Original article

Prevalence of metabolic and lean metabolic syndrome in type II diabetes patients and its association with age and gender: A descriptive observational study from Maharashtra

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Abstract

Background: In India, Type 2 DM is an epidemic disorder due to social influence and changes in life style. As per WHO estimation, the universal prevalence of Diabetes mellitus was 170 million (2.8%) in 2002, this number expected to grow up to 366 million (4.4%) or more in 2030. Metabolic syndrome is a collection of factors which can increase the risk of heart disease, stroke and diabetes. Metabolic syndrome comprises of group of multiple risk factors for atherosclerotic cardiovascular disease (ASCVD) such as central obesity, hypertension, impaired fasting glucose (IFG) or type 2 diabetes mellitus (T2DM), elevated triglyceride levels (TG) and reduced high density lipoprotein cholesterol (HDL-C).

Objective: The objective of present study was to find out prevalence of metabolic syndrome and lean metabolic syndrome in type2 Diabetes mellitus patients in our hospital.

Methodology: The present descriptive observational study was carried out at Department of General Medicine, NKP Salve Medical College, Nagpur involving 100 cases of type II diabetes mellitus from October 2023 to May 2024.

Results: Prevalence of metabolic syndrome in our study was 68%. Prevalence of lean metabolic syndrome in our study was 29%. Age wise association with metabolic syndrome showed that majority of the cases were from 41-50 years age group i.e. 30.9% with male predilection i.e. 70.6%. Age wise association with lean metabolic syndrome showed that majority of the cases were from 51-60 years age group i.e. 41.4% with male predilection i.e. 65.5%.

Conclusion: Prevalence of metabolic syndrome in our study was 68%. Prevalence of lean metabolic syndrome in our study was 29%.

Key words: Metabolic syndrome, lean metabolic syndrome, prevalence, type II DM

Introduction

Diabetes mellitus is a collection of common metabolic disorder mainly considered by hyperglycaemia which results commencing from defective insulin secretion or insulin action or together.[1] It is a diverse group of diseases with different group of etiology such as social, environmental and genetic factors which acting concurrently or mutually. [2]

Insulin is a hormone which controls the body metabolism of carbohydrates, proteins and lipids at different level. Chronic poor glycaemic control will cause disorder like dyslipidaemia, hypo thyroidism, cardiac disease, central nerve system problems and also poor control of infections.[3]

In India, Type 2 DM is an epidemic disorder due to social influence and changes in life style. As per WHO estimation, the universal prevalence of Diabetes mellitus was 170 million (2.8%) in 2002, this number expected to grow up to 366 million (4.4%) or more in 2030. [4-6]

Metabolic syndrome is a collection of factors which can increase the risk of heart disease, stroke and diabetes. Metabolic syndrome comprises of group of multiple risk factors for atherosclerotic cardiovascular disease (ASCVD) such as central obesity, hypertension, impaired fasting glucose (IFG) or type 2 diabetes mellitus (T2DM), elevated triglyceride levels (TG) and reduced high density lipoprotein cholesterol (HDL-C).[7]

The prevalence of metabolic syndrome (MetS) in India is reported to be up to 29.7%, quite high as compared to other south-east Asian countries. The concept of MS was to identify a clustering of cardiovascular (CV) risk factors which predisposed subjects to risk of developing cardiovascular disease (CVD) and type 2 diabetes (T2DM), so that early effective preventive measures can be implemented. The original accepted criteria for the metabolic syndrome were based on risk prediction in the non-Asian Indian populations. Therefore, there is a continuous debate regarding the optimum definition which is most sensitive and universally applicability in different populations like Asians. National Cholesterol Education Program Adult Treatment Panel III recommends that three of five clinical and/or biochemical abnormalities should be present to satisfy labelling of metabolic syndrome, whereas the International Diabetes Federation (IDF) definition requires abdominal obesity as an obligatory criterion and presence of at least two other abnormal criteria. [7]

There is very less literature on lean metabolic syndrome is available. Hence we planned this study with the objective to find out prevalence of metabolic syndrome and lean metabolic syndrome in type -2 diabetes mellitus patients.

Objective of present study was to find out prevalence of metabolic syndrome and lean metabolic syndrome in Type 2 Diabetes mellitus patients in our hospital.

Study Methodology: This is cross sectional study undertaken in our institute NKP Salve Medical College, Nagpur on Type 2 Diabetes mellitus patients attending OPD and IPD. The selection of patients was done using Simple random sampling method. Study was done over period of 2 years. Samples were collected as per simple random sampling method. .

Sample size of 100 cases with type II diabetes mellitus were selected.

Inclusion criteria:

● All type 2 Diabetes Mellitus patients of age 18 and above were taken.

- Patient with type 2 DM attending OPD and admitted in medicine ward.

 Exclusion criteria:

- Patients with liver disorders, renal disorders, congestive cardiac failure, thyroid dysfunction, chronic alcoholics and other drug abuse.
- Individual less than 18 years age.
- Recently pregnant.
- Type 1diabetes mellitus patients.
- Current psychiatric treatment.

Methods of data collection:

Collection of data was done by taking detail history, clinical examination and laboratory investigations through proforma for the study after taking informed consent and with consent of IEC

• All cases subjected to following investigations-

1.ANTHROPOMETRIC VARIABLE with following anthropometric findings were done:

(a)**HEIGHT** –Was measured to nearest 0.1 cm without shoes using stadiometer

(b)**Weight**- Was measured to nearest 0.1 kg in light clothing.

(c) **Waist Circumference**-Was measured in horizontal plane mid-way between inferior margin of ribs and superior border of iliac crest

(d) **BMI**-Was calculated by Wt/(Ht)2

(e)**Blood Pressure**-was recorded after at least 5 minutes of rest in both arms in sitting or supine position by using sphygmomanometer.

Two reading was taken 5 minutes apart and mean of two was taken as blood pressure.

Blood sample-Subjected for fasting, post meal , HbA1C and also for lipid profile. About 5ml of venous blood sample was collected after an overnight fasting, 4ml was dispended in vacutainer plain tube and 1 ml into fluride oxalate tube.

Statistical analysis:

Data was collected by using a structure proforma. Data thus was entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA. Qualitative data was expressed in terms of percentages and proportions. Quantitative data was expressed in terms of Mean and Standard deviation.

Results

Table 1: Distribution of the study population according to age and gender

	Frequency	Percent
30-40	16	16.0

Age group in years	41-50	30	30.0
	51-60	31	31.0
	61-70	17	17.0
	>70	6	6.0
	Total	100	100.0
Gender	Male	58	58.0
	Female	42	42.0
	Total	100	100.0

The study shows tha majority of them were from 51-60 years age group i.e. 31% followed by 30% from 41-50 years, 17% from 61-70 years, 16% from 30-40 years age group. Least were from above 70 years i.e. 6%. Mean age of the study participants was 52.93±11.81 years. 58% were males and 42% were females in our study.

Table 2: Prevalence of metabolic syndrome

		Frequency	**Percent**
Metabolic syndrome	Present	68	68.0
	Absent	32	32.0
	Total	100	100.0

Prevalence of metabolic syndrome in our study was 68%

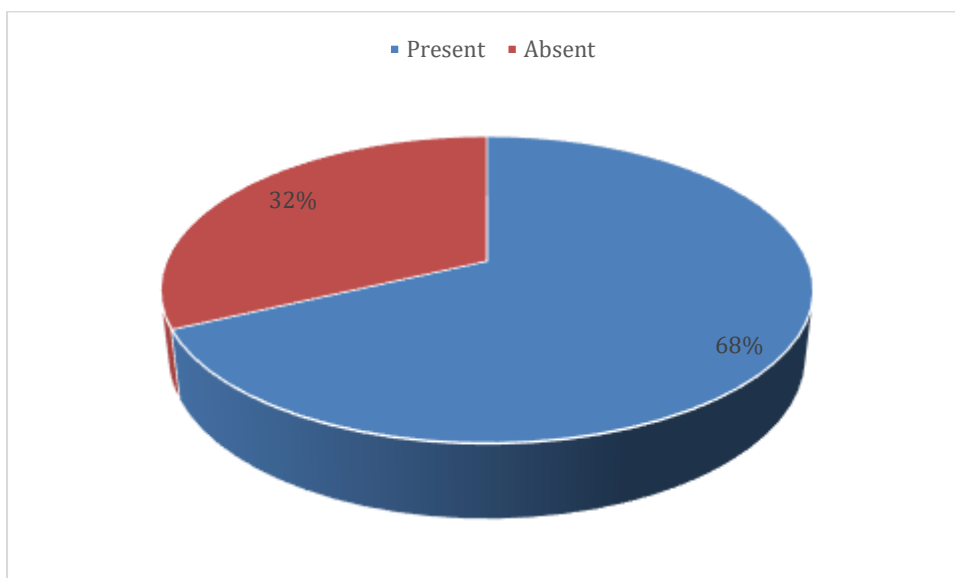**Figure 1: Pie diagram showing Prevalence of metabolic syndrome**

Table 3: Prevalence of lean metabolic syndrome

		Frequency	Percent
Lean metabolic syndrome	Present	29	29.0
	Absent	71	71.0
	Total	100	100.0

Prevalence of lean metabolic syndrome in our study was 29%

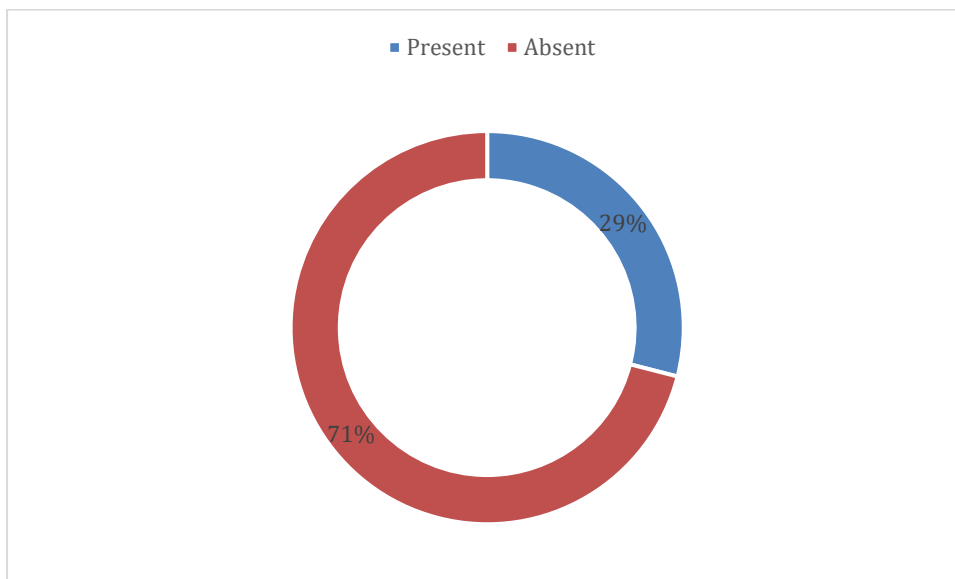**Figure 2: Pie diagram showing Prevalence of lean metabolic syndrome**

Table 4: Metabolic syndrome and its association with age group

		Metabolic syndrome		No metabolic syndrome		Total
		Frequency	Percent	Frequency	Percent	
Age group in years	30-40	10	14.7	6	18.8	16
	41-50	21	30.9	9	28.1	30
	51-60	19	27.9	12	37.5	31
	61-70	14	20.6	3	9.4	17
	>70	4	5.9	2	6.3	6
	Total	68	100.0	32	100.0	100

The corelation of age with metabolic syndrome showed that majority of the cases were from 41-50 years age group i.e. 30.9% followed by 27.9% from 51-60 years, 20.6% from 61-70 years, 14.7% from 30-40 years and 5.9% from above 70 years.

Table 5: Metabolic syndrome and its association with gender

		Metabolic syndrome		No metabolic syndrome		Total
		Frequency	Percent	Frequency	Percent	
Gender	Male	48	70.6	10	31.3	58
	Female	20	29.4	22	68.8	42
	Total	68	100.0	32	100.0	100

Gender wise association with metabolic syndrome showed that majority of the cases males i.e. 70.6% and remaining were females i.e. 29.4%.

Table 6: Lean metabolic syndrome and its association with age group

		LMS present		LMS absent		Total
		Frequency	Percent	Frequency	Percent	
Age group in years	30-40	2	6.9	14	19.7	16
	41-50	9	31.0	21	29.6	30
	51-60	12	41.4	19	26.8	31
	61-70	5	17.2	12	16.9	17
	>70	1	3.4	5	7.0	6
	Total	29	100.0	71	100.0	100

Age wise association with lean metabolic syndrome showed that majority of the cases were from 51-60 years age group i.e. 41.4% followed by 31% from 41-50 years, 17.2% from 61-70 years, 6.9% from 30-40 years and 3.4% from above 70 years.

Table 7: Lean metabolic syndrome and its association with gender

		LMS present		LMS absent		Total
		Frequency	Percent	Frequency	Percent	
Gender	Male	19	65.5	39	54.9	58
	Female	10	34.5	32	45.1	42
	Total	29	100.0	71	100.0	100

Gender wise association with lean metabolic syndrome showed that majority of the cases males i.e. 65.5% and remaining were females i.e. 34.5%.

Discussion

Asian Indians are a high-risk population with respect to diabetes and CVD, and the numbers are consistently on the rise. The prevalence of MS in Asian Indians varies according to the region, the extent of urbanization, lifestyle patterns, and socioeconomic/cultural factors. Recent data show that about one third of the urban population in India's major cities have MS. Also prevalence of LMS shows increasing trends.

We also examined that if those persons above the recommended cutoff for waist are excluded, and thus only lean/nonobese persons are included, and the same definition of MetS (herein termed as lean MetS) is applied (three out of four criteria), what will be the prevalence of MetS and will it be lower in the nontribal population compared to the tribal population

Age and gender

We included total 100 subjects in our study. Majority of them were from 51-60 years age group i.e. 31% followed by 30% from 41-50 years, 17% from 61-70 years, 16% from 30-40 years age group. Least were from above 70 years i.e. 6%. Mean age of the study participants was 52.93±11.81 years. 58% were males and 42% were females in our study.

Osadnik K et al[80] included a total of 797 participants aged 18–35 years old were included in the study. The mean age of LMS was 29.4 ± 4.1 years and 82.8% were males and 18.2% were females.

Sawant A. et al[81] conducted the study in MS and showed that the gender distribution was 56.75% males and 46.71% females. The age of the subjects ranged from 20 to 90 years, with a mean age in males of 54.28 years (SD = 13.89) and in females of 52.67 years (SD = 12.76). Of these, 18.65% males and 16.02% females were in 20–40 age group, 47.91% males and 57.42% females were in 41–60 age group, and 33.44% males and 26.56% females were >60 years old.

Prevalence of metabolic syndrome

Prevalence of metabolic syndrome in our study was 68%. Age wise association with metabolic syndrome showed that majority of the cases were from 41-50 years age group i.e. 30.9% followed by 27.9% from 51-60 years, 20.6% from 61-70 years, 14.7% from 30-40 years and 5.9% from above 70 years. Gender wise association with metabolic syndrome showed that majority of the cases males i.e. 70.6% and remaining were females i.e. 29.4%.

Grundy SM et al[45] in his article provided a list of prevalence of MS in different countries as Italy-22.2%, Portugal-23.9%, Spain-17% and Finland 37% which is less compared to our prevalence.

In India, prevalence is relatively high, again dependent somewhat on the criteria used. With NCEP criteria, less than one-fifth of the studied population in Southeast Asia has the MetS. This lower prevalence, compared with North American and European populations, may be attributable in part to a younger population.

Prevalence of lean metabolic syndrome

Prevalence of lean metabolic syndrome in our study was 29%. Age wise association with lean metabolic syndrome showed that majority of the cases were from 51-60 years age group i.e. 41.4% followed by 31% from 41-50 years, 17.2% from 61-70 years, 6.9% from 30-40 years and 3.4% from above 70 years. Gender wise association with lean metabolic syndrome showed that majority of the cases males i.e. 65.5% and remaining were females i.e. 34.5%.

Sawant A. et al[81] found the prevalence of MS in their study population to be 19.52% which is less as compared to our findings. The prevalence of MS in males was almost double than females (*P* = .008).

We found the prevalence of MS in our study population to be 68.5% and LMS 29.5%, which corroborate with **Deepa et al**[82] CURES 34 study showing prevalence of 18.3%.

Gupta R et al[83] **and Ramachandran A. et al**[84] reported prevalence of MS in India as 31.6% and 41.1% respectively which is lower as compared to our study.

Conclusion:

- Prevalence of metabolic syndrome in our study was 68%. Prevalence of metabolic syndrome was seen in majority of the patients from 41-50 years age group i.e. 30.9% and males i.e. 70.6%.
- Prevalence of lean metabolic syndrome in our study was 29%. Prevalence of lean metabolic syndrome was seen in majority of the patients from 51-60 years age group i.e. 41.4% and males i.e. 65.5%.

Conflict of interest: Nil

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