# To Study Various Complications Present amongst Metabolic Syndrome Patients and Control Subjects

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## Abstract

**Objectives:** Metabolic syndrome (MetS) is a cluster of several metabolic disorders including hyperglycemia, reduced high density lipoprotein cholesterol, raised triglyceride level in serum, hypertension and abdominal obesity.

**Methods:** The present study was conducted at the MM Institute of Medical Sciences and Research. The study includes 300 patients with MetS as a case and 300 healthy volunteers as a control. MetS was diagnosed according to international diabetes federation.

**Results:** In our study 103 MetS patients of 300 have shown the complications like DM (Diabetes Mellitus), HTN (Hypertension) and obesity which are predisposing factors for atherosclerosis and other cardiovascular diseases which lead to morbidity and mortality.

**Conclusions:** Our study found that diabetes Mellitus, hypertension, dyslipidemia and obesity are the predisposing factors for metabolic syndrome.

***Key Words:*** *Diabetes Mellitus, Hypertension, Obesity, Metabolic Syndrome, Dyslipidemia.*

## Introduction

MetS is a group of signs and symptoms which include abdominal obesity, insulin resistance, and elevated blood pressure (BP). It is related to cause risk of chronic kidney disease, Type 2 Diabetes Mellitus, cardiovascular disease (CVD) and these diseases are important cause of mortality [1]. Early identification of MetS is important because it raises the risk of CVD between 1.5 to 1.8 times more and raise relative risk of coronary artery disease and 4.2 fold a death [2]. In persons with MetS, the prevalence of CVD increases 2-3 folds [3].

International Diabetes Federation (IDF) defines MetS, as central obesity defined as waist circumference (WC) ≥ 90 cm for men and ≥ 80 cm for women) along with presence of any two of the following [4].

- Systolic blood pressure (SBP) ≥ 130 mm Hg or diastolic blood pressure (DBP) ≥ 85 mm Hg.
- Increased fasting blood Sugar (FBS) ≥ 100 mg/dl.
- Increased triglyceride (TG): ≥ 150 mg/dl.
- Decreased high density lipoprotein cholesterol (HDL-C): < 40 mg/dl in men, < 50 mg/dl in women.

Fast economic development with accelerating change in lifestyle, urbanization, nutrition, reduced physical activity and socio-economic status play key roles in the dramatic acceleration of MetS [5].

MetS is very common among patients with type 2 diabetes mellitus. Participants who subsequently developed MetS had greater obesity, higher triglyceride.

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A study documented the pivotal role of obesity in the pathogenesis of MetS in different population[6]. A subject with abnormal glucose tolerance were analyzed, they displayed a higher BMI, blood pressure, triglyceride level, central obesity and lower HDL levels than normal glucose tolerance groups, all were the recognized features of metabolic syndrome [7].

## Aims and Objectives

1. Selection of the MetS patients and control subjects.

2. Measurement of SBP, DBP and WC in MetS patients and control subjects.

3. Assay of fasting blood sugar, triglyceride, and high density lipoprotein cholesterol in MetS and control subjects.

## Materials and Method

The study has been conducted between February 2017 to August 2018

**Study Area:**

The present study was conducted in the Department of Biochemistry in collaboration with Department of Medicine, Maharishi Markandeshwar Institute of Medical Sciences and Researches, Mullana, Ambala, Haryana, India.

**Study Population:**

Group 1: 300 subjects with metabolic syndrome.

Group 2: 300 healthy Volunteers controls (age and sex matched) without metabolic syndrome.

Informed consent has been taken from the participants included in the study.

**Inclusion Criteria:**

· Patients with Metabolic syndrome above 18 years of age.

**Exclusion Criteria:**

· Familial hyperlipidemia

· Pregnancy

· Thyroid disease

· Any history of liver disease

· Lactation

· Oral contraceptives

· Recovery from non thyroidal illness

· Cushing disease

· Renal disease

· Patients with history of chronic drug use (steroid treatment, antidepressant and anti psychotic drug user)

**Waist Circumference Measurement:** WC was measured with a tape in a horizontal plane, mid way between the inferior margin of the ribs and the superior border of the iliac crest.

**Sample Collection:**

5 ml of blood sample was aseptically collected as per the standard guidelines and protocol. Serum was allowed to separate and subsequently analyzed for various parameters. FBS was assayed by glucose oxidase and peroxidase method, triglyceride by glycerol-oxidase peroxidase method and HDL-C by enzymatic assay method.

## Statistical Analysis

Data obtained was analysed by using SPSS 21 version software and results was compared in cases and controls. P value < 0.05 was taken as significant at 95% confidence intervals. Student's t-test was used to find the association between thyroid profile and various components of MetS.

## Result

The total number of patients in our study were 600 (100%) out of which 300 (50%) were healthy controls subjects and 300 (50%) were MetS patients. Among 300 patients with MetS in the study, 102 (34.0 %) were male and 198 (66.0 %) were female. Similarly there were 300 control subjects, out of which 102 (34.0 %) were male and 198 (66.0 %) were female.

**Table 1: Anthropometric and laboratory finding amongst metabolic syndrome patients and control subjects.**

| Parameters | Control | Case | P Value |
|---|---|---|---|
| WC (cm) | 80.49 ± 4.70 | 102.26 ± 7.92 | **<0.000** |
| SBP (mm Hg) | 115.31 ± 6.62 | 148.26 ± 21.24 | **<0.000** |
| DBP (mm Hg) | 76.31 ± 5.42 | 91.77 ± 10.96 | **<0.000** |
| FBS (mg/dl) | 79.35 ± 6.05 | 141.08 ± 56.02 | **<0.000** |
| TG (mg/dl) | 126.26 ± 14.76 | 167.0 ± 50.92 | **<0.000** |
| HDL-C (mg/dl) | 52.16 ± 6.33 | 37.79 ± 14.52 | **<0.000** |

The table 1 shows that the mean and standard deviation (SD) of WC for control subjects is **80.49 ± 4.70** cm and for MetS patients is **102.26 ± 7.92** cm. A statistically highly significant difference was observed among two groups **(p < 0.000)**. The mean and SD of SBP for control subjects is **115.31 ± 6.62** mm Hg and for MetS patients is **148.26 ± 21.24** mm Hg. A statistically highly significant difference was observed among two groups **(p < 0.000)**. The mean and SD of DBP for control subjects is **76.31 ± 5.42** mm Hg and for MetS patients is **91.77 ± 10.96** mm Hg. A statistically highly significant difference was observed among two groups **(p < 0.000)**.

The mean and SD of FBS for control subjects is **79.35 ± 6.05** mg/dl and for MetS patients is **141.08 ± 56.02** mg/dl. A statistically highly significant difference was observed among two groups **(p < 0.000)**. The mean and SD of triglyceride for control subjects is **126.26 ± 14.76** mg/dl and for MetS patients is **167.0 ± 50.92** mg/dl. A statistically highly significant difference was observed among two groups **(p < 0.000)**. The mean and SD of high density lipoprotein for control subjects is **52.16 ± 6.33** mg/dl and for MetS patients is **37.79 ± 14.52** mg/dl. A statistically highly significant difference was observed among two groups **(p < 0.000)**.

**Table 2:- Complication present amongst metabolic syndrome patients and control subjects**

| Group | | Frequency | Percent |
|---|---|---|---|
| Control | No Complication | 300 | 100.0 |
| | | | |
| Case | Dyslipidemia, HTN, Obesity | 71 | 23.7 |
| | Dyslipidemia, Obesity | 21 | 7.0 |
| | DM, HTN, Dyslipidemia, Obesity | 78 | 26.0 |
| | DM, HTN, Obesity | 103 | 34.3 |
| | DM, Dyslipidemia, Obesity | 27 | 9.0 |
| | Total | 300 | 100.0 |

The above table shows that in control subjects no complication were present. In case 71 (23.7 %) patients had dyslipidemia, HTN, obesity, as a complication. 21 (7%) patients had dyslipidemia, obesity present as a complications, 78 (26%) patients had DM, HTN, dyslipidemia, obesity as a complication, 103 (34.3%) patients had DM, HTN, obesity present as a complication and 27 (9%) patients had DM, dyslipidemia, obesity as a complications.

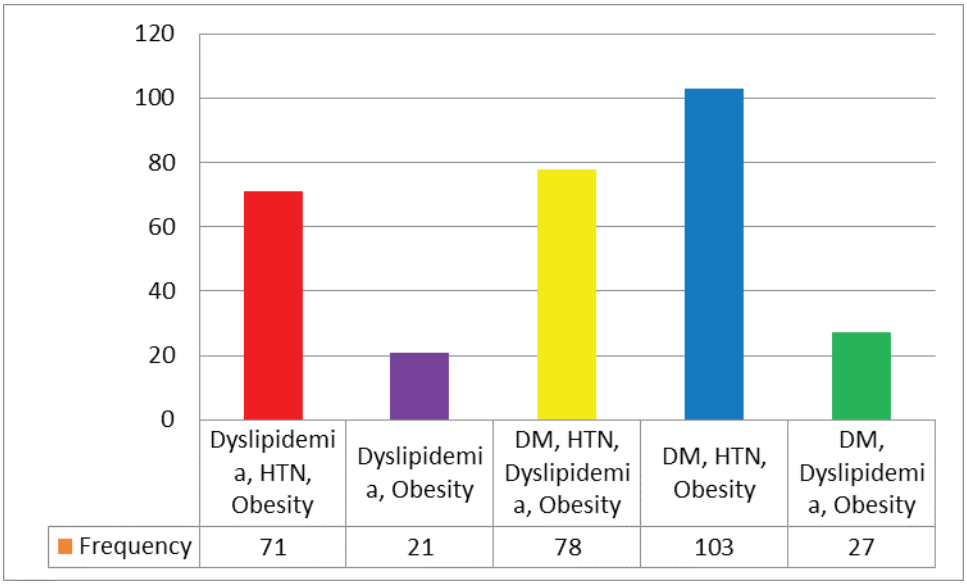


**Figure 1:- Showing complication present amongst metabolic syndrome patients.**

Figure 1 shows that complication present in metabolic syndrome patients. 71 (23.7 %) patients have dyslipidemia, HTN, obesity present as a complication. 21 (7%) patients have dyslipidemia, obesity present as a complications, 78 (26%) patients have DM, HTN, dyslipidemia, obesity present as a complication, 103 (34.3%) patients have DM, HTN, obesity present as a complication and 27 (9%) patients have DM, dyslipidemia, obesity present as a complications.

## Discussion

In our study the mean WC (102.26 ± 7.92) was significantly higher in MetS patients than in control groups (80.49 ± 4.70) p (<0.000). The mean SBP (148.26 ± 21.24) was significantly higher in MetS patients than in control group (115.31 ± 6.62) p (<0.000). The mean DBP (91.77 ± 10.96) was significantly higher in MetS patients then in control group (76.31 ± 5.42) p (<0.000). The mean FBS (141.08 ± 56.02) was significantly higher in MetS patients when compared to control group (79.35 ± 6.05) p (<0.000). The mean triglyceride (167.0 ± 50.92) was significantly higher in MetS patients when compared to control group (126.26 ± 14.76) p (<0.000). The mean HDL-C (37.79 ± 14.52) was significantly lower in MetS patients when compared to control group (52.16 ± 6.33) p (<0.000).

We have conducted a study to evaluate the major complications of metabolic syndrome. In our study, control patients had no complications. In metabolic syndrome patients, most commonly complications present were DM, HTN, obesity and the complications were present in 103 (34.3%) MetS patients,78 (26.0%) MetS patients had DM, HTN, Dyslipidemia, obesity as complications, 71 (23.7%) MetS patients had Dyslipidemia, HTN, Obesity as complication, 27 (9.0%) MetS patients had DM, Dyslipidemia, Obesity as complication and 21 (7.0%) MetS patients had Dyslipidemia, Obesity as complications.

## Conclusion

Our study advocate that diabetes Mellitus, hypertension, obesity, dyslipidemia are the predisposing factors for metabolic syndrome. To prevent from metabolic syndrome we have to control blood sugar,

blood pressure, waist circumferences and lipid profile, which are predisposing factors for atherosclerosis and other cardiovascular diseases which lead to morbidity and mortility.

**Ethical Clearance:** Taken from Institutional Ethics Committee vide letter no. 904 date 17.12.2016.

**Source of Funding:** Self

**Conflict of Interest:** Nil

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