Comparitive Study of Blood Glucose, Glycosylated Hemoglobin, Serum Cholesterol, Triglycerides and H.D.L. Levels in Lean, Nonobese and Obese Type 2 Diabetes Mellitus

Dhananjay V. Bhale

Professor and HOD, Department of Biochemistry, MGMS Medical College Aurangabad, Maharashtra, INDIA.

Corresponding Address:

dr.bhale@gmail.com

Research Article

Abstract: **Background:** Diabetes has emerged as a major public health problem in our country Insulin has important effects on key steps in metabolism of lipids and lipoproteins and altered lipid metabolism is common in diabetic population. As far as diabetes in India is concerned, the vast majority are found to be nonobese. More peculiarly prevalence is rising in lean persons. Very little data is available on Nonobese type 2 diabetes and especially on those who have low body weight BMI<18.5Kg/m2 i.e. Lean type 2 Diabetes mellitus. In this study we tried to study Pecularities and differences of Lipid profile and diabetic profile in lean, nonobese and obese type 2 Diabetes mellitus in Marathwada Region. **Materials and Methods:** Present study was carried out in MGM Medical College, Aurangabad. Total 90 known cases of type 2 diabetes mellitus were taken from 30 to 60 years age group with no h/o Hypertension, chronic kidney disease, stroke and acute myocardial infarction in past. They were divided into three groups as follows: Lean, Nonobese and obese. Fasting and Postprandial Blood glucose measured by glucose oxidase method on RA 1000 fully automated Biochemistry Analyser. Glycosylated Hemoglobin was estimated by Flukinger and Winterbalter's colorimetric method. Serum Cholesterol, Triglycerides, and H.D.L. by kit method on RA 1000. **Conclusion**: The increase in glycosylated haemoglobin in lean diabetics as compared to nonobese and obese is statistically significant (P<0.05). This shows that Lean t type 2 diabetics had a poor glycemic control as compared to nonobese and obese type 2 diabetics. Serum cholestrol values were low in lean as compared to non obese and obese diabetics. Triglycerides were lower (P < 0.05) in lean diabetics.

Key words: Glycosylated Hemoglobin, B.M.I.(Body mass index) : Weight in kg / height in m2.

Introduction

Diabetes has emerged as a major public health problem in our country. Its prevalence rate is increased from 2.1% in1972 to almost 12% in 1995. Various studies have shown that Indians are having increased propensity to develop diabetes. Impact of industrial and agricultural development in our country with resultant rural to urban migration, improved earning capacity and consequent lifestyle changes may have been the factors responsible for increase in prevalence of diabetes. As far as diabetes in India is concerned, the vast majority are found to be nonobese. More peculiarly prevalence is rising in lean and underweight persons. Very little data is available on Nonobese type 2 diabetes and especially on those who have low body weight BMI< 18.5 Kg/m2. 4

Materials and Methods

Present study was carried out in MGM Medical College, Aurangabad. Total 90 known cases of type 2 diabetes mellitus were taken and divided into three groups as follows: Lean(B.M.I.< 18.5) Nonobese (B.M.I.= 18.5-25) and obese (B.M.I.>25).

B.M.I.(Body mass index): Weight in kg/height in m2.

Following biochemical parameters were done.

1. Fasting and Postprandial Blood glucose measured by glucose oxidase peroxidase kit method on RA 1000 fully automated Biochemistry Analyser.
2. Glycosylated Hemoglobin was estimated by Flukinger and Winterbalter's colorimetric method[8]
3. Serum Cholesterol by Cholesterol oxidase peroxidase method, Triglycerides by enzymetic kit method, on RA 1000.

Result

Observations

Table 1: Table showing Summary of Observations and Results and comparison of Blood Glucose and Glycosylated Hemoglobin in Lean ,Nonobese and Obese type 2 Diabetes mellitus

GROUP			Fasting Blood Sugar	Postprandial blood sugar	Glycosylated Haemoglobin
I	LeanType2 diabetes	Mean ± S.D.	195.8±59.93	283.83 ± 8.97	11.98 ± 2.62
II	Nonobese type 2 diabetes	Mean ± S.D.	152.1 ± 23.87	239.9 ± 57.12	8.9 ± 1.53
III	Obese type 2 diabetes	Mean ± S.D.	182.3 ± 25.33	279.93 ± 34.06	9.93 ± 2.02
't Value'			**Fasting Blood sugar**	**Postprandial blood sugar**	**Glycosylated Haemoglobin**
Group I with Group II			7.44	2.82	5.36
Group III with Group II			4.46	3.18	2.15
Group Iwith Group III			2.25	0.30 *	3.27

(*P > 0.05 , Statistically not significant)

Table 2: Table showing Summary of Observations and Results and comparison of serum cholesterol and triglycerides in Lean, Nonobese and Obese type 2 Diabetes mellitus

Group		Cholesterol	Triglycerides
I Lean Type 2 diabetes	Mean ± S.D.	158.01 ± 54.99	166.96 ± 38.67
II Nonobese Type 2 diabetes	Mean± S.D.	187.6 ± 32.36	139.00 ± 35.74
III Obese type 2 diabetes	Mean± S.D.	223.7 ± 39.29	156.5 ± 21.78
't Value'			
Group I with II		2.45	2.01
Group IIIwith II		3.74	2.21
Group I with III		5.14	1.25*

(*P >0.05 , Statistically not significant)

Table 3: showing number of cases and their groups

Group	Study subjects	B.M.I. Kg/m2	Number of cases
I	Lean or low body weight type 2 diabetes	< 18.5	30
II	Nonobese or standard body weight type 2 diabetes	18.5-25	30
III	Obese or Overweight type 2 diabetes	> 25	30

Discussion

Diabetes mellitus is most prevalent metabolic and noncommunicable disorder in world. In India, a huge number of diabetics are there with BMI less than 18.5. They present with different clinical presentation, morbidity, mortality patterns and biochemical profile when compared to classical patients of NIDDM [11] It has been shown by Keneth H, Gabby et al in 1979 that glycosylation of Hb molecule at various reactive sites increases progressively with increasing hyperglycemia and that chemical measurement of total glycosylation of HbA1 and HbA provides a useful alternative to currently used chromatographic procedures for determination of Glycosylated Hb [8] The normal range of Glycosylated hemoglobin is 4 to7% of total haemoglobin[8] To know the glycemic control we have measured Glycated haemoglobin in all the three groups. The increase in glycosylated haemoglobin in lean diabetics as compared to nonobese and obese is statistically significant. Das S. et al (1999) carried out study on 380 patients, 91 were found to be having BMI less than 18.5 and were considered as low body weight diabetic patients. They found that these patients were having poor glycemic control as the fasting blood glucose was around 200mg% and Glycosylated haemoglobin was more than 10%[6,7,8]

Samar Banerjee and Uttam Paul(1999) studied 75 caes of Type 2 Diabetes mellitus. Out of them 25 were lean, 25 nonobese and 25 were obese. They observed poor glycemic control in lean diabetics as compared to nonobese and obese Type 2 Diabetic patients. Fasting plasma glucose was 238.95±42.26, 197±43.69 and 205.36±40.50 mg% in lean, nonobese and obese diabetics respectively .Postprandial plasma glucose was 294.88±52.28, 243.8±56.35 and 279.75±52.78 mg%. In lean, nonobese and obese type 2 diabetics respectively. Glycosylated Hb was found to be increased in lean diabetics ie 9.15±0.88 g % as compared to nonobese and obese type 2 diabetics in whom it was 7.65±1.11 and 8.05±1.8% respectively. 2 These results match with results of our study (Table no. 1) Nigam Anant observed that mean fasting and postprandial blood glucose was 209.0±10.6 and 290.0±10.8mg% respectively, in 149 patients with B.M.I.17.2±1.1kg/m2. This shows that there is moderately severe to severe hyperglycemia in lean

diabetics [9] These results match with results of our study. (Table no. 1) Sahay B. K. observed that mean fasting blood sugar levels were 276.0±101.6, 242.63±64.92 and 235.07±91.46 in lean, nonobese and obese type 2 diabetics respectively[10] These observations are similar to observations in our study[17] (Table no. 1) Das S. et al in 1995 in their pilot study on lean NIDDM studied pecularities and differences in metabolic and hormonal status. Total cholestrol and triglycerides were lower (P<0.05) in lean diabetics [3,4,5] The results in our study match with Das S. et al.(Table no. 2). Banerjee Samar et al in 1999 studied 75 cases of type 2 diabetis mellitus. Out of 75 cases studied 25 cases were lean, 25 were non obese and 25 obese type 2 diabetics. Total cholestrol was 201.09±41.02, 219.36±31.47 and 226.17±32.5 in lean non obese and obese diabetics respectively. Serum cholestrol values were low in lean as compared to non obese and obese diabetics repectively. These observations are similar to observations in our study. (Table no. 2). Baliarishna A.A.et al 1999 studied lipid profile and glycemic status in 91 low body weight type 2 diabetics they found moderate to severe hyperglycemia. Both cholestrol and triglycerides were low or normal with a higher HDL cholestrol values which could contribute to lower incidence of macrovascular disease in low body weight type 2 mellitus.[1]

Results of our study match with results studies of Balarishna AA et al.2 (Table no.2)

Conclusions and Summary

There was moderate to severe hyperglycemia in low body weight type 2 diabetics as compared to nonobese and obese type 2 diabetics. The increase in glycosylated haemoglobin in lean as compared to nonobese and obese type 2 diabetics is statistically significant (P<0.05).

This shows that low body weight type 2 diabetics had a poor glycemic control as compared to nonobese and obese type 2 diabetics. (Table no.1) Serum cholestrol values were low in lean as compared to non obese and obese diabetics respectively. Seum Triglycerides were lower (P<0.05) in lean diabetics as compared to obese and nonobese type 2 Diabetes mellitus (Table no. 2)

References

1. Baliarishna AK, Das S. Experience from cuttack. Low Body weight Type 2 D.M.1999:5-16
2. Banergee Samar, Uttam K. Paul. Experience from Colkata. Low Body weight Type 2 D.M.1999:17-24
3. Das S, Kamal KC, Tripathi BB. Metabolic and hormonal status in underweight (lean) NIDDM.Diabetes1991; 40(Suppl I):34A.
4. Das S,Kamal KC,Baliarishna AK. Tripathi BB Lean NIDDM-Pecularities and differences in metabolic and hormonal status-A pilot study.JAPI 1995;43(5):339-42
5. Das S.Introduction to Low body weight type 2 Diabetes mellitus,1999:1-4
6. Das S, Tripathi BB , Kamal KC.Factors influencing plasma lipids and lipoprotein cholesterol in Indian NIDDM Journal of diabetes Asso of India 1992;32(2):27-34
7. Diabetes epidemiology as a tool to trigger diabetes research and care. Diabetologia 1999;42:499-518.
8. Kenneth H ,Gabby H ,Fluckinger R et al .Glycosylated hemoglobin , increased glycosylastion of hemoglobin A in diabetic patients.Diabetes 1979;28:337-40.
9. Nigam Anant. Experience from Jaipur Low body weight type 2 Diabetes mellitus, 1999:25-31.
10. Sahay BK. Experience from Hyderabad. Low body weight type 2 Diabetes mellitus, 1999:25-31.
11. Tripathi BB, Kar BC. Observations and clinical patterns of diabetes mellitus in India .Diabetes 1965;14:404-12.