# Prevalence of Metabolic Syndrome among workers of Dolomite Mine at Madharam, Khammam District Andhra Pradesh

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## Abstract

**Introduction:** Metabolic syndrome (MS) is a combination of disorders that, when occurring together, increase the risk of developing cardiovascular disease and Diabetes. The prevalence of the components of MS is increased in obesity and is associated with atherothrombotic complications in micro- and macro vascular territories. The syndrome is also strongly associated with the increased risk of Coronary heart disease and Type 2 Diabetes mellitus (T2DM). This study aimed to investigate the prevalence of metabolic syndrome among Dolomite mine workers at Madharam, Khammam District, Andhra Pradesh.

**Objective:** To investigate the prevalence of metabolic syndrome among Dolomite mine workers at Madharam, Khammam District, Andhra Pradesh.

**Material and Methods:** The study was Cross-sectional study done on workers of dolomite mine who attended for Periodic medical examination in 2011 in Madharam. Subjects were interviewed privately by a Physician using validated pretested open ended questionnaire. The demographic, clinical data and relevant family history was collected at the time of the interview. The data was computerized and analysed by using epi info. The International Diabetes Federation (IDF) definition of the metabolic syndrome (2006)[1] was used.

**Results:** Average age of the workers is 43.5yrs. Majority of the workers belong to 46-50 yrs age group. All are male workers. Among the workers, 18% are overweight, where as 9.37 % are underweight. Majority of the workers 163 (90.5%) are having central obesity and 56 (31.11%) are dyslipidaemic. Diabetics are 33 (18.33%) where as 42 (23.33%) are hypertensives. Among the study subjects 39 (21.66%) are suffering with metabolic syndrome. Significant association was found between hypertension and family history, Smoking and hypertension, diabetes and family history, diabetes and metabolic syndrome. Metabolic syndrome was found in 24 (61.5%) of the diabetics.

**Keywords:** IDF criteria, metabolic syndrome, occupational status

## Introduction

The present study was conducted in a dolomite mine which is an open cast mine situated in Madharam village which was 50kms away from Khammam town. Dolomite is a sedimentary carbonate rock rich in magnesia, (double salt with carbon dioxide and calcium oxide) dolomite is used as a flux for the smelting of iron and steel. Industrialization and urbanization are contributing to a global epidemic of cardiovascular disease (CVD). Environmental factors and changes in lifestyle are major contributors. Consumption of high-calorie, refined food in association with decreased levels of physical activity are the main culprits in this global epidemic, which is affecting the developing world as well as the more prosperous developed countries. Metabolic syndrome was a forerunner of diabetes.

The age-adjusted risk in the Framingham offspring study with metabolic syndrome was 2.54 for coronary heart disease and 6.92 for diabetes in men. The MS alone predicted 25% of all new-onset CVD. Metabolic syndrome was initially observed in 1923 by Kyln. In 1988, Gerald Reaven reintroduced the concept. Syndrome X (insulin resistance syndrome) or Metabolic Syndrome (MS) first described by Raeven [2]. Early identification and management of the components of the metabolic syndrome are critical on preventing or delaying the development of type 2 diabetes, heart disease, and cardiovascular

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complications. An attempt is being made to assess the prevalence of metabolic syndrome among the workers associated with dolomite mine.

## Aim

To determine the prevalence of metabolic syndrome among Dolomite mine workers at Madharam, Khammam district, Andhra Pradesh.

## Material and methods

Out of 202 workers present, Cross-sectional study was conducted on 180 male workers who attended the periodical medical examination (whose relevant clinical data is complete/available) in Nov 2011 of Dolomite mine in Madharam, Khammam district, Andhra Pradesh. Method of data collection was by interview schedule and relevant medical examination and investigations. Subjects were interviewed using validated pretested open ended questionnaire. The following demographic and clinical data were collected at the time of the interview: sex, age, smoking habit, family history of diabetes, Hypertension. All subjects have given informed oral consent to make use of the available data in the medical records for publication after assuring them the confidentiality. The data was computerized and analysed by using epi info.

## Inclusion criteria

All the workers who attended the periodical medical examination(whose relevant clinical data is complete/available) in Nov 2011 are included in the study.

## Exclusion criteria

Defaulters, workers whose clinical data is incomplete, administrative staff are excluded from the study. The International Diabetes Federation consensus worldwide definition of the metabolic syndrome (2006)[1] is: Central obesity is defined as: waist circumference more than or equal to 90cm for Indian men plus any two of the following four factors.

- Raised Triglycerides level: 150 mg/Dl
- Reduced High density lipid cholesterol: < 40 mg/dL in males and < 50 mg/dL in females,
- Raised blood pressure: systolic Blood Pressure 130 or diastolic BP 85 mm Hg,
- Raised fasting plasma glucose (FPG) 100mg/dLor previously diagnosed type 2 diabetes.

If above 5.6 mmol/L or 100 mg/dL, (Oral Glucose Tolerencetest) strongly recommended but is not necessary to define presence of the syndrome.

Waist circumference was measured at the midpoint between the last rib and the iliac crest with participants standing and wearing only under garments

Body weight was measured by precision scale while subjects were minimally clothed without shoes.

Height was measured in a standing position without shoes using stadiometer while the shoulders were in a normal state.

(BMI) = Body mass index wt (kg) /ht (m2)

Blood pressure (at rest) was measured with the participant seated. Two readings were taken in 5-minute interval, the mean of the two measurements was considered.

## Results

The mean age of the study population was43.5 ±7.57 years Majority of the workers belong to 46-50 yrs age group. All are male workers. Among the workers, 18% are overweight,where as 9.37 % are underweight. Majority of the workers 163 (90.5%) are having central obesity and 56 (31.11%) are dyslipidaemic. Diabetics are 33 (18.33%) whereas 42 (23.33%) are hypertensives. Among the study subjects 39 (21.66%) are suffering with metabolic syndrome. Significant association was found between hypertension and family history, Smoking and hypertension, diabetes and family history, diabetes and metabolic syndrome. Metabolic syndrome was found in 24 (61.5%) of the diabetics.

### Table 1. Association of hypertension with history of hypertension among first degree relatives

| FAMILY HISTORY | HYPERTENSION | NO YPERTENSION | TOTAL |
|---|---|---|---|
| Positive family history | 18(37.5%) | 30(62.50%) | 48(100%) |
| No family history | 24(18.18%) | 108(81.82%) | 132(100%) |
| TOTAL | 42(23.33%) | 138(76.67%) | 180(100%) |

**Table 2. Association of smoking with hypertension**

|  | HYPERTENSION | NO HYPERTENSION | TOTAL |
|---|---|---|---|
| SMOKERS | 29(31.52%) | 63(68.48%) | 91(100%) |
| NON- SMOKERS | 13(14.77%) | 75(85.23%) | 89(100%) |
| TOTAL | 42(23.33%) | 138(76.67%) | 180(100%) |

$$X^2 = 6.1481 \quad p=0.01315 \quad df = 1$$

**Table 3. Association of diabetes with history of diabetes among first degree relatives**

| FAMILY HISTORY | DIABETES | NO DIABETES | TOTAL |
|---|---|---|---|
| Positive family history | 17(27.42%) | 45(72.58%) | 62(100%) |
| No family history | 16(13.56%) | 102(86.44%) | 118(100%) |
| TOTAL | 33(18.33%) | 147(81.67%) | 180(100%) |

$$X^2=4.3302 \quad p=0.0374 \quad df=1$$

**Table 4.  Association of metabolic syndrome with diabetes**

|  | METABOLIC SYNDROME | NO METABOLIC SYNDROME | TOTAL |
|---|---|---|---|
| DIABETES | 24(72.73%) | 9(27.27%) | 33(100%) |
| NO DIABETES | 15(10.20%) | 132(89.80%) | 147(100%) |
| TOTAL | 39(21.67%) | 141(78.33%) | 180(100%) |

$$X2=62.07 \quad p=<0.0001 \quad df=1$$

Odds ratio=23.4667    converted Relative risk (RR) = 7.1273 95% Confidence limits =9.2231 – 59.7073z =6.623 Odds =2.667   Phi =58.4424 (61.5%) of the diabetics have Metabolic syndrome.

**Table 5.  Age wise distribution of workers with metabolic syndrome**

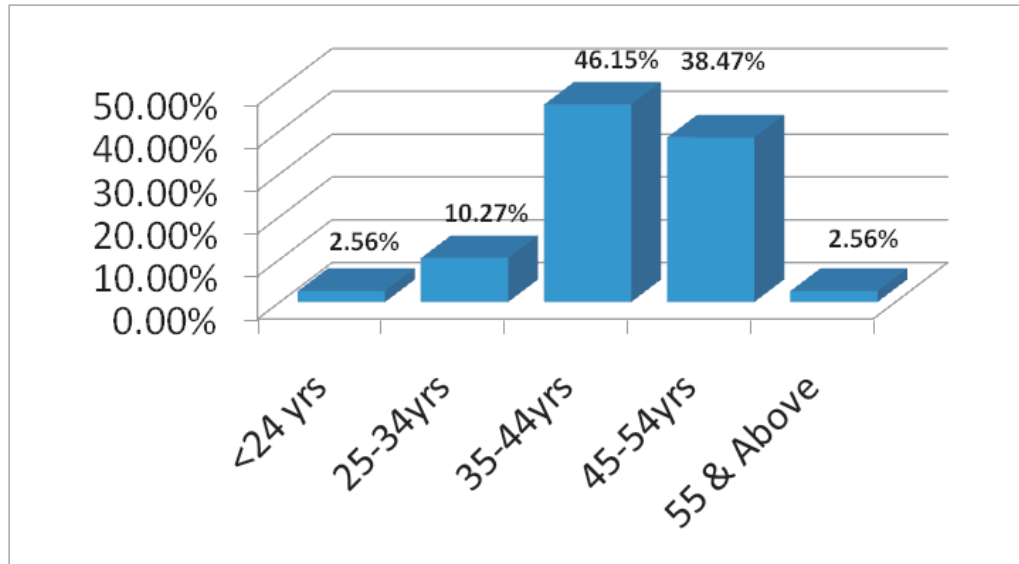| AGE (yrs) | NO OF WORKERS | WORKERS WITH MS  NO (%) |
|---|---|---|
| <24 | 2 | 1 (2.56%) |
| 25   34 | 22 | 4 (10.27%) |
| 35   44 | 81 | 18(46.15%) |
| 45   54 | 68 | 15(38.47%) |
| 55 & Above | 7 | 1 (2.56%) |
| T0TAL | 180 | 39 (100%) |

**Figure 1. Age specific prevalence of metabolic syndrome**

The prevalence of metabolic Syndrome increased with age but was reduced in the oldest age group

**Discussion**

This study has established that metabolic syndrome is a major health problem, even among the healthy active population who are physically active with minimal sedentary lifestyle. These findings, thus, call for sector-specific strategies for health promotion and prevention or treatment of metabolic syndrome and its specific components.

In this study the prevalence of metabolic syndrome was 22.77% as compared with 18.5% in a study conducted by Chitra V Nair et al [3] among the workers of Heavy Water Plant, kota, Rajasthanusing IDF criteria. It was 13.6% in study conducted by Kawada Tetal [4]in 2010among the workers in Japan using IDF criteria.

The prevalence of metabolic syndrome according to IDF criteria was 13% in a study conducted by N. Amidu et al [5]among garage workers in the automobile industry in Kumasi, Ghana. In contrast, the prevalence of the metabolic syndrome was 41.3% using IDF criteria in a study conducted by PrabhdeepKauretal[6]amongUrban Industrial Male Population in Chennai, South India which is high.

Age was an important risk factor. In our study there was a sharp rise in the prevalence of the metabolic syndrome in the 35-44 yr age group (46.15%) as compared to less than 35 years age group. The high prevalence of the metabolic syndrome in younger age group is of concern because early onset will expose these subjects to the risk factors for prolonged duration and increase the risk of diabetes and cardiovascular disease. It is consistent with the study done by Prabhdeep Kaur et al among Urban Industrial Male Population in South India. In our study we observe that the prevalence of metabolic Syndrome increased with age but was reduced in the oldest age group which is consistent with the study findings of Foong Ming Moy [6] among Malays in 2010. The unexpected low prevalence among the oldest age group can merely be a chance finding. This contradicts the results shown in a study conducted by Kawada T et al [4]in 2010 where the prevalence of metabolic syndrome increases with increasing age.

In summary, there is need for cross-sectional studies with larger representative samples to get more reliable estimates of prevalence of the metabolic syndrome. Based on the findings we recommend periodic work

site screening for risk factors for metabolic syndrome at 35 years and above to facilitate early detection. The subjects with the metabolic syndrome should be advised regarding lifestyle modification and weight reduction. Prospective studies will help identify the appropriate criteria that will predict metabolic syndrome in this population.

**Conclusion**

Since diabetics are at a higher risk of developing metabolic syndrome there is a need to develop strategies for early diagnosis of metabolic syndrome and interventions to mitigate the impact. Primordial prevention by reducing the risk of diabetes in a population will be advantageous.

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