



CLINICAL AND BIOCHEMICAL PROFILE OF TYPE 2 DIABETES PATIENTS IN RURAL AREA

Diabetology

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ABSTRACT

Background: To define the profile of type 2 diabetes mellitus population from rural area of Pune, Maharashtra, at Khatal Hospital, Bhigwan. **Objective:** Type 2 diabetes is the most prevalent form of diabetes worldwide. To determine the complications in diabetic patients through their clinical and biochemical profile.

Material and Methods: We evaluated 102 cases of type 2 diabetes mellitus. (62 Males & 40 Females), in age group of 40 to 70 yrs attending opd of Khatal Hospital, Bhigwan, Pune, Maharashtra. Patients who were already diagnosed with type 2 Diabetes were included in the study. Patients were interviewed and assessed for duration of diabetes, type of therapy, complications due to diabetes. Results: The study included 102 patients; mean age was 56.16 ± 9.41 . The mean duration of diabetes was 5.60 ± 5.87 years. The majority of them were obese with mean BMI of 26.95 ± 3.64 and mean WHR of 0.93 ± 0.06 . The glycemic control was not good according to standard guidelines with mean HbA1c of 8.12 ± 1.63 , mean Blood Sugar Fasting 147.27 ± 55.05 and mean Post Prandial sugar of 233.97 ± 86.22 . Majority of them were on OHAS 92 (90.19%) & only few 10 (9.8%) were on insulin. The presence of microvascular complications was much higher than macrovascular complications. Hypertension was present in 60 subjects (58.8%), retinopathy was present in 20 (19.6%) subjects, followed by neuropathy in 18 (17.6%), 13 (12.7%) were having CAD, Nephropathy in 7 (6.9%) and least observed complication was CVE 2 (2%). **Discussion and Conclusions:** This study showed that majority of subjects had poor glycemic control. Central obesity was present in studied group. Most of the subjects were asymptomatic, proving Diabetes as silent killer. Microvascular complications were more prevalent as compare to macrovascular complications. The most prevalent form of dyslipidemia in diabetic subjects was low high density lipoproteins and high triglycerides in both males and females, as compare to high low density lipoproteins and high total cholesterol in western population.

KEYWORDS

Type 2 Diabetes, microvascular complications, dyslipidemia

INTRODUCTION:

Diabetes Mellitus is a worldwide problem and its prevalence has increased dramatically in last few decades. The world health organization has estimated that in 1995, 19.4 million individuals were affected by Diabetes in India and these numbers are expected to increase to 57.2 by the year 2025.¹ The development of diabetes immediately increases a patient's propensity for developing a broad spectrum of irreversible complications.² It has been found in various studies that over 50 % of diabetic subjects in India have poor glycemic control and a substantial proportion amongst these also have diabetes related complications. Complications of diabetes can be broadly divided into macrovascular and microvascular complications. The macrovascular complications include cerebrovascular disease, coronary artery disease, and peripheral vascular disease. The microvascular complications include diabetic retinopathy (DR), diabetic neuropathy and diabetic nephropathy. It is the leading cause of non traumatic lower limb amputations related to neuropathy and vasculopathy.³ Diabetic Retinopathy is most common cause of legal blindness between the ages of 20 to 70 years.

MATERIALS AND METHODS:

The present study is hospital based study carried out in Rural area at Khatal Hospital, Bhigwan Dist – Pune during the six months period of august 2015 to January 2016.

Inclusion Criteria:

Male and Female patients with type 2 Diabetes Mellitus attending opd of Khatal Hospital, in the age group of 40 to 70 years.

Exclusion Criterias:

1. Gestational Diabetes Mellitus
2. Type 1 Diabetes Mellitus
3. Seriously ill patients

Data Collection:

After obtaining permission from ethical committee of CMC Vellore the study was carried out.

Methods:

A detailed history of clinical information including the age, sex, inter current illness was taken. Anthropometric parameters – Height, Weight, BMI, WHR were recorded and clinical examination was performed to detect diabetic complications. A biochemical profile was

done for HbA1c, Blood sugar fasting (overnight 8 hours) and post Prandial (two hours), Serum creatinine and lipid profile fasting (overnight twelve hours). Blood Sugar levels were determined by the glucose oxidase method. Concentration of Total Cholesterol was done by CHOD –PAP method, Triglycerides by GPO method, High density Cholesterol (HDL) by PTA method. HbA1c was measured by HPLC method. Fundus examination was done by Direct Ophthalmoscope of HEINE Ophthalmoscope. Confirmation of findings was done by Slit Lamp examination. Serum creatinine was measured for all patients. A JNC 7 criterion was used to define hypertension⁴. The national cholesterol education programme guidelines were used to define dyslipidemia⁵. The Indian Council of Medical Research recommendations for Indians –Obese if BMI was ≥ 25 Kg /m² and overweight when BMI was 23-24.9 kg/m² were used⁶. Good glycemic control, HbA1c < 7%; sub-optimal 7-8 % ; and inadequate control , 8-9 % were used for defining the glycemic control.

Analysis of Data: The SPSS software version 17 was used for analysing the Data. The mean and SD was obtained for summarizing the quantitative variables, while the categorical variables were tabulated using frequencies and percentages. P value of less than 0.05 was considered significant.

RESULTS:

A sample of 102 type 2 Diabetes Mellitus patients was studied. The clinical and biochemical profile of diabetic subjects is shown in table 1. The mean age of study subjects was 56.18 ± 9.41 years (Females 54.72 ± 8.89 ; & Males 57.12 ± 9.68 ; $p=0.21$), which was not statistically significant. There were almost equal number of cases in all age groups. 33 (32.4%) in age group of 40 -50 yrs, 34 (33.3%) in age group of 51 – 60 yrs, 35 (34.3%) in age group of 61 to 70 yrs. 62(60.8%) were males and 40 (39.2%) were females. According to BMI only 13.72% (14) subjects had normal weight with 68.62% (70) being obese. The mean BMI of females (28.26 ± 4.06) was higher as compare to males (26.09 ± 3.07), which was statistically significant ($p < 0.001$). The ratio of abnormal WHR was high amongst males 60 (96.77%) as compare to females 37 (92.5%), which was statistically significant with $p < 0.001$. The waist circumference was significantly more in males as compare to females with $p < 0.001$. The mean of duration of Diabetes was 5.60 ± 5.87 yrs. Maximum number of subjects had duration of Diabetes less than 5 yrs. The family history of diabetes was present in 40 (39.2%) and family history of Diabetes was absent in 62 (60.8%).

Table 1. The Clinical and Biochemical profile of Diabetic Subjects

Variables	Mean ± SD (n=102)
Age (yrs)	56.18 ± 9.41
BMI (Kg / m ²)	26.95 ± 3.64
WC (cm)	92.64 ± 8.40
WHR	0.93 ± 0.06
Total Cholesterol (mg/dl)	187.38 ± 39.15
LDL (mg/dl)	105.82 ± 32.44
Triglycerides (mg/dl)	164 ± 69.51
HDL (mg/dl)	43.99 ± 10.02
Fasting Blood Glucose (mg/dl)	147.27 ± 55.05
Post Prandial Blood Glucose (mg/dl)	233.97 ± 86.22
Hba1c	8.12 ± 1.63
Normal BMI(18.5 -22.9 Kg /m ²)	14 (13.72%)
Overweight (23- 24.9 Kg /m ²)	18 (17.64%)
Obese (> 25 Kg /m ²)	70 (68.62 %)
WHR ≥ 0.85 (Females)	37 (92.5 %)
WHR ≥ 0.90(Males)	60 (100%)
Duration of Diabetes in yrs	5.60 ± 5.87

Values are mean ± SD numbers (percentage)

Out of 102 subjects studied, 10 (9.8%) gave history of alcohol intake, 3(2.9%) were smoker. Out of 102 subjects, 60 (58.8%) were hypertensive, 13(12.7%) were known cases of CAD, 2(2%) had past history of CVE, 18(17.6%) had neuropathy and 7 (6.9%) had nephropathy.20 (19.60%) had Diabetic Retinopathy and 82 (80.4%) subjects had no retinopathy.

Table 2. Clinical and Biochemical profile of Type 2 Diabetic subjects in Males and Females

Variable	Females (n=40)	Males (n= 62)
Age	54.72 ± 8.89	57.12 ± 9.68
BMI	28.26 ± 4.06 ***	26.09 ± 3.07
WC	89.27 ± 7.33	94.82 ± 8.38 ***
WHR	0.90 ± 0.05	0.95 ± 0.05 ****
Sr.Creatinine	0.90 ± 0.15	0.98 ± 0.26
TC(mg/dl)	190.35 ± 47.39	185.46 ± 33.05
HDL (mg/dl)	45.22 ± 11.78	43.19 ± 8.71
LDL (mg/dl)	105.92 ± 38.97	105.75 ± 27.78
TGs (mg/dl)	175.27 ± 81.60	156.72 ± 60.04
Hba1c	8.28 ± 1.60	8.02 ± 1.66
BSL (fasting)mg/dl	152.27 ± 62.06	143.98 ± 50.27
BSL (PP)mg/dl	242.07 ± 91.36	228.74 ± 83.02
Normal (18.5-22.9 Kg/m ²)	3 (7.5 %)	11(17.74%)
Overweight (23- 24.99Kg/m ²)	6 (15 %)	12(19.35 %)

Numbers Percentage p* < 0.05, P** < 0.01, P *** < 0.001, P**** < 0.0001, BMI-Body Mass Index, WC-Waist Circumference, WHR-Waist Hip Ratio, TC-Total Cholesterol, HDL-High Density Cholesterol, LDL-Low Density Cholesterol, TGs -Triglycerides, Hba1c-Glycosylated haemoglobin, BSL -Blood Sugar Level, PP -Post Prandial

The clinical parameters of male and female subjects is shown in Table 2. The mean age of females (54.72 ± 8.89) was less as compare to males (57.12 ± 9.68), which was statistically not significant as p > 0.05. BMI was significantly more in females than males as p < 0.001. Waist circumference and WHR was significantly more in males than females as p < 0.001. There was no statistically significant difference between males and females with respect to mean cholesterol (Males 185.46 ± 33.05; Females 190.35 ± 47.39, High density Cholesterol (Males 43.19 ± 8.71 ; Females 45.22 ± 11.78), Triglycerides (Males 156.72 ± 60.04 ; Females 175.27 ± 81.60), Hba1c (Males 8.02 ± 1.66 ; Females 8.28 ± 1.60) as p value was > 0.05. Almost equal number of subjects had good glycemic control i.e. Hba1c < 7, 22 (21.56 %) and poor glycemic control that is Hba1c > 9, 23 (22.54 %).

Table 3. Comparison of risk factors according to sex in study group

Risk factor	Male (n=62)	Female (n=40)	Z Value	P Value
Family history	43(37.10)	17(42.5)	0.54	0.59
Alcohol	10(16.13)	0	3.45	0.0006

Smoking	3(4.84)	0	1.77	0.08
Hypertension	34(54.84)	26 (65)	1.03	0.30
CAD	6 (9.68)	7(17.5)	1.10	0.27
CVE	2(3.23)	0	1.44	0.15
Neuropathy	12(19.35)	6(15)	0.58	0.56
Nephropathy	4(6.45)	3(7.5)	0.20	0.84

Alcohol consumption was significantly more in males than females as p < 0.0005. Family history, Hypertension, CAD, Nephropathy was more in females than males and smoking , CVE, Neuropathy was more in males than females but not statistically significant as p > 0.05.

Table 4. The symptoms present in subjects

Symptoms	Number of subjects
Asymptomatic	58 (56.86 %)
Generalised weakness	7 (6.86 %)
Weight gain	2 (1.96 %)
Swelling feet	2 (1.96 %)
Chest pain	6 (5.88 %)
Dyspnoea	4 (3.92 %)
Tingling and numbness	12 (11.76 %)
Blurred or loss of vision	3 (2.94 %)
Others	3 (2.94 %)
Complications	
Retinopathy	20 (19.6 %)
Nephropathy	7 (6.9 %)
Neuropathy	18 (17.6 %)
CAD	13 (12.7 %)
CVE	2 (2 %)
PVD	0
Hypertension	60 (58.8 %)

DISCUSSION:

The present study comprised of 102 Type 2 Diabetic subjects in the age group of 40 to 70 years. The mean age of our subjects was (56.18 ± 9.41) older than that of Agarwal RP et al⁶, who reported a mean age of (50.7 ± 12.6 years and Barma et al⁷ reported a mean age of 53 years. However the study Mukhyaprana⁸ et al reported a higher mean age of 60 years. The main findings of the study were only 21.8% of study population had good glycemic control ; which is less as compare to Swedish survey which found 34 % of type 2 diabetic subjects had good glycemic control.⁹ AI Maskari et al found, 38% of type 2 diabetic subjects had good glycemic control¹⁰. AI-Kaabi J et al reported that 31% of subjects had good glycemic control.¹¹

The possible explanation is that our study included diabetic subjects of varied duration of diabetes from 1 year to 20 years. Females has a poorer control as compare to male counterparts, which is in contrast to studies reporting better control in females.¹²

This study reported high prevalence of microvascular complications dominated by retinopathy (19.6 %), neuropathy (17.6%) and nephropathy (6.9%) and low prevalence of macrovascular complications, also reported previously^(13,14). In present study majority of type 2 diabetic subjects were obese (68%), this is consistent with various other studies^(15,16,17)

The parallel progression of DR and DN is evident from the existing evidence, which suggest that one could be a predictor of other.¹⁸

Alcohol consumption and smoking was found in 9.8 % and 2.9 % respectively. The lipid profile was significantly deranged in studied population. Dyslipidemia was present in 64% of subjects. The proportion of Overall most prevalent dyslipidemia was high triglycerides, followed by high LDL cholesterol. The least prevalent dyslipidemia was high total cholesterol.

Conclusions: The present study comprised of 102 type 2 diabetic subjects. Only 21 % of subjects had good glycemic control as compare to other studies reporting the proportion varying from 31 -38 %. Females had a poorer glycemic control as compare to their male counterparts. The absence of classical symptoms of diabetes and being asymptomatic maximum number of subjects again proves its silent killer nature. A study reported a high prevalence of microvascular complications, dominated by retinopathy (19.6%), neuropathy (17.6%) and nephropathy (6.9%) as compare to macrovascular

complications i.e. CAD (12.7%), CVE (2%). Typical diabetic dyslipidemia pattern was found in study of elevated triglycerides and low HDL. A study reported rising trend of diabetes complications among rural diabetic patients. Diabetes being not only a disease of urbanisation but rural area to be focussed in near future for screening of diabetes and prevention of complications.

Strength and Limitations of Study:

Unavailability of published data from local rural area is strength of study. As it was hospital opd based study most of the subjects have less diabetes duration in yrs, so may not reflect exact prevalence of micro and macrovascular complications in diabetic population of particular area.

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