associated with each condition. Metabolic syndrome is an extremely
mellitus and Metabolic Syndrome potentiates the cardiovascular risk
Syndrome and incident diabetes exists. The cooccurrence of diabetes
diabetes are prone to complications driven by both modifiable and non-
associated with disturbance in the body's metabolism and energy
lipoprotein cholesterol), raised fasting glucose, and central/abdominal
dyslipidaemia (raised triglycerides and lowered high density
syndrome, especially as the population ages. The main components
consists of a constellation of metabolic abnormalities that confer
Evolution of the criteria for the metabolic syndrome since the original
definition by the World Health Organization in 1998 reflects growing
clinical evidence and analysis by a variety of consensus conferences
feature of the metabolic syndrome to define is waist circumference.
Metabolic syndrome, World Health Organization Criteria of Metabolic Syndrome, predictive risk factors,
important parallel risk contributor to heart disease. Isomaa et al. reported a threefold increased risk of coronary heart disease and
stoke, as well as markedly increased cardiovascular mortality among
Medical syndromes include central obesity, hypertriglyceridemia, low levels of
high-density lipoprotein (HDL) cholesterol, hyperglycemia, and
hypertension. There is a growing interest in a cluster of synergistically
interacting cardiovascular risk factors called metabolic syndrome
(MetS). The syndrome has also been described as Insulin Resistance
Syndrome, Deadly Quartet, and Syndrome X. The most challenging
Intraabdominal circumference (visceral adipose tissue) is the most
strongly related to insulin resistance and risk of diabetes and CVD, and
for any given waist circumference the distribution of adipose tissue
between subcutaneous (SC) and visceral depots varies substantially.
Thus, within and between populations, there is a lesser vs greater risk
at the same waist circumference. These differences in populations
reflect the range of waist circumferences considered to confer risk in
different geographic location.

The prevalence of the metabolic syndrome varies around the world, in
part reflecting the age and ethnicity of the populations studied and the
diagnostic criteria applied. In general, the prevalence of the metabolic
syndrome increases with age.

Greater global industrialization is associated with rising rates of
obesity, and expected increase in the prevalence of the metabolic
syndrome, especially as the population ages. The main components
associated with the metabolic syndrome include raised blood pressure,
dyslipidaemia (raised triglycerides and lowered high density
lipoprotein cholesterol), raised fasting glucose, and central/abdominal
obesity. Diabetes mellitus is a group of metabolic diseases that is
associated with disturbance in the body's metabolism and energy
utilization from carbohydrates, lipids, and proteins. Patients with
diabetes are prone to complications driven by both modifiable and non-
modifiable risk factors. A strong association between Metabolic
Syndrome and incident diabetes exists. The cooccurrence of diabetes
mellitus and Metabolic Syndrome potentiates the cardiovascular risk
associated with each condition. Metabolic syndrome is an extremely

### INTRODUCTION:

The metabolic syndrome (syndrome X, insulin resistance syndrome) consists of a constellation of metabolic abnormalities that confer increased risk of cardiovascular disease (CVD) and diabetes mellitus. Evolution of the criteria for the metabolic syndrome since the original definition by the World Health Organization in 1998 reflects growing clinical evidence and analysis by a variety of consensus conferences and professional organizations. The major features of the metabolic syndrome include central obesity, hypertriglyceridemia, low levels of high-density lipoprotein (HDL) cholesterol, hyperglycemia, and hypertension. There is a growing interest in a cluster of synergistically interacting cardiovascular risk factors called metabolic syndrome (MetS). The syndrome has also been described as Insulin Resistance Syndrome, Deadly Quartet, and Syndrome X. The most challenging feature of the metabolic syndrome to define is waist circumference. Intraabdominal circumference (visceral adipose tissue) is the most strongly related to insulin resistance and risk of diabetes and CVD, and for any given waist circumference the distribution of adipose tissue between subcutaneous (SC) and visceral depots varies substantially.

Thus, within and between populations, there is a lesser vs greater risk at the same waist circumference. These differences in populations reflect the range of waist circumferences considered to confer risk in different geographic location.

The prevalence of the metabolic syndrome varies around the world, in part reflecting the age and ethnicity of the populations studied and the diagnostic criteria applied. In general, the prevalence of the metabolic syndrome increases with age.

Greater global industrialization is associated with rising rates of obesity, and expected increase in the prevalence of the metabolic syndrome, especially as the population ages. The main components associated with the metabolic syndrome include raised blood pressure, dyslipidaemia (raised triglycerides and lowered high density lipoprotein cholesterol), raised fasting glucose, and central/abdominal obesity. Diabetes mellitus is a group of metabolic diseases that is associated with disturbance in the body's metabolism and energy utilization from carbohydrates, lipids, and proteins. Patients with diabetes are prone to complications driven by both modifiable and non-modifiable risk factors. A strong association between Metabolic Syndrome and incident diabetes exists. The cooccurrence of diabetes mellitus and Metabolic Syndrome potentiates the cardiovascular risk associated with each condition. Metabolic syndrome is an extremely
World Health Organization (WHO) Criteria.
World Health Organization criteria also require the presence of diabetes mellitus, impaired glucose tolerance or insulin resistance, and any two of the following:
1. Body mass index (BMI) ≥ 30 kg/m² and/or waist-to-hip ratio >0.90 (male), >0.85 (female);
2. Blood pressure ≥ 140/≥90 mmHg or on hypertension medication;
3. Triglyceride ≥ 1.7 mmol/L and/or HDL-C < 0.91 mmol/L (male), <1.01 mmol/L (female).

RESULTS:

Table 5: Distribution of study subjects according to BMI (WHO

<table>
<thead>
<tr>
<th>Category</th>
<th>Number (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>12</td>
<td>12.0</td>
</tr>
<tr>
<td>Pre-hypertension</td>
<td>28</td>
<td>28.0</td>
</tr>
<tr>
<td>Grade I hypertension</td>
<td>23</td>
<td>23.0</td>
</tr>
<tr>
<td>Grade II hypertension</td>
<td>37</td>
<td>37.0</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Majority i.e., 88.0 % of the study subjects had hypertension, 12.0% did not have hypertension. Among those who had hypertension, majority i.e., 37.0% had grade-II hypertension, 23.0% had pre-hypertension and 23.0% had grade-I hypertension according to JNC VIII criteria.

The mean Systolic and diastolic blood pressure (SBP) among the study subjects were 146.1 ± 23.1 mmHg and 84.68 ± 10.1 mmHg respectively.

DISCUSSION:
Majority i.e., 43 (43.0%) of the study subjects were in the age group of 56-65 years, followed by 29 (29.0%) in the age group of 66-75 years, 20.0% in the age group 46-55 years, 6.0% in 36-45 years and 2.0% in the age group > 75 years. The mean age of the study participants was 61.58 ± 9.5 years with a range of 39 to 78 years.

In the present study, out of 100 study subjects, 56 (56.0%) were females and 44 (44.0%) were males. The mean age of males was 65.05 ± 9.3 years and of females 58.85 ± 8.9 years.

Compare to Kwabena Nsiah et al., study the population comprised 150 type 2 diabetes mellitus patients, made up of 50 males (33.3%) and 100 females (66.67%). The overall mean age of the population was 51.31 (SEM = 0.97) years, whereas the ages of the males and females were 52.86 (SEM = 1.56) and 50.54 (SEM = 1.22), respectively.

Among the study subjects, majority i.e., 44.0% belonged to Obese class-I followed by overweight (27.0%), 26.0% in obese class-II and 3.0% in normal range. Among both males and females, majority i.e., 47.7% and 41.1% respectively belonged to obese class-I.

The mean BMI among females (27.8 ± 5.2 kg/m²) was almost similar to males (27.2 ± 4.2 kg/m²). Compare to Kwabena Nsiah et al., study the mean value of BMI was 26.43 kg/m², and the mean BMI of females was significantly higher (P< 0.0244) than that of males.

Majority i.e., 88.0 % of the study subjects had hypertension, 12.0% did not have hypertension. Among those who had hypertension, majority i.e., 37.0% had grade-II hypertension, 23.0% had pre-hypertension and 23.0% had grade-I hypertension according to JNC VIII criteria.

The mean Systolic and diastolic blood pressure (SBP) among the study subjects were 146.1 ± 23.1 mmHg and 84.68 ± 10.1 mmHg respectively. Compare to James Osei-Yeboah et al., study the mean value of BMI was 26.43 kg/m², and the mean BMI of females was significantly higher (P<0.0244) than that of males.

Table 6: Distribution of study subjects according to grades of hypertension according to JNC VIII criteria

<table>
<thead>
<tr>
<th>Grades of HTN</th>
<th>Number (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>12</td>
<td>12.0</td>
</tr>
<tr>
<td>Pre-hypertension</td>
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<td>100.0</td>
</tr>
</tbody>
</table>

In our study among 100 Type 2 diabetic patients, 97% were found to have metabolic syndrome according to WHO criteria of metabolic syndrome.

On the whole, there was a high prevalence of MetS among the type 2 diabetics studied, similar to the study of Felix-Val et al.
extremely common among diabetic patients, especially by WHO criteria and the individual factors which may responsible for the development of cardiovascular complications. Therefore it is important for those caring for people with diabetes to be aware of whether their patients also meet the criteria for MetS. Overall, metabolic syndrome can serve as a simple clinical approach to identify persons for intervention to reduce both CVD and type 2 DM.

**LIMITATIONS AND STRENGTHS OF STUDY**

The small sample size, makes it less representative of the general diabetic population of the country. The cross-sectional nature would not allow the cause-effect relationship to be established, making generalization of the findings difficult. Being a hospital-based study also introduces some bias factor. The strengths of the study are the assessment of multiple parameters in one study, and the use of multiple logistic regression analyses to identify risk factors towards MetS in type 2 diabetics, and the quantification of the contributions due to the selected risk factors.

**REFERENCES:**