Section: Community Medicine

Original Research Article

DEMOGRAPHIC AND CLINICAL PROFILE OF LEAN ADULTS WITH TYPE 2 DIABETES MELLITUS ATTENDING A TERTIARY CARE HOSPITAL IN WESTERN ASSAM- A CROSS-SECTIONAL STUDY

Sabrina Yasmin[1], Parimita Roychoudhury[1], Mahmuda Nasrin[1], Rinku Borah[1]

[1]*Assistant Professor, Department of Community Medicine, Dhubri Medical College and Hospital, Dhubri Assam, India*

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Corresponding Author:
Dr. Parimita Roychoudhury,
Assistant Professor, Department of Community Medicine, Dhubri Medical College and Hospital, Assam, India.
Email: parimitaroychoudhury16@gmail.com

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ABSTRACT

Background: Type 2 Diabetes Mellitus has reached epidemic proportions globally and has been largely attributed to the increasing prevalence of worldwide obesity at a geometric rate. However, beyond the classical obesity related Type 2 Diabetes Mellitus, the number of non-obese patients with Type 2DM is also on the rise. It has been observed that 10-20 % of individuals with Type 2DM are non-obese and in some parts of the world, especially Asian countries, the prevalence of the non-obese variant is as high as 60-80% of the total Type2DM. The study aims to assess the demographic clinical characteristics of the Lean adults with Type 2 Diabetes Mellitus, attending a tertiary care hospital in western Assam.

Materials and Methods: A Hospital based cross-sectional study was conducted in NCD clinic of Dhubri Medical College and Hospital for a period of 6 months among all adult patients aged ≥18 years attending the NCD clinic with Type 2 Diabetes Mellitus during the study period. Out of the Type 2DM patients Lean diabetics will be studied for their demographic and clinical profile.

Results: In this study a total of 296 patients were diagnosed as Type 2DM. Out of which 130 patients (44%) were found to be Lean diabetics. The age groups for the patients with Lean diabetes ranges from 30 years to 100 years with mean of 60 years. Differences in Lean and Non lean Type DM participants in their demographic and anthropometric parameters like age, weight, BMI were found to be statistically significant. The differences of Height, weight and BMI of male and female lean diabetics were statistically significant. Breathing difficulty and weakness were the most common clinical presentation among them.

Conclusion: To prevent severe complications in lean diabetics more importance should be given on the therapeutic as well as programmatic side as considerable number of lean diabetics are present in the population.

Keywords: Lean adults, Type 2 Diabetes Mellitus, Body Mass Index, Waist Hip ratio, Lipid profile.

INTRODUCTION

In recent decades, India has witnessed a rapidly exploding epidemic of diabetes. Indeed, India today has the second largest number of people with diabetes in the world. The International Diabetes Federation (IDF) estimates that there are 72.9 million people with diabetes in India in 2017, which is projected to rise to 134.3 million by the year 2045.[1] The prevalence of diabetes in urban India, especially in large metropolitan cities has increased from 2% in the 1970s to over 20% at present and the rural areas are also fast catching up. Type 2 Diabetes Mellitus has been largely attributed to the increasing prevalence of worldwide obesity at a geometric rate. Type 2 diabetes is a metabolic-cum-vascular syndrome characterized by predominant insulin resistance with varying degrees of insulin secretory defect. It is a progressive disease often associated with central obesity, dyslipidaemia and hypertension.[1] It is more common in overweight and obese individuals of middle to late age but is increasingly being seen in

younger age groups and in those with lower body mass index (BMI) as well. Beyond the classical obesity related type 2 diabetes and other well-defined types of diabetes like type 1, Maturity onset Diabetes of the Young, Gestational diabetes, etc., the number of non-obese patients with T2DM is also on the rise.[2] The term "Lean Diabetes" is used to describe Diabetic patients with Body Mass Index (BMI) value of less than 19 kg/m2 or BMI in the normal range. Whereas those diabetic subjects with BMI more than 30 kg/m2 are categorised as obese diabetic patients. It has been observed that 10-20 % of individuals with Type2DM are non-obese and in some parts of the world, especially Asian countries, the prevalence of the non-obese variant is as high as 60-80% of the total T2DM. Many Indian studies reported that 1.6 to 26% of Type 2 Diabetics are of low or normal body weight. On the contrary, in Western countries majority of T2DM individuals are overweight or obese. Lean and obese T2DM patients have different clinical course, complications, and metabolic profile.[2-4] These non-obese individuals have certain peculiarities and have a higher mortality rate compared with obese individuals. The pathophysiology, clinical and biochemical features of T2DM in lean individuals remains poorly understood and this has an impact on defining its management. However, studies on clinical and biochemical characteristics of type 2 diabetes in lean individuals in India are few in number. With this in background the study aimed to assess the proportion of Lean adults with type 2 Diabetes Mellitus attending a tertiary care hospital in western Assam and to ascertain the associated sociodemographic and clinical characteristics in the Lean diabetic patients.

Aim and Objectives

Aim: To ascertain the demographic and clinical profile of Lean Adults with Type 2 Diabetes Mellitus attending a tertiary care hospital in western Assam

Objectives:

1. To estimate the proportion of Lean adults with Type 2 Diabetes Mellitus attending a tertiary care hospital in western Assam
2. To assess the demographic and clinical characteristics of Lean adult patients with type 2 Diabetes Mellitus attending a tertiary care hospital in western Assam
3. To compare the demographic and clinical features of Lean to non-Lean patients with Type Diabetes Mellitus attending a tertiary care hospital in western Assam.

MATERIALS AND METHODS

Study Design: Hospital based cross-sectional study conducted in NCD clinic of Dhubri Medical College and Hospital for a period of 6 months from January 2024 till July 2024

Study participants: Includes all adult patients aged ≥18 years with Type 2 Diabetes Mellitus based on American Diabetes Association (ADA) criteria attending NCD clinic during the study period

Selection of study participants: The diagnosis of diabetes was made by clinicians at Medicine OPD, based on clinical and biochemical tests like fasting blood glucose, Post Prandial blood glucose, random blood glucose and HbA1c measurement etc. After excluding Type 1 DM patients, the remaining patients diagnosed with Type 2 Diabetes Mellitus, were referred to the NCD clinic for anthropometric measurements (weight, height, waist circumference and hip circumference,) in order to calculate BMI and Waist Hip Ratio according to standardised procedures. The patients were then classified as Lean and non-Lean based on the traditional BMI, WHR cut-offs.

Assessment of demographic and clinical characteristics: A detailed history of demographic variables (age at diagnosis, sex, residence, level of education, family history of diabetes, smoking and alcohol intake status) and clinical data (history of admission at diagnosis, use of diabetes and ancillary drugs, coexisting medical comorbidities) has been collected. The socio-demographic and clinical characteristics of the Lean and non-Lean type 2 Diabetics were investigated with the help of pretested and preformed interview schedule. Resting blood pressure will be measured and Hypertension will be defined as systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg on clinical examination or a self-reported history of pre-existing hypertension either on antihypertensive therapy or without treatment. Any seriously ill patient whose sensorium and higher functions are altered or patients suffering from acute myocardial infarction, renal failure, liver disease, critical illness, tuberculosis, carcinoma and any severe infection. Pregnant women were also excluded.

Operational Definition:

Lean Diabetes: If BMI <23kg/m2 or Waist-Hip ratio is ≤0.80 in females and ≤0.95 in males (WHO classification of BMI for Asian population).

Statistical analysis: The categorical and continuous variables describing all the study participants were expressed as percentages and means with standard deviation, respectively. The differences in the demographic and clinical characteristics of the lean Type 2DM participants were analysed using Student t test for continuous data. All analyses were performed using SPSS statistical software version 22. A p value <0.05 was considered statistically significant.

Ethical approval: Ethical approval for the study was obtained from the Institutional Ethical Committee (Reg. No. ECR/1807/Inst/As/2023 Dated:17/04/23) Written informed consent was obtained from the participants before the data collection. They were assured that the information collected was purely for research purposes and would be kept confidential.

RESULTS

In this study a total of 296 patients attended the Medicine OPD during the study period with the diagnosis of Type 2DM diagnosed by Medicine specialist and were referred to NCD clinic. Among them the mean age was 55.8±11.9 years with a range of 25 to 100 years. Among the study population, 138 (46.6%) were males and remaining 158 (53.4%) participants were females. The mean BMI was 23.66±5.84 kg/m2 the study population, with a range of 13.8 to 38.4 kg/m2 [Table 1].

Table 1: Distribution of participants as per demographic characteristics

Parameters	**Mean±SD or n (%)**
Age (Years)	55.8 ±11.9
BMI(kg/m2)	23.6±5.8 (Range 13.8 to 38.4)
Gender	
Male	138(46.6%)
Female	158(53.4%)
Lean Diabetes	
Yes	130(44%)
No	166(56%)

Out of 296 participants presenting with Type2 DM 130 (44%) were found to be Lean Type 2 diabetics. The age groups for the participants with lean diabetes ranges from 30 years to 100 years with mean of 60 years.

Table 2: comparison of demographic profile of the lean and non lean diabetics diabetics

Age	**Lean n=130**	**Non-lean n=166**	**p-value**
21-40 Years	8 (6%)	27 (16%)	0.01
40+ Years	122 (94%)	139 (84%)	
Gender			0.22
Male	65 (50%)	70 (42%)	
Female	65 (50%)	96 (58%)	
Education			0.24
Class i-v	30 (23%)	32 (19%)	
Class vi-x	28 (22%)	42 (25%)	
Class xi-xii	9 (7%)	23 (14%)	
Graduate	7 (5%)	10 (6%)	
Illiterate	55 (42%)	55 (33%)	
Post graduate & above	1 (1%)	3 (2%)	
Religion			1.00
Hindu	21 (16%)	27 (16%)	
Muslim	109 (84%)	139 (84%)	

On comparing the demographic parameters of lean and non lean Type 2 diabetics the differences in age in the two groups was found to be statistically significant.

Table 3: Clinical Profile of Lean diabetics

Parameters	**Female (Mean±SD) n=65**	**Male (Mean±SD) n=65**	**P value**
Height (cm)	155.8±4.5	160.7±8.9	0.001
Weight(kg)	49.6±3.2	52±4.2	0.004
BMI (kg/m2)	20.3±1.2	18±0.2	0.001
Waist /Hip ratio	0.8±0.1	0.92±0.4	0.14
Systolic BP	132.2±11.9	133±15.9	0.74
Diastolic BP	78±10.0	80±8.6	0.22
Duration of Diabetes (months)	40.2	53.3	0.41

The distribution of the Lean diabetic patients according to various parameters and the comparison of the male and female patients shows that the differences of Height, weight and BMI are statistically significant.

Table 4: Comparison of various parameters between Lean and non Lean diabetic patients

Parameters	**Lean diabetics (Mean±SD) n=130**	**Non lean (Mean±SD) n=166**	**P value**
Height (cm)	155.4±3.4	155.6±3.4	0.616
Weight(kg)	48.8±4	64.2±3	0.006
BMI (kg/m2)	20.1±1.2	26.3±6	0.001
Waist /Hip ratio	0.9±1	1.1±1	0.089
Systolic BP	133±9	135±7	0.038
Diastolic BP	80±2	84±7	0.02
Duration of Diabetes (months)	50	52.3	0.5

On comparing the lean and non lean diabetics it has been observed that there were statistically significant differences with respect to weight ,BMI and systolic and diastolic BP measurements.

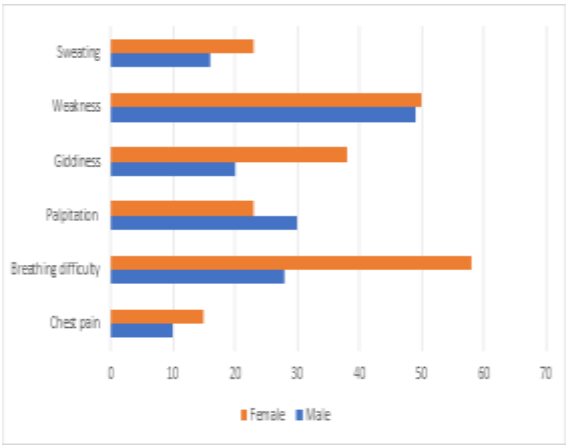

Figure 1: Distribution of lean diabetic patients as per the presenting symptoms at the time of OPD visit

DISCUSSION

In the present study there were 296 patients who have visited the Medicine OPD during the study period and were diagnosed with Type 2DM and were referred to NCD clinic. Out of the patients 130 patients (44%) were found to be Lean Type 2DM after doing anthropometric measurements and classified as per BMI and WHR. Study done by Sandinti Deepa et al,[10] in the Department of General Medicine at RL Jalapa hospital, Kolar in 2017, out of the 106 subjects involved in the study Obese to Lean Type 2DM patients were in the ratio of 1:4. The proportion of Obese Type 2DM subjects was (n=84, 79.2%) whereas Lean Type DM were (n=22, 20.8%). In a study by Dr. S. Siva Kumar,[9] in Madurai found that Lean Type 2 DM observed were 18%, as compare to 52% of normal and 30% of obese patients. Study conducted by Mukhyaprana et al,[12] Obese Type 2DM were 7.4% and majority (65%) were normal weight. Incidence of Lean Type 2DM in various Indian studies ranges from 1.6% and 3.5% as in Ramachandran et al,[6] study and Mohan et al,[7] respectively to as high as 28% as in Tripathi et al.[3] The proportion of Lean Type2 DM patients found in our study was slightly higher than the Obese or non-Lean Type DM patients in comparison to various other Indian studies .Study results were consistent with Mukhyaprana et al,[12] and Tripathi et al.[3] In a study done in United States cohort of 18000 patients with type 2 diabetes showed that around 13% belonged to patients with Lean Type 2 DM, with ideal body weight defined as a BMI ranging from.[13-16] In the present study the patients of Lean as well as non-Lean Type 2DM, majority (94% in Lean and 84% in non-Lean Type 2DM) were 40 years and above. In non-Lean category majority of patients were females however the proportion of male and female were same in Lean group of patients. In a study done by Dr. S. Siva Kumar,[9] it was found that there was no particular characteristics for the age group of the Lean diabetics. But 33.4% of Lean diabetics belong to 51-60 years of age, 38.5% of normal weight patients between 30 and 40 years, and 53.3% of obese patients belong to 51-60 years of age group. In a study done by Garg Kumar A et al. The male and female ratio was 69:31 versus 42:58 between lean and obese groups respectively with a male predominance, 69% of patients being male in lean group compared to a female predominance (58%) in obese group.[17-20]

The differences of demographic characteristics among Lean and non-Lean Type2 DM patients showed that the variations in age factor among the both groups were statistically significant and other features like educational status, religion were statistically insignificant. In the study done by Sandinti Deepa et al,[10] distribution of subjects in different age groups across lean and obese diabetes groups was statistically not significant with a p-value of 0.319. The gender distribution of subjects across lean and obese diabetes groups was statistically not significant with a p-value of 0.809.

In our study it has been observed that out of 130 lean patients' majority (94%) were more than 40 years. There were 65 males and 65 females. The mean age of the patient was 60 years and the mean duration of diabetes was 40.2 months for females and 53.3 months for males. The mean age of our patients is older than that of Barma et al and Das et al,[4] who reported a mean age of 53 years and 48 years respectively and Sinharoy et al,[11] reported a mean age of 47 years. However, the study Mukhyaprana et al,[12] reported equal mean age of 60 years. In our study, Lean type 2 Diabetes patients were of equal proportions with respect to gender, however in the study done by Dr.S. Siva Kumar,[9] it was slightly higher in female sex (22.7%) with sex ratio of 0.8: 1 in male: female. In another study done by Sandinti Deepa et al,[10] the study population, 65 (61.3%) were participants males and remaining 41 (38.7%) participants were females. A study done by B Chandra G et al,[17] showed (65%) male and (35%) female distribution among lean type 2 diabetes mellitus population. Kannan,[18] and C.S Yagnik et al,[19] depicted in their studies the male preponderance in lean type 2 diabetes mellitus. The patient showed Mean age of presentation of non-obese and obese cases are 47.7 years and 54 years respectively.

The mean BMI was 29.27±5.84 kg/m2 in the study population, with a range of 17.90 to 38 kg/m2. On comparing the lean diabetics with non-lean diabetics, it has been observed that there were statistically significant differences with respect to weight, BMI and systolic and diastolic BP measurements. In a study done by V. Jali Met al,[14] a comparison of lean type 2 DM between male and female cases revealed that the difference in weight was statistically significant, Similarly, the waist-hip ratio comparison revealed the mean values found to be significant.[21]

CONCLUSION

From our study it has been observed that considerable higher proportion of Lean type 2 DM in our population. The age of presentation of Lean Type 2DM was towards the higher range. The differences in clinical presentation and demographic profile of Lean patients of type 2 diabetes in compared to non-Lean diabetics were not much. However Lean Type 2 DM patients presented with weakness and breathing difficulty in relatively larger proportions so complication in Lean and non-Lean diabetics needs to be studied. Adequate focus should be put from therapeutic and programmatic management point of view on Lean diabetics to prevent complications in them.

Limitation: In the study we did not evaluate for the macrovascular and microvascular complications of Type 2 diabetes among the Lean as well as non-Lean diabetics as done in various other studies done across the country due to constrains of time and manpower .Comparison of complications of diabetes in both the groups which will be dealt later with further studies would have thrown more light I understanding the peculiar characteristics of Lean Type 2 DM patients in the community.

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