

## Original Research

### Assessment of metabolic syndrome in rural population

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#### ABSTRACT:

**Background:** Metabolic syndrome is a cluster of conditions that occur together, increasing the risk of heart disease, stroke, and type 2 diabetes. The present study was conducted to assess metabolic syndrome in rural population. **Materials & Methods:** 380 adults of both genders were enrolled for the study. The anthropometric parameters such as height, weight, waist circumference was measured. Overnight fasting samples were collected for lipid profile (total cholesterol, triglyceride, high density lipoproteins, low density lipoproteins, very low-density lipoproteins) and fasting blood glucose levels. **Results:** Out of 230 subjects, males were 230 and females were 150. The mean waist circumference was 76.2cm and 74.2cm, systolic blood pressure was 132.4mmHg and 134.6mmHg and diastolic blood pressure was 82.6mmHg and 84.2mmHg in males and females respectively. The difference was significant ( $P < 0.05$ ). The mean fasting blood glucose was 90.4mg/dL and 91.2mg/dL, triglyceride was 132.8mg/dL and 128.6mg/dL, total cholesterol was 168.4mg/dL and 170.4mg/dL, high-density lipoprotein was 40.6mg/dL and 42.6mg/dL, low-density lipoprotein was 99.4mg/dL and 101.8mg/dL, and very low-density lipoprotein was 26.8mg/dL and 24.2mg/dL in males and females respectively. The difference was significant ( $P < 0.05$ ). **Conclusion:** There was high alteration of triglycerides in males and females suggesting the timely assessment of lipid profile in adult population in order to prevent further complications.

**Keywords:** Metabolic syndrome, Blood pressure, Diabetes

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#### INTRODUCTION

Metabolic syndrome is a cluster of conditions that occur together, increasing the risk of heart disease, stroke, and type 2 diabetes.<sup>1</sup> The main components of metabolic syndrome include abdominal obesity, high blood pressure (hypertension), high blood sugar (hyperglycemia), high triglyceride levels, low HDL cholesterol levels. Excess fat around the waistline, often measured by waist circumference.<sup>2</sup> In men, a waist circumference of 40 inches (102 centimeters) or more, and in women, a waist circumference of 35 inches (88 centimeters) or more, indicates abdominal obesity. Blood pressure levels consistently higher than 130/85 mm Hg. Hypertension puts extra strain on the heart and blood vessels, increasing the risk of cardiovascular disease.<sup>3</sup> Elevated fasting blood sugar levels, typically defined as fasting glucose levels of 100 mg/dL (5.6 mmol/L) or higher. This indicates insulin resistance, where the body's cells do not respond effectively to insulin, leading to elevated blood sugar levels. Triglycerides are a type of fat

found in the blood. Elevated triglyceride levels (150 mg/dL or higher) are associated with an increased risk of heart disease. High-density lipoprotein (HDL) cholesterol is often referred to as "good" cholesterol because it helps remove LDL cholesterol (the "bad" cholesterol) from the bloodstream. Low HDL cholesterol levels (less than 40 mg/dL in men and less than 50 mg/dL in women) increase the risk of heart disease.<sup>4</sup>

Several studies reported a high prevalence of metabolic syndrome or its individual components like impaired glucose tolerance, obesity and hypertension. However, there is considerable interplay among these components and their contribution to the pathogenesis of the diabetes and cardiovascular complications. Because of the well-known etiopathological background, altered vascular homeostasis and insulin resistance has been associated with lipid metabolic abnormality, which forms an intricate nexus of metabolic pathology.<sup>5,6</sup> The present study was

conducted to assess metabolic syndrome in rural population.

**MATERIALS & METHODS**

The present study consisted of 380 adults of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. The anthropometric parameters such as height, weight, waist circumference was measured. Overnight fasting

samples were collected for lipid profile (total cholesterol, triglyceride, high density lipoproteins, low density lipoproteins, very low-density lipoproteins) and fasting blood glucose levels. The National Cholesterol Education Programme Adult Treatment Panel, ATP-III guidelines were used to categorize the study subject. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Total- 380		
Gender	Male	Female
Number	230	150

Table I shows that out of 380 subjects, males were 230 and females were 150.

**Table II Anthropometric parameters**

Parameters	Males	Females	P value
Waist circumference (cm)	76.2	74.2	0.91
Systolic blood pressure (mmHg)	132.4	134.6	0.82
Diastolic blood pressure (mmHg)	82.6	84.2	0.97

Table II shows that mean waist circumference was 76.2cm and 74.2cm, systolic blood pressure was 132.4mmHg and 134.6mmHg and diastolic blood

pressure was 82.6mmHg and 84.2mmHg in males and females respectively. The difference was significant (P< 0.05).

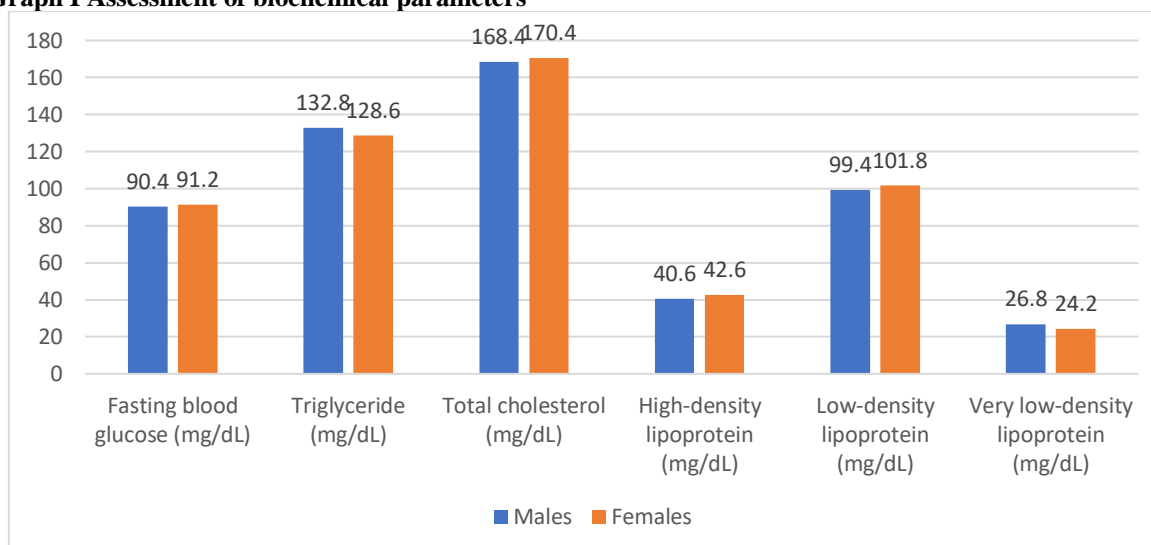
**Table III Assessment of biochemical parameters**

Parameters	Males	Females	P value
Fasting blood glucose (mg/dL)	90.4	91.2	0.91
Triglyceride (mg/dL)	132.8	128.6	0.82
Total cholesterol (mg/dL)	168.4	170.4	0.47
High-density lipoprotein (mg/dL)	40.6	42.6	0.51
Low-density lipoprotein (mg/dL)	99.4	101.8	0.69
Very low-density lipoprotein (mg/dL)	26.8	24.2	0.73

Table III, graph I shows that mean fasting blood glucose was 90.4mg/dL and 91.2mg/dL, triglyceride was 132.8mg/dL and 128.6mg/dL, total cholesterol was 168.4mg/dl and 170.4mg/dL, high-density lipoprotein was 40.6mg/dL and 42.6mg/dL, low-

density lipoprotein was 99.4mg/dL and 101.8mg/dL, and very low-density lipoprotein was 26.8mg/dL and 24.2mg/dL in males and females respectively. The difference was significant (P< 0.05).

**Graph I Assessment of biochemical parameters**



## DISCUSSION

Individuals who have faulty glucose metabolism, hypertension, obesity, and dyslipidemia collectively are referred to as having "metabolic syndrome," which presents a significant public health problem to the healthcare systems of both developed and developing nations.<sup>7</sup> One may argue that metabolic syndrome serves as a prerequisite for two significant and rapidly developing clinical conditions: atherosclerotic cardiovascular diseases and diabetes mellitus.<sup>8</sup> These conditions are major causes of morbidity and mortality worldwide. Coronary heart disease was most common in those with diabetes and metabolic syndrome, according to the National Health Examination Survey-III (NHANES).<sup>9</sup> The present study was conducted to assess metabolic syndrome in rural population.

We found that out of 230 subjects, males were 230 and females were 150. Deshmukh et al<sup>10</sup> found that for both sexes, three factors were extracted accounting for about 71% variance in the measured variables. An adiposity factor which accounted for highest explained variance (28%), was the initial factor extracted. It was loaded positively by waist circumference, triglyceride, and very low-density lipoprotein and negatively loaded by high density lipoprotein. Second factor extracted was a cholesterol factor which explained about 20% variance. It was positively loaded by total cholesterol and low-density lipoprotein. Blood pressure factor was third to be extracted which again explained about 20% variance. It was positively loaded by systolic and diastolic blood pressure.

We observed that the mean waist circumference was 76.2cm and 74.2cm, systolic blood pressure was 132.4mmHg and 134.6mmHg and diastolic blood pressure was 82.6mmHg and 84.2mmHg in males and females respectively. Hanson et al<sup>11</sup> observed that among 890 originally nondiabetic participants, 144 developed diabetes in a median follow-up of 4.1 years. The insulinemia factor was strongly associated with diabetes incidence (incidence rate ratio [IRR] for a 1-SD difference in factor scores = 1.81,  $P < 0.01$ ). The body size and lipids factors also significantly predicted diabetes (IRR 1.52 and 1.37, respectively,  $P < 0.01$  for both), whereas the blood pressure factor did not (IRR 1.11,  $P = 0.20$ ). Identification of four unique factors with different associations with incidence of diabetes suggests that the correlations among these variables reflect distinct metabolic processes, about which substantial information may be lost in the attempt to combine them into a single entity.

We found that the mean fasting blood glucose was 90.4mg/dL and 91.2mg/dL, triglyceride was 132.8mg/dL and 128.6mg/dL, total cholesterol was 168.4mg/dl and 170.4mg/dL, high-density lipoprotein was 40.6mg/dL and 42.6mg/dL, low-density lipoprotein was 99.4mg/dL and 101.8mg/dL, and very low-density lipoprotein was 26.8mg/dL and 24.2mg/dL in males and females respectively. Katsuki

et al<sup>12</sup> evaluated body fat areas, lipid profiles, and the glucose infusion rate (GIR) during a euglycemic-hyperinsulinemic clamp study in 20 metabolically obese, normal weight (MONW) subjects (BMI  $< 25$  kg/m<sup>2</sup>) and visceral fat areas 100 cm<sup>2</sup>) with normal glucose tolerance. Body fat areas were measured by computed tomography scans. Control data were obtained from 20 normal subjects (BMI  $< 25$  kg/m<sup>2</sup>) and visceral fat areas  $< 100$  cm<sup>2</sup>). MONW subjects showed a significant increase in fasting serum levels of TG ( $P < 0.01$ ) and a decrease in GIR ( $P < 0.01$ ) compared with normal subjects. There were significant correlations between visceral fat areas ( $r = -0.563$ ,  $P < 0.01$ ) or serum levels of TG ( $r = -0.474$ ,  $P < 0.05$ ) and GIR in MONW subjects. Multiple regression analyses showed that visceral fat areas ( $F = 7.702$ ,  $P < 0.02$ ) and serum levels of TG ( $F = 7.114$ ,  $P < 0.05$ ) were significantly associated with GIR in all (MONW and normal) subjects.

The limitation of the study is the small sample size.

## CONCLUSION

Authors found that there was high alteration of triglycerides in males and females suggesting the timely assessment of lipid profile in adult population in order to prevent further complications.

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