viewed as noteworthy. Members with WHR in the high-hazard class had TC/HDL ratio of  $3.8 \pm 0.5$  which was like those with  $BMI > 30$  Kg/m<sup>2</sup>. Pearson relationship coefficient of Total cholesterol, LDL-C and TC/HDL with WHR was 0.505, 0.484 and 0.528 individually which was more grounded than that with BMI. WHR is a solid device to recognize patients who are at high hazard to create CVD and other metabolic diseases. Kapoor, R. (2015) [14]. Inspected to decide the relationship of obesity estimated by body mass index (BMI), abdomen size or waist hip ratio (WHR), with numerous hazard factors in Punjabi population. Techniques: 2015 (1157M, 858F) T2D subjects, aged somewhere in the range of 31 and 79 years were selected for the investigation. Waist hip ratio (WHR), waist circumference (WC), body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), lipid pro-index (all out

cholesterol, triglycerides, HDL, LDL), beat wave speed (baPWV), ankle brachial index (ABI) and HbA1c of the subjects were dissected. Pearson's relationship coefficients ( $r$ ) of BMI, waist and WHR with different hazard factors were resolved. Results: There is a positive relationship of BMI, waist size and WHR with SBP ( $r = 0.18-0.07$ ), DBP ( $0.13-0.08$ ), duration of diabetes ( $r = 0.10-0.07$ ), HbA1 C ( $r = 0.126-0.08$ ), absolute cholesterol ( $0.23-0.09$ ), and LDL cholesterol ( $0.12-0.07$ ) and negative connection with HDL cholesterol ( $r = 0.11$  to  $0.08$ ) in the two people ( $p < 0.05$ ). Triglycerides were observed to be essentially related with BMI and WHR just ( $p < 0.05$ ). No critical relationship was found with PWV and ABI. Determination: There is a positive relationship of indicators of (body mass index, waist size and waist hip ratio) with major cardiovascular hazard components and customary anthropometric estimations are required in diabetic population to forestall future CV risk.

## Methods

### Subjects

The study was conducted on middle aged males (aged 40 to 45 year) of Punjab. A total fifty ( $N=60$ ) middle aged males of Punjab was selected as subject. All the subjects were selected from different region of Punjab having no medical history. These subjects were selected in terms of cluster sample from the all the region of Punjab.

### Hypothesis

On the basis of different research findings, expert's opinion and scholar's own understanding of the problem, it was hypothesized that-

1. There would be significant relationship of waist-hip ratio with Total cholesterol level of middle aged males of Punjab.
2. There would be significant relationship of waist-hip ratio with Triglyceride level of middle aged males of Punjab.
3. There would be significant relationship of waist-hip ratio with High Density Lipoprotein level of middle aged males of Punjab.
4. There would be significant relationship of waist-hip ratio with Low Density Lipoprotein level of middle aged males of Punjab.

### Criterion measures

The following were the criterion measures for this study:

#### 1. Biochemical parameters

##### Lipid profile

The LDL, HDL, triglyceride and total cholesterol level was measured by the pathology expert of pathology lab by collection of the blood sample from the vein. The blood sample was collected after 8 to 10 hours of fasting.

#### 2. Waist Hip ratio

This test was to determine the ratio of waist circumference to the hip circumference. A simple calculation of the measurements of the waist girth was divided by the hip girth. It was measured by the measuring tape.

Waist to Hip Ratio (WHR) =  $G_w / G_h$ ,

Where  $G_w$  = waist girth,  $G_h$  = hip girth

### Selection of variables

#### Biochemical Parameters

Sr. No	Biochemical parameters	Tests	Unit of Measurement
1.	Low Density Lipoprotein (LDL)	Laboratory test	Mg/dl
2.	High Density Lipoprotein (HDL)	Laboratory test	Mg/dl
3.	Triglycerides	Laboratory test	Mg/dl
4.	Total cholesterol	Laboratory test	Mg/dl
5.	Waist Hip Ratio Test	Manual	Constant

**Collection of data**

Data was collected by administration of laboratory tests for selected biochemical parameters. The tests were administered after giving them instruction and taking consent from the subjects. The subjects were tested in the following way.

**Biochemical parameters:** The administration of test was taken place after 8 to 10 hours of fasting.

**Statistical analysis**

**The Person's product moment correlation:** method was employed to test the significant Relationship of waist hip ratio with selected biochemical parameters of aged males of Punjab, The level of significance chosen to test the hypothesis will be 0.05,  $P < 0.05$ . Accordingly, a statistical software package (SPSS-17) will be used.

**Analysis of data and result of the study**

The statistical Analysis of data (Low Density Lipoprotein (LDL), High Density Lipoprotein (HDL), Triglycerides, Total cholesterol,) were collected from Sixty (N=60) middle aged male subjects of Punjab. The finding of the study and their discussions have presented below.

**Level of significance**

The level of significance to check the r - value was set at 0.05 level which was considered appropriate for the purpose of the study.

**Findings of the study**

The results pertaining to selected dependent variables have been presented in tables 4.1 to 4.4.

**Table 4.1:** relationship Of Waist Hip Ratio With total Cholesterol of middle aged male peoples of Punjab

Variable	N	Mean	SD	Coefficient of correlation (r)	P value
Waist hip ratio	60	1.1	0.029	0.95*	0.0001
Cholesterol	60	223.9	8.81		

Significant at.05 level N 60df = 58  $r_{tab} = 0.25$

Table 4.1 indicates that the mean and standard deviation of the variable waist hip ratio and blood cholesterol were 1.10, 0.029 and 223.9, 8.81 respectively. It is evident from table 4.1 that there is significant relationship existed between blood

cholesterol and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and blood cholesterol was 0.95\* which was more than the required value (0.25). P value (0.0001) was less then significant value (0.05).

**Table 4.2:** Relationship Of Waist Hip Ratio With triglycerides of middle aged male peoples of Punjab

Variable	N	Mean	SD	Coefficient of correlation	P value
Waist hip ratio	60	1.1	0.029	0.95*	0.0001
Triglycerides	60	307.48	60.07		

Significant at.05 level N=60Df= 58  $r_{tab} = 0.25$

Table 4.2 indicates that the mean and standard deviation of the variable waist hip ratio and Triglycerides were 1.10, 0.029 and 307.48, 60.07 respectively. It is evident from table 4.2 that there is significant relationship existed between Triglycerides and Waist Hip Ratio. As

coefficient of correlation in case of waist hip ratio and Triglycerides was 0.95\* which was more than the required value (0.25). P value (0.0001) was less then significant value (0.05).

**Table 4.3:** Relationship of waist hip ratio with high density lipoprotein (h dl) of middle aged male peoples of Punjab

Variable	N	Mean	SD	Coefficient of correlation	P value
Waist hip ratio	60	1.1	0.029	-0.95*	0.0001
HDL	60	37.28	1.05		

Significant at.05 level N=60 DF= 58  $r_{tab}=0.25$

Table 4.3 indicates that the mean and standard deviation of the variable waist hip ratio and HDL were 1.10, 0.029 and 37.28, 1.05 respectively. It is evident from table 4.3 that there is significant negative

relationship existed between HDL and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and HDL was -0.95\* which was more than the required value (0.25). P value (0.0001) was less then significant value (0.05).

**Table 4.4:** Relationship of waist hip ratio with low density lipoprotein (l dl) of middle aged male peoples of Punjab

Variable	N	Mean	SD	Coefficient of correlation	P value
Waist hip ratio	60	1.1	0.029	0.99*	0.0001
LDL	60	145.76	5.46		

Significant at.05 level N=60 DF= 58  $r_{tab}=0.25$

Table 4.4 indicates that the mean and standard deviation of the variable waist hip ratio and LDL were 1.10, 0.029 and 145.76, 5.46 respectively. It is evident from table 4.4 that there is significant Positive relationship existed between LDL and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and LDL was 0.99\* which was more than the required value (0.25). P

value (0.0001) was less then significant value (0.05).

**Discussion of findings**

Table 4.1 indicates that the mean and standard deviation of the variable waist hip ratio and blood cholesterol were 1.10, 0.029 and 223.9, 8.81 respectively. It is evident from table 4.1 that there is significant relationship existed between blood

cholesterol and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and blood cholesterol was 0.95\* which was more than the required value (0.25). P value (0.0001) was less than significant value (0.05).

Table 4.2 also indicates that the mean and standard deviation of the variable waist hip ratio and Triglycerides were 1.10, 0.029 and 307.48, 60.07 respectively. It is evident from table 4.2 that there is significant relationship existed between Triglycerides and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and Triglycerides was 0.95\* which was more than the required value (0.25). P value (0.0001) was less than significant value (0.05).

Table 4.3 indicates that the mean and standard deviation of the variable waist hip ratio and HDL were 1.10, 0.029 and 37.28, 1.05 respectively. It is evident from table 4.3 that there is significant negative relationship existed between HDL and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and HDL was -0.95\* which was more than the required value (0.25). P value (0.0001) was less than significant value (0.05).

Table 4.4 indicates that the mean and standard deviation of the variable waist hip ratio and LDL were 1.10, 0.029 and 145.76, 5.46 respectively. It is evident from table 4.4 that there is significant Positive relationship existed between LDL and Waist Hip Ratio. As coefficient of correlation in case of waist hip ratio and LDL was 0.99\* which was more than the required value (0.25). P value (0.0001) was less than significant value (0.05).

Mallick A. K, *et al.* (2018) <sup>[15]</sup> conducted study which has supported the finding of table 4.1. To 4.4. Mallick A. K, *et al.* <sup>[15]</sup> said that Central or abdominal obesity is associated with metabolic disorders such as hypertension, diabetes mellitus and cardio vascular disease (CVD). Anthropometric tools especially BMI is commonly used to categorize obesity. BMI, calculated from the weight and height of an individual, represents generalized fat distribution. Waist hip ratio (WHR) is more reliable anthropometric tool for measuring abdominal obesity as it takes waist circumference into consideration. Therefore, this study was undertaken to study the correlation of dyslipidemia with BMI and WHR and conclude if WHR could be used as a reliable tool for identifying high risk patients. Two hundred participants aged between 35 to 45 years were randomly chosen. Lipid profile of all the participants was determined. These participants were divided into three groups based on their BMI. Same participants were also divided based on their WHR into two groups – Low risk and high risk. Mean of lipid profile was analyzed for significance by ANOVA and independent t test using SPSS 23.0. Correlation of dyslipidemia and BMI and WHR was analyzed using Pearson Coefficient.  $P < 0.05$  was considered significant. Result: Participants with WHR in the high-risk category had TC/HDL ratio of  $3.8 \pm 0.5$  which was similar to those with  $BMI > 30$  Kg/m<sup>2</sup>. Pearson correlation coefficient of Total cholesterol, LDL-C and TC/HDL with WHR was 0.505, 0.484 and 0.528 respectively which was stronger than that with BMI. Conclusion: WHR is a reliable tool to identify patients who are at high risk to develop CVD and other metabolic diseases.

Kapoor, R. (2015) <sup>[14]</sup> conducted study which has supported the finding of table 4.1. To 4.4. He examined to determine the association of obesity, measured by body-mass index (BMI), waist-size or waist-hip ratio (WHR), with multiple risk factors in Punjabi population. Methods: 2015 (1157 M, 858 F) T2D subjects, aged between 31 and 79 years were enrolled for the study. Waist hip ratio (WHR), waist circumference (WC),

body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), lipid profile (total cholesterol, triglycerides, HDL, LDL), pulse wave velocity (ba PWV), ankle brachial index (ABI) and HbA1c of the subjects were analyzed. Pearson's correlation coefficients (r) of BMI, waist and WHR with various risk factors were determined. Results: There is a positive correlation of BMI, waist-size and WHR with SBP ( $r = 0.18-0.07$ ), DBP (0.13–0.08), duration of diabetes ( $r = 0.10-0.07$ ), HbA1 C ( $r = 0.126-0.08$ ), total cholesterol (0.23–0.09), and LDL cholesterol (0.12–0.07) and negative correlation with HDL cholesterol ( $r = 0.11$  to 0.08) in both men and women ( $p < 0.05$ ). Triglycerides were found to be significantly correlated with BMI and WHR only ( $p < 0.05$ ). No significant correlation was found with PWV & ABI. Conclusion: There is a positive relationship of markers of obesity (body-mass index, waist size and waist hip ratio) with major cardiovascular risk factors and regular anthropometric measurements are needed in diabetic population to prevent future CV risk.

### Discussion of hypothesis

**Based on the findings of the study, the hypothesis stated that**

1. There will be significant relationship of waist hip ratio with total cholesterol level of middle aged males of Punjab has been accepted.
2. There will be significant relationship of waist hip ratio with triglyceride level of middle aged males of Punjab has been accepted.
3. There will be significant relationship of waist hip ratio with High density lipoprotein level of middle aged males of Punjab has been accepted.
4. There will be significant relationship of waist hip ratio with Low density lipoprotein level of middle aged males of Punjab has been accepted.

### Conclusions

On the basis of the findings and within the limitations of the study the following conclusions were drawn:

1. There was significant positive relationship of waist hip ratio with total cholesterol level of middle aged males of Punjab. It shows high association between waist hip ratio and total cholesterol level
2. There was significant positive relationship of waist hip ratio with triglyceride level of middle aged males of Punjab. It shows high association between waist hip ratio and triglyceride level.
3. There was significant negative relationship of waist hip ratio with High density lipoprotein level of middle aged males of Punjab. It shows high association between waist hip ratio and High density lipoprotein level.
4. There was significant positive relationship of waist hip ratio with Low density lipoprotein level of middle aged males of Punjab. It shows high association between waist hip ratio and Low density lipoprotein level.

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