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Original Article

Clinical and Biochemical Profile of Lean, Normal, Obese Type 2 Diabetes Mellitus

S M Shavana[1], Zufire H M Khan[2], Heber Anandan[3]

[1]Assistant Professor, Department of Medicine, Tirunelveli Medical College, Tamil Nadu, India, [2]Medical Officer, Government Headquarters Hospital, Tenkasi, Tamil Nadu, India, [3]Senior Clinical Scientist, Dr. Agarwal's Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: Type 2 diabetes mellitus (DM) is the most prevalent form of diabetes seen worldwide. Epidemiological data over the past decades have shown that the pattern and profile of Type 2 DM are very different in India compared to the West.

Aim: To study the clinical and biochemical profile of lean, normal, and obese Type 2 DM.

Materials and Methods: 100 patients Type 2 DM patients were divided into three groups. Group A includes body mass index (BMI) <18.5 kg/m^2 (lean body weight Type 2 DM) and Group B includes BMI, between 18.5 and 24.9 kg/m^2 (normal weight Type 2 DM). Group C includes BMI > 30 kg/m^2 (obese Type 2 DM).

Results: Waist-hip ratio with increase in BMI. Among 100 patients studied, 64 patients have abnormal waist-hip ratio. Lean diabetics have more severe hyperglycemia with poor metabolic control. Similarly, post-prandial values were also high in lean Type 2 DM patients. Regarding lipid profile of lean Type 2 diabetes patients, all the parameters were lower in lean diabetics compared to all other groups. Lean Type 2 diabetes had a favorable lipid profile compared to normal weight and obese diabetes.

Conclusion: Lean diabetics have high fasting blood glucose level. Thus, early diagnosis and timely intervention, coupled with lifestyle modifications must be targeted toward this lean group of diabetics.

Key words: Biochemical profile, Body weight, Diabetics

INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic disorders characterized by a deficiency of insulin secretion and/or insulin effect, which causes hyperglycemia, disturbances of carbohydrate, fat and protein metabolism, and a constellation of chronic complications. Diabetes is and will remain a threat to global health. Worldwide diabetes probably affects 150 million people. The incidence of diabetes is showing an alarming rise in developing countries, particularly in India.[1] 60-80% of the diabetics in developed countries are obese. Whereas in India we find that clinical profile of diabetics is different.[2] Most of the patients attending our diabetic clinic are not obese as defined by existing parameters such as body mass index (BMI). It is interesting to note that most patients fall in normal weight group and some even lean group. Obesity in Type 2 diabetes is less common in Indian population compared to western population.[3,4] Hence, it is worth studying the clinical profile of lean Type 2 diabetes, by comparing with normal and obese population with Type 2 diabetes.

Aim

To study the clinical and biochemical profile of lean, normal, and obese Type 2 DM.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of General Medicine, Annal Gandhi Memorial Government Hospital, Trichy. 100 patients Type 2 DM patients were divided into 3 groups. Group A includes BMI < 18.5 kg/m^2 (lean body weight Type 2 DM) and Group B includes BMI, between 18.5 and 24.9 kg/m^2 (normal weight Type 2 DM). Group C includes

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Corresponding Author: Zufire H M Khan, 304/1, Mallika Colony ext., Thiyagarajanagar, Tirunelveli, Tamil Nadu, India.
Phone: +91-9047037671. E-mail: zufire.mmc@gmail.com

BMI >30 kg/m^2 (obese Type 2 DM). A detailed history were taken from each person, i.e., age of onset, duration, any positive family history, dietary pattern, presenting complaints - at the time of diagnosis. Detailed examination was done for all the hundred patients to find out various complications, if any. Biochemically, blood glucose (both fasting and post-prandial), blood urea, serum creatinine, and lipid profile were analyzed in all the three groups. Selection of cases included in the study was selected as per the records available with them. Duration of disease, BMI, waist-hip ratio, current blood glucose, urea, serum creatinine, and lipid profile was taken into consideration. Exclusion criteria: Presence of history of pulmonary tuberculosis. Presence of other chronic illnesses that could affect body weight such as chronic liver disease and chronic kidney disease. Type 2 diabetes patients with age of onset <30 years. History wise, particularly in lean patients those who were normal or obese at the time of presentation, but lost body weight significantly after the detection of Type 2 DM, patients with a history of cancer/human immunodeficiency virus infection. Overweight patients with BMI between 25 and 30.

RESULTS

In our study, we found there is no particular age group for lean diabetics. However, 24.5% of lean diabetics belong to 51-60 years of age, 57.1% of normal weight patients between 41 and 50 years, and 55.6% of obese patients belong to <40 years age group. There is statistically significant relationship exist in our study between sex and BMI. Slightly higher incidence of female was observed lean body weight group (21.2%) and in normal body weight (51.9%) group. In obese, there is male preponderance (37.5%). The family history of diabetes is present only in 9.6% of lean diabetics, in comparison to 35.4% in normal, and 54.8% in obese diabetics. Hence, there is lesser incidence of family history among the lean diabetics. There is a linear increase in number of patients having abnormal. Waist-hip ratio with increase in BMI. Among 100 patients studied, 64 patients have abnormal waist-hip ratio. Among that, it is 12.5% in lean, 42.2% in normal, and 45.3% in obese Type 2 diabetics. Even though, 19% (19) of diabetics patients are lean based on BMI, 8 among them have abnormal waist-hip ratio. Hence, waist-hip ratio is a better indicator than BMI for assessment of obesity. Lean diabetics have more severe hyperglycemia with poor metabolic control. Lean persons have higher fasting blood sugar levels than obese and normal weight Type 2 diabetes patients (Table 1). Similarly, post-prandial values were also high in lean Type 2 DM patients. This has been explained by probable low beta cell reserve among lean diabetics. Hence, lean diabetics are insulinopenic and highly insulin sensitive (Table 2). Regarding lipid profile of lean Type 2 diabetes patients, all the parameters were lower in lean diabetics compared to all other groups. Moreover, lean diabetics have slightly higher high-density lipoprotein (HDL) value as compared to normal and obese diabetics, which is statistically significant. Furthermore, free cholesterol value in lean diabetics is not as high as compared to obese patients. Hence, lean diabetics have favorable lipid profile as compared to normal and obese diabetics. In contrast to the previous studies, in our study the triglyceride (TGL) levels were not significantly high in lean diabetics (Tables 3-6).

Table 1: Distribution of FBS in study groups

FBS	Lean Group A	Normal Group B	Obese Group C	*P* value
Normal	4	9	11	0.243
Abnormal	15	40	21	
Total	19	49	32	

FBS: Fasting blood sugar

Table 2: Distribution of PPBS in study groups

PPBS	Lean Group A	Normal Group B	Obese Group C	*P* value
Normal	1	6	5	0.544
Abnormal	18	43	27	
Total	19	49	32	

PPBS: Post-prandial blood sugar

Table 3: Distribution of total cholesterol in study groups

Total cholesterol	Lean Group A	Normal Group B	Obese Group C	*P* value
Normal	16	25	10	0.001
Abnormal	3	24	22	
Total	19	49	32	

Table 4: Distribution of TGL in study groups

TGL	Lean Group A	Normal Group B	Obese Group C	*P* value
Normal	16	27	20	0.083
Abnormal	3	22	12	
Total	19	49	32	

TGL: Triglyceride

Table 5: Distribution of HDL in study groups

HDL	Lean Group A	Normal Group B	Obese Group C	*P* value
Normal	12	22	12	0.201
Abnormal	7	27	20	
Total	19	49	32	

HDL: High-density lipoprotein

Table 6: Distribution of LDL in study groups

LDL	Lean Group A	Normal Group B	Obese Group C	*P* value
Normal	12	8	4	<0.0001
Abnormal	7	41	28	
Total	19	49	32	

LDL: Low-density lipoprotein

DISCUSSION

Our study includes 100 patients with Type 2 diabetes. Among them, normal weight (49%), obese patients (32%), and lean Type 2 diabetics (19%) were identified. In our study, there is no statistically significant relationship between age and BMI observed. However, a study conducted by Mukhyaprana *et al.*,[5] mean age of onset of diabetes in lean were 60.34 ± 13.5 years. In Gohel *et al.*[6] study, it was between 30 and 40 years. In our study, lean Type 2 diabetes patients were slightly higher in female sex (21.2%) which was statistically significant. A study conducted by Mukhyaprana *et al.*[5] observed most lean Type 2 DM were males (65% of total lean) Type 2 DM which was statistically not significant. Positive family history was present only in 9.6% of patients with lean body weight Type 2 DM as compared to 35.4% in normal weight and 54.8% in obese patients with Type 2 DM which were statistically significant. A study conducted by Mukhyaprana *et al.*[6] observed positive family history in 45% of lean and 62.6% in normal body weight diabetics. Study conducted by Gohel *et al.*[6] observed low incidence of positive family history (20%) in lean as compared to 40% in normal and 44% in obese patients. In our study, 12.5% of lean diabetes had abnormal waist-hip ratio as compared to 42.2% in normal and 45.3% in obese patients. Waist-hip ratio had a statistically significant relationship with BMI. The previous study conducted at Mukhyaprana *et al.*[5] observed 48% of lean diabetics had abnormal waist-hip ratio, stating that a significant number of lean diabetics (48%) had abnormal waist-hip ratio. The waist-hip ratio may thus be a more sensitive indicator of obesity in Indians. In our study, a significant proportion of lean persons had higher fasting blood sugar levels than obese patients with Type 2 diabetes, which was statistically significant as compared to normal and obese patients with Type 2 diabetes. This has been explained based on low - beta cell reserve in these patients. Similar results were also observed in study conducted by Mukhyaprana *et al.*[5] Fasting blood sugar was 177.08 ± 105.1. Post-prandial blood sugar values in lean Type 2 DM patients were higher, even though statistically not significant. Analysis of lipid profile in our study showed interesting results. Type 2 lean diabetics, had lower incidence of dyslipidemia as compared to all other groups, even though only HDL relationship with BMI was statistically significant. In our study, HDL values were slightly higher in lean diabetics as compared to normal and obese patients which were statistically significant. Furthermore, free cholesterol value in lean diabetics was not high as compared to normal weight and obese patients. TGL values in lean diabetics were not very high as compared to normal and obese diabetics. Previous studies by Banerji *et al.* and Das *et al.* had showed slight increase in TGL and HDL in lean diabetics. Japanese study by Ikeda *et al.*[7] showed no major differences in lipid profile in lean diabetics, irrespective of glycemic status. Lean Type 2 diabetes had a favorable lipid profile compared to normal weight and obese diabetes.

CONCLUSION

Majority of Type 2 diabetes patients in our population are having normal weight than lean body weight. Lean diabetics have more severe hyperglycemia and poor metabolic control. They are more prone for infections. Hence, we conclude that early initiation of insulin in lean Type 2 diabetics is expected to achieve good glycemic control and to prevent future complications.

REFERENCES

1. Zimmet P, Alberti KG, Shaw J. Global and societal implications of the diabetes epidemic. Nature 2001;414:782-7.
2. Hoet JJ, Tripathy BB. Malnutrition and diabetes in the tropics. Report of the international workshop on types of diabetes peculiar to the tropics. Diabetes Care 1996;19:1014.
3. Alberti KG, Zimmet PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: Diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. Diabet Med 1998;15:539-53.
4. Das S. Low body weight NIDDM: An independent entity. In: Das AK, editor. Medicine Update. Mumbai: Association Physicians of India; 1998. p. 595-602.
5. Mukhyaprana MP. Clinical profile of Type 2 diabetes mellitus and body mass index-is there any correlation? Calicut Med J 2004;2:e3.
6. Gohel DR, Desai VK. M.P. Shah medical college, Janmagar clinical profile of lean body weight Type 2 DM patients in comparison with obese and non-obese. Type 2 DM patients. J Assoc Phys India 2003;51:771-7.
7. Ikeda T, Ochi H, Ohtani I, Fujiyama K, Hoshino T, Tanaka Y, *et al.* Serum lipid and apolipoprotein levels in non-hypertensive lean NIDDM patients. J Intern Med 1991;230:131-4.

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