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A Study to Determine the Profile of Type 2 Diabetes Mellitus in Patients Attending Bokaro General Hospital (Bokaro)

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Abstract

Aims and objective: *Prime objective was to determine anthropometric, clinical, biochemical profile of type 2 diabetes mellitus in patients attending Bokaro General Hospital.*

Method: *A hospital based cross sectional study was conducted during March 2010 to June 2012. The study population comprised diabetic subjects attending endocrinology unit of Bokaro General Hospital. Total 126 patients were taken comprising of old and new cases.After taking and recording detailed history including present complains ,past history including duration of diabetes ,history and duration of hypertension, cardiovascular disease, dyslipidemia; personal history and complete anthropometric and physical examination was carried out.*

Result : *Out of 126 patients about 4 % were <40 years of age, maximum number of patient belonged to age group 41-60, 64% and only 32.6% patient were in elderly group. Mean age was found to be 56.67±8.38. Majority of females fell in the age group of 41 – 60 years (76.59%). Whereas age distribution was almost equal in men and women in 41-60.In both male and female age group only 2.53% ,6.38% were noted to be <40 years of age respectively. p value = < .001 ,Which is statistically significant. The difference between male and female was found to be highly significant (p<0.001) Around 28.58 % patient were non obese .In our study majority of patient were found to be obese (50%) and 21.42 %were observed to be overweight. Most of our patient were found to be obese (with BMI 25.22±3.73) according to the WHO guidelines and the consensus statement for diagnosis of Obesity, Abdominal obesity and the metabolic syndrome for Asian Indians. (Normal BMI: 18-22.9 kg/m2; Overweight: 22-24.9 kg/m2;Obesity: >25 kg/m2).Most of the patients were obese. Overweight patient constituted 26.65%male and 12.76% female. Almost equal number of diabetic males (27.58%)as well as females(29.78%) were having normal BMI. p value<0.04. The difference between male and female was found to be significant (p<0.04). Male patient having central obesity (55%) exceeded males with normal (45%) abdominal circumference. In females majority of them were having central obesity and only 6% females were having normal abdominal girth. Mean waist circumference among females was 92.03±9.85. In comparison more than 90% of female were found to be having central obesity, whereas about half (55%) of males revealed abdominal obesity .Good number of males (45%) were normal around the waist .only 6.38% female were having normal abdominal girth. p value <.001. The difference between male and female was found to be highly significant (p<0.001).*

More than half (55%) of our population were having cholesterol within normal limit.

Around 60 % of diabetic patient revealed normal triglyceride level. Only 41 % diabetic showed raised triglyceride level. Out of 126 patients very few diabetics(15%) were having normal HDl. Majority were having low HDL. LDL was well within control in 86% of patients with 82 out of 126 patients LDL less than/equal to 100 mg/dl. About 69 % of total diabetic were suffering from hypertension. Significant percentage of females were found to be having dyslipidemia (91%), whereas about 79% of males were having abnormal lipid profile. The difference between male and female was found to be significant (p<0.03). In our study it was observed that approximately 70% of patients were having Metabolic syndrome and on comparing between male to female percent it was seen that female patient were predominantly suffering from metabolic syndrome. The difference between male and female was found to be highly significant (p<0.001) Out of 126 patients 15 patients were having hypothyroidismIn present study good glycemic control was achieved in 34.17% of males but only 21.27 % of females revealed good control .Equal number of male and females had glycated haemoglobin between 7-9% More than 51% of females and about 39 % of males showed HbA1C above 9%.p value 0.1. The difference between male and female was found to be not significant (p<0.1).

Out of 126 patients 45.56% males and 44.68% females were having diabetic neuropathy Approximately one third (27%) of males and twenty percent females had retinopathy. The difference between male and female was found to be not significant (p value 0.17).One fourth of males 26% and about one fifth of females had nephropathy. Kidney involvement was seen in only 23% of patients .The difference between male and female was found to be not significant (p value 0.3).In present study out of 126 patients 17 % patient were suffering from coronary heart disease.

Conclusion

In our hospital study although conducted in small number of patients revealed:

1. *Most of the patients belonged to age group 40-60.*
2. *Majority of diabetics were obese, having BMI more than 25 kg/m2*
3. *Very few new patients were studied in our study presenting with polydipsia, polyuria as common presentation.*
4. *Majority of our patients were having dyslipidemia, and it was seen that dyslipidemia was significantly preponderant in females.*
5. *There was dominance of female having metabolic syndrome almost reaching 91% which is much above the findings depicted by other Indian studies, Probably because of limited number of females in our study.*
6. *Our study revealed the level of glycemic control was near the target given by ADA in almost one third of patients, which can be attributed to comprehensive care imparted by endocrinology unit.*
7. *Neuropathy, Retinopathy and Nephropatahy, were present in one fourth of the patient and it was seen to be significantly associated with duration of diabetes.*

Further study with large number of patient is required to substantiate our study.

Significant Findings of the study

1. *Most of the patients belonged to age group 40-60.*
2. *Majority of diabetics were obese, having BMI more than 25 kg/m2 .*
3. *Very few new patients were studied in our study presenting with polydipsia, polyuria as common presentation.*
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Keywords: *Profile of Type 2 DM , Metabolic syndrome, hypertension*

Introduction

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels. India leads the world with largest number of diabetics. Also being termed as the Diabetic capital of World [(1)]. WHO predicts India will have highest number of diabetes patients by 2025. It is the sixth leading cause of death and results in significant morbidity [(2)]. According to recent estimates approximately 285 million people worldwide(6.6%) in the 20 -79 years age group will have diabetes in 2010 and by 2030,438 million (7.8%) of the adult population is expected to have diabetes the largest increase will take place in region dominated by developing countries.

The global increase in the prevalence of diabetes is due to population growth, aging, urbanization and increase of obesity and physical inactivity. The so called "Asian Indian Phenotype" refers to certain unique clinical and biochemical abnormalities in Indians which include increased insulin resistance, greater abdominal adiposity i.e., higher waist circumference despite lower body mass index, lower adiponectin and higher high sensitive C-reactive protein levels. This phenotype makes Asian Indians more prone to diabetes and premature coronary artery disease. At least a part of this is due to genetic factors. However, the primary driver of the epidemic of diabetes is the rapid epidemiological transition associated with changes in dietary patterns and decreased physical activity as evident from the higher prevalence of diabetes in the urban population. Even though the prevalence of microvascular complications of diabetes like retinopathy and nephropathy are comparatively lower in Indians, the prevalence of premature coronary artery disease is much higher in Indians compared to other ethnic groups. The most disturbing trend is the shift in age of onset of diabetes to a younger age in the recent years. This could have long lasting adverse effects on nation's health and economy.

Early identification of at-risk individuals using simple screening tools like the Indian Diabetes Risk Score (IDRS) and appropriate lifestyle intervention would greatly help in preventing or postponing the onset of diabetes and thus reducing the burden on the community and the nation as a whole. Recent studies from India showed increasing prevalence of type 2 diabetes in all the regions like 19.5% in Kerala (ADEPS), 15.5% in Chennai (CURES), 13.5% Chennai, 12.4% Bangalore, 16.6% hyderabad, 11.7% Kolkata and 9.3% Mumbai (NUDS). In the urban population, an Indian Council of Medical Research (ICMR) study in 1972 reported a prevalence of 2.3% (Ahuja et al 1979) which rose to 12.1% in the year 2000 (Ramachandran et al. 2001). More recently, Mohan et al. (2008) provided estimates from a nationwide surveillance study of T2DM and found that in urban areas there was a prevalence 7.3% of known T2DM and a prevalence of 3.2% in periurban/slum areas (urban fringes). An early study in 1991 of rural areas in Delhi indicated that the prevalence rate for T2DM ranged from 0.4-1.5% (Ahuja et al. 1991).

Prevalence rates vary according to measuring criteria used e.g. using the American diabetes association criteria, it has recently been estimated to be 1.9% in the rural areas; but with using the WHO criteria the estimate increased to2.7% (Sadikot et al. 2004).Other studies indicate higher rates. Data from a large-scale survey on 4,535 individuals aged 30 years from 20 villages of Godavari, a developing rural area of Andhra Pradesh, suggests that rural India may soon experience the urban epidemic of T2DM (Chow et al. 2006) the prevalence for known T2DM was of 6.4%, for undiagnosed T2DM 6.8%, and that 15.5% had Impaired fasting glucose. While these data are by no means representative of rural India as a whole,they imply increases of T2DM. Figures based on National Family Health Survey (NFHS) in 2005-06 .suggest the prevalence of T2DM in

rural India are highest in Kerala, Tripura, West Bengal, Goa and Sikkim, (1500 to >2000 individuals per 100,000 individuals) and least in central India (<500individuals per 100,000 individuals). There has been a dramatic improvement of the Indian economy in terms of percapita income. These dramatic changes have had a great impact on urbanization and lifestyle of the Indians. Diabetes mellitus has become the main public-health problem and amenable to change through early recognition at the individual level and surveillance at the population level. Results of studies showed that India is facing three-fold rise in the prevalence of diabetes in urban (5-15%) and inrural (2-6%) areas [3,4]. India tops in the world with the largest number of diabetic subjects (31.7 million cases of T2DM)[5]. This is further compounded by the epidemic of obesity and doubling the cost of diabetes management. Therefore, prevention is important from monetary and from lifestyle modification point of view. Increasing awareness of risk factors and how to prevent these should be emphasized in the population [6]. Apart from this, the lifestyle modifications (physical exercise, diet control, etc.)are appropriate measures in the prevention of diabetes. Furthermore, to control and prevent the T2DM epidemic, it must be approached in an appropriate, socioeconomically and culturally-relevant manner but very little data are available from Jharkhand to support this, and for the prevention of diabetes, it is also vital to know the profile of diabetics. This paper reports the profile of type 2 diabetic in Bokaro. Scarcity of research in Jharkhand, only one pilot study by Ramchandra et al. Present study has been taken up, to determine the profile of type 2 diabetes mellitus patient attending BGH, BOKARO. Both indoor as well as outdoor patient of type 2 diabetes were included.

Methods

A hospital based cross sectional study was conducted during March 2010 to June 2012 in Bokaro General Hospital, Bokaro district in state of Jharkhand. Bokaro is an Industrial Town .It is famous for its steel plant SAIL.

Exclusion criteria

1. Diabetic with Cancer patients
2. Diabetic with cld
3. Type 1 dm
4. Gdm

The study population comprised diabetic subjects attending endocrinology unit of Bokaro General Hospital. Total 126 patients were taken comprising of old and new cases. Informed consent (written consent from literate subjects and verbally informed consent from illiterate subjects), 126 subjects were enrolled through simple randomsampling method. After explaining the details of the study, a comprehensive case history was recorded on a semi-structured, close-ended proforma. Basic data on age, sex, education, occupation. All the subjects were also interviewed regarding history of hypertension and other co-morbid conditions. A general physical examination was performed. After taking and recording detailed history including present complains ,past history including ,duration of diabetes ,history and duration of hypertension, cardiovascular disease, dyslipidemia; personal history and complete anthropometric and physical examination was carried out-

1. Age
2. Sex
3. Height(Measure without shoes using a tape stadiometer)
4. Weight (measured with light clothing and without shoes on a portable weighing scale)
5. BMI (Calculated by dividing weight(in kg)by height squared (metre)]
6. Waist circumference (Waist circumference was measured just above the iliac crest using flexible measuring Tape)

Physical examination

Blood pressure was recorded after the subjects had rested for at least five minutes. Two readings were

taken five minutes apart, and mean of the two was considered the actual blood pressure. Hypertension was diagnosed based on drug treatment for hypertension or if the blood pressure was >130/80mmHg according to the Joint National Committee- 7 (JNC-VII) criteria (16-17).

The diagnosis of new diabetes mellitus was made using the criteria established by the American Diabetes Association i.e. a medical record fulfilling following criteria

Criteria for the diagnosis of diabetes (ADA 2011)

A1C _6.5%. The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.*

Or

FPG _126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 h.*

Or

2-h plasma glucose _200 mg/dl (11.1mmol/l) during an OGTT. The test should be

performed as described by the World Health Organization, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*

Or

In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose _200 mg/dl (11.1mmol/l)

*In the absence of unequivocal hyperglycemia, result should be confirmed by repeat testing.

The guidelines of the National Cholesterol Education Programme were used for defining dyslipidaemia (19). It was defined by presence of one or more than one abnormal serum lipid concentration, such as hypercholesterolaemia, high LDL-C, hypertriglyceridaemia, and low HDL-C. Body massindex (BMI) values were defined according to the recommendations of the Indian Council of Medical Research for Indians. A study subject was considered to be obese if BMI was ≥25 kg/m2 and overweight when BMI was 23-24.9 kg/m2 (20). The criterion for glycaemic status was <7% (good control), 7-9% (sub-optimal control) >9% (uncontrolled) (21).

These patients were then subjected to comprehensive laboratory investigation. Blood samples were drawn between 7:00 AM and 9:AM after 8-12 hours of overnight fasting.

OLYMPUS AU 640 autoanalyser was used to perform following test: -

1. Fasting blood glucose- Sample was collected in fluoride vial. Glucose was estimated using hexokinase method enzymatic UV test. Glucose is phosphorylated by hexokinase in the presence of atp and magnesium ion .To produce Glucose 6 Phosphate and ADP.G6PD specifically oxidizes G6 Phosphate to Gluconate 6 phosphate with concurrent reduction of NAD+ TO NADH by increase in absorbance at 340 nm is proportional to the glucose concentration in the sample.
2. Glycosylated Haemoglobin (HbA1c) :- The concentration of both HbA1c And total haemoglobin are determined the HbA1c /Total haemoglobin is expressed as % HbA1c.HbA1c is determined by immune inhibition test.
3. Lipid profile- Total cholesterol, Triglycerides, HDL, LDL Triglyceride - Enzymatic color test was the principal for serum Triglyceride estimation

Total Cholesterol – Enzymatic color test using cholesterol esterase and cholesterol oxidase was done for quantitative determination of cholesterol in serum.

HDL - Anti Human Beta lipoprotein antibody in reagent 1 binds to lipoproteins other than HDL. The antigen antibody complexes formed blocks enzyme reaction when reagent 2 is added. DL cholesterol is identified by the presence of an enzyme chromosome system.

LDL- A protecting agent in reagent 1 protects LDL from enzymatic reactions all non lal lipoproteins are broken down by reaction with cholesterol esterase and cholesterol oxidase.

H2O2 produced by this reaction is decomposed by catalase. When Reagent 2 is added the protecting

agent is released from LDL and catalase inactivated by sodium azide.LDL can now be quantified by cho/pap system.

4. Urea – Urea is hydrolysed in the presence of water and urease to produce ammonia and carbon dioxide the ammonia produced in the first reaction combines with 2 oxoglutarate and NADH in the presence of Glutamate dehydrogenase to yield glutamate and NAD+.Decrease in NAD absorbance per unit time is proportional to urea concentration.

Creatinine – Creatinine forms a yellow orange colored compound with picric acid in an alkaline medium. Rate of change in absorbance at 520/800 nm is proportional to creatinine concentration in the sample.

5. Microalbumin_- This is based on the principal of immune turbidimetry. Urine microalbumin when a sample is mixed with tris buffer and goat anti human albumin antibody human albumin reacts specifically with anti human antibody to yield in soluble aggregates. The absorbance of these aggregates is proportional to the albumin concentration in the sample.
6. Urine r/m
7. Urine c/s
8. ACR
9. TSH

Analysis of Data

Data were processed in Excel-sheet and analyzed using the SPSS software (version 11.5). Quantitative variables were summarized using mean and standard deviation while categorical variables were tabulated using frequencies and percentages. Student's t-test was used for testing the significance of differences between the mean values of two continuous variables. The probability (p) level of less than 0.05 was considered significant. Logistic regression was used to examine predictors of neuropathy, nephropathy, and retinopathy using variables Type 2 diabetes mellitus duration, Hypertension Duration, Systolic blood pressure, Diastolic Blood Pressure As independent variables

Result

Out of 126 patients about 4 % were <40 years of age, maximum number of patient belonged to age group 41-60, 64% and only 32.6% patient were in elderly group. Mean age was found to be 56.67±8.38. Majority of females fell in the age group of 41 – 60 years (76.59%). Whereas age distribution was almost equal in men and women in 41-60.In both male and female age group only 2.53% ,6.38% were noted to be <40 years of age respectively. p value = < .001 ,Which is statistically significant. The difference between male and female was found to be highly significant (p<0.001) Around 28.58 % patient were non obese .In our study majority of patient were found to be obese (50%) and 21.42 %were observed to be overweight. Most of our patient were found to be obese (with BMI 25.22±3.73) according to the WHO guidelines and the consensus statement for diagnosis of Obesity, Abdominal obesity and the metabolic syndrome for Asian Indians. (Normal BMI: 18-22.9 kg/m2; Overweight: 22-24.9 kg/m2 ;Obesity : > 25 kg/m2). Most of the patients were obese. Overweight patient constituted 26.65%male and 12.76% female. Almost equal number of diabetic males (27.58%)as well as females (29.78%) were having normal BMI. p value<0.04. The difference between male and female was found to be significant (p<0.04). Male patient having central obesity (55%) exceeded males with normal (45%) abdominal circumference. In females majority of them were having central obesity and only 6% females were having normal abdominal girth. Mean waist circumference among females was 92.03±9.85. In comparison more than 90% of female were found to be having central obesity, whereas about half (55%) of males revealed abdominal obesity .Good number of males (45%) were normal around the waist .only 6.38% female were having normal abdominal girth. p value

<.001. The difference between male and female was found to be highly significant (p<0.001). More than half (55%) of our population were having cholesterol within normal limit. Around 60 % of diabetic patient revealed normal triglyceride level. Only 41 % diabetic showed raised triglyceride level. Out of 126 patients very few diabetics (15%) were having normal HDl. Majority were having low HDL. LDL was well within control in 86% of patients with 82 out of 126 patients LDL less than/equal to 100 mg/dl. About 69 % of total diabetic were suffering from hypertension. Significant percentage of females were found to be having dyslipidemia (91%), whereas about 79% of males were having abnormal lipid profile. The difference between male and female was found to be significant (p<0.03). In our study it was observed that approximately 70% of patients were having Metabolic syndrome and on comparing between male to female percent it was seen that female patient were predominantly suffering from metabolic syndrome. The difference between male and female was found to be highly significant (p<0.001)

Out of 126 patients 15 patients were having hypothyroidismIn present study good glycemic control was achieved in 34.17% of males but only 21.27 % of females revealed good control .Equal number of male and females had glycated haemoglobin between 7-9% More than 51% of females and about 39 % of males showed HbA1C above 9%.p value 0.1. The difference between male and female was found to be not significant (p<0.1).

Out of 126 patients 45.56% males and 44.68% females were having diabetic neuropathy

Approximately one third (27%) of males and twenty percent females had retinopathy. The difference between male and female was found to be not significant (p value 0.17).One fourth of males 26% and about one fifth of females had nephropathy. Kidney involvement was seen in only 23% of patients .The difference between male and female was found to be not significant (p value 0.3).In present study out of 126 patients 17 % patient were suffering from coronary heart disease.

In our hospital study although conducted in small number of patients revealed:

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Body mass index

RANGE(Kg/m2)	NO OF PATIENTS	PERCENTAGE
• 18.5-22.9	36	28.58%
• 23-24.9	27	21.42%
• >25	63	50%

Male Female BMI distribution

BMI	Male No	%	Female No	%
<=23	22	27.8	14	29.78
23.1-24.9	21	26.65	6	12.76
>25	36	45.55	27	57.44

Waist Circumference Male

Waist circumference	NUMBER	MEAN±S.D	PERCENTAGE
• <=90	36	90.5±8.20	45%
• >90	43		55%

Lipid profile

Total cholesterol

Total cholesterol	No	%
<=170	70	55
>170	57	45

Triglyceride Level

Triglyceride	No	%
<=150	74	59
>150	52	41

HDL

Total	Low	%	Normal	%
126	107	85%	20	15%

LDL Level

Ldl level	No	%
<=100	82	66
101-130	26	20
>130	18	14

Metabolic syndrome

	Present	%	Absent	%
Male	45	56.96	34	43.04
Female	43	91.48	4	8.52
Total	88	69.84	38	30.16

Hypothyroidism in Type 2 diabetes

Total	Present	%	Absent	%
126	15	12%	111	88%

Logistic Regression Nephropathy

	B	Wald	Sig	
DM Dur	-0.73	4.144	.042	S
HTnDur	-0.62	2.618	.106	Ns
SBP	0.001	.007	1.001	Ns
DBP	-0.014	.102	.986	Ns
Constant	3.090	962	21.975	Ns

The logistic regression analysis reveals significant association between duration of diabetes and nephropathy. (p value 0.042)

Logistic Regression Table Retinopathy

	B	Wald	Sig	
DM Dur	-.105	7.864	.005	S
HTnDur	.022	.332	.565	Ns
SBP	-.007	.192	.661	Ns
DBP	.005	.016	.901	Ns
Constant	1.454	.289	.591	Ns

There is strong association between duration of diabetes and retinopathy. (p value 0.005)

Logistic Regression Table Neuropathy

	B	Wald	Sig	
DM Dur	0.149	12.197	0.000	S
HTnDur	-0.002	0.003	0.957	Ns
SBP	-0.013	0.545	0.460	Ns
DBP	-0.012	0.87	0.770	Ns
Constant	1.411	0.215	0.649	Ns

Highly significant association is seen between duration of diabetes and neuropathy. (p value 0.005)

Distribution of clinical and other associated factors of Type 2 Diabetes Patient from BGH, Bokaro

CHARACTRISTICS	NUMBER(T=126)	Percent %
Age(years)(means±s.d)	56.67± 8.38	
Weight kg(mean)	65.89	
AGE GROUP		
<=40	5	4%
41-60	80	63%
>60	41	33%
SEX		
Male	79	63%
Female	47	37%
Glycosylated haemoglobin		
(HbA1c) (mean±SD)	9.55 ± 3.42	
Glycaemic status (%)		
<7 (good control)	37	29%
7-9 (sub-optimal control)	34	27%
>9 (uncontrolled)	55	44%
BMI group		
Normal (18.5-22.9 kg/m²)	36	29%
Overweight (23.0-24.9kg/m²)	27	21%
Obese (≥25.0 kg/m²)	63	50%
Metabolic syndrome	88	70%
Male	45	57%
Female	43	91%
Dyslipidaemia	107	85%
Male	63	79%
Female	43	91%
Hypothyroidism	15	12%
Hypertension	87	69%
CHD	22	17%
Nephropathy	29	23%
Neuropathy	57	45%
Retinopathy	30	24%

Discussion

Type 2 diabetes mellitus is a major public health problem and has become disease of paramount importance , it is the sixth leading cause of death and results in significant morbidity .India is no exception to this and very soon going to become Diabetic capital surpassing china (Mohan v et al). This study presented cross sectional data from subjects with type 2 diabetes attending Department of endocrinology, Bokaro General Hospital, Jharkhand. So far as we know very few studies have been done in the state of Jharkhand. Abundant literature is available from various part of India such as New Delhi, Chennai, Hyderabad, Gujarat etc. Recent studies from India showed increasing prevalence of type 2 diabetes in all the regions like 19.5% in Kerala (ADEPS), 15.5% in Chennai (CURES), 13.5% Chennai, 12.4%in Bangalore, 16.6% in Hyderabad, 11.7% in Kolkata and 9.3% in Mumbai (NUDS). Our prime aim was to find out the anthropometric, clinical and biochemical profile of diabetes and associated complications in patients who hail from industrial township of Bokaro steel city.

Type 2 Diabetes mellitus occurs most commonly in adults aged 40 years or older, and the prevalence of the disease increases with advancing age , Indeed the aging of the population is one reason that type 2 diabetes mellitus is becoming increasingly common, Virtually all cases of diabetes mellitus in older individual are type 2.In the present studytype2 diabetic subjects were evenly distributed in three age groups with a mean age of 56}8 years . The study sample comprised of (n=126), 62.69%(79) males and 37.31% (47) females. In our study most of our patient belonged

to age group 41-60 years (63.44%) which is consistent with the study conducted by JC et al . Overweight, excess energy intake and physical inactivity has been associated with the rapidly rising number of diabetes in India. Majority of our patients were found to be obese (50%) having BMI>25 kg/m 2 , only 21 % were observed to be having normal BMI . Overweight patients comprised approx. 27% of our study. The findings showed the mean BMI of 25.22 □}3 .73 . So in total more than 75% of our total patients were above normal BMI. According to Misra A et al almost 30-65% of adult urban Indians are either overweight or obese or have abdominal obesity, which is similar to our series. Mayur Patel et al (Gujrat) found that there diabetic patients had a mean BMI of 27.06}4.57, which is in conformity with our finding (25.22}3.73). Similarly in various studies by Singhet al, Shai et al, Misra A et al (2008) showed that overweight/obesity and central obesity were significantly associated with diabetes. Waist circumference is a powerful indicator of metabolic diseases .We observed that >93% of our female subjects were having abdominal girth of >80 cm; in males also >55% were having central obesity ,Which is consistent with the finding of Chopra et al ,Delhi Where they concluded that >90 cm in males and above > 80 cm in females is a powerful clinical predictor of the metabolic syndrome. In a study conducted by Reddy et al 30.9% of men and 32.8 % of women in industrial population in India were reported to have abdominal obesity, Gupta et al ,in his study noted 44% of females and 21.8% of males having central obesity but he used old criteria (wc =>102 cm, Male,>=88 cm in Females), Prabhakaran et al revealed in his study of industrial population in North India that 10.1% of males were having central obesity and 25.9% of females showed increased abdominal girth applying criteria for south east Asian. Our findings are at variance with that of Prabhakaran et al who has given his finding on industrial population as we have .The dissimilarity is probably because of small number of patients in our series. One point of note is that females exceed male while considering central obesity in all the studies. Moreover these are population study conducted in general population. Although our study comprised of very few new type 2 diabetes subjects(7%) it revealed that most common presentation were polyuria, polydipsia, nocturia, some patients presented with weight loss as well. Similar observations were seen in Mayur et al (Gujrat) and other sources . As stated by Gupta R et al : Metabolic syndrome was present in 345 (31.6%) age-adjusted prevalence was 24.9% , 18.4% in men and 30.9% in women. Misra et al in their population study done in North India showed 13.3% in male and 15.6% female to be having metabolic syndrome where as Deepa et al found (urban) 23.2% of patient suffering from metabolic syndrome. Ramchandran et al (2003), revealed36.4% male and 46.5% female to be having mets, which clearly shows female with mets exceeding males . Chow et al found32.5% and 23.9% male and female respectively which is at variance with our study. Mets is highly prevalent in the urban Indian diabetic population. It should be identified by regular screening in individuals from the general population to avert or delay the progression to type 2 diabetes in order to reduce diabetes- related morbidity and mortality . In our study 12% of diabetic patients were having hypothyroidism, which shows association of hypothyroidism with type 2 diabetics . Diabetic patients have a higher prevalence of thyroid disorders compared with normal population .A number of studies have also indicated a higher than normal prevalence of thyroid disorders in type 2 diabetic patients ,with hypothyroidism being most common disorder. Hypothyroidism to be nearly 6 percent among people with type 2 diabetes, compared to just under 2 percent in those without. In various studies it was seen that the association between type 2 diabetes and hypothyroidism was so significant that researchers recommended routine screening for hypothyroidism at the time of a type 2 diabetes diagnosis. As stated by Sweresh et al Hypertension is approximately twice as frequent in patients with diabetes compared with

patients without the disease. Conversely, recent data suggest that hypertensive persons are more predisposed to the development of diabetes than are normotensive persons. Hypertension is very common in diabetes. The people with type 2 diabetes mellitus tends to be older, Hypertension defined as blood pressure of 140/90 mmHg ,is twice common versus the aged matched nondiabetic population, affecting approximately 80% of people with type 2 diabetes.

In present study two third of the patients were found out to be hypertensive, which is consistent with the statement by Sweresh et al. In our series 17 % of patients were noted to be having coronary artery disease. In our study 45% of patients were having neuropathy. The EURODIAB study found prevalence rate of 28% for Diabetic neuropathy.In present study prevalence of neuropathy was higher . In our study diabetic retinopathy was found in 24 % of patients and its association with type 2 dm duration was found to be significant(p <.005).Which is consistent with the Wisconsin Epidemological study of Diabetic retinopathy (WESDR) Statement, that Prevalence of retinopathy and Maculopathy increases with the duration of diabetes.In various studies on the prevalence of diabetic retinopathy was found as Remaet al, 1996 Clinical based (Chennai) 34.1%, Dandonaet al 22.6% Ramachandranet al, 23.7%, Remaet al, 2000 Chennai 7.3% Narendran et al, 2002 26.8% which is quite similar with our study. In present study nephropathy was present in 23% of subjects. Significant association was observed between duration of diabetes with development of nephropathy(p<0.042). The prevalence of nephropathy In various studies atIndia like Gupta et al, (1991) Clinical based New Delhi Microalbuminuria: 26.6%, Yajniket al, (1992) Clinic based Pune Microalbuminuria: 23.0%, Vijay et al, (1994)Clinical based Chennai Proteinuria: 18.7%, Varghese et al, (2001)Clinical based Chennai Microalbuminuria: 36.3%, Unnikrishnanet al, (2006) Population based Chennai Microalbuminuria : 26.9%, which is similar to our study.

Studies have documented that self-care among T2DM subjects improved glycaemic control and reduced complications. In the present study, 29.3% of the subjects had good glycaemic Control (<7%) which was similar to various studies. A Swedish survey found that 34% of type 2 diabetes subjects had good glycaemic control. Al- Maskari F et al. found that 38% of T2DM subjects had good glycaemic control, and the study by Al-Kaabi J et al. reported that 31% of subjects had good glycaemic control. The reason of good glycemic control can be attributed to comprehensive care taken by our endocrinology unit. Raheja Bs et al. in his study (DIABCARE asia India study) which was intended to investigate the relationship between diabetes control, management and late complications in a subset of urban Indian diabetes population treated at 26 tertiary diabetes care centres. A total of 2,269 patients participated in this study and it was observed that approximately half the patients had poor control (HbA1c > 2% points above upper limit of normal) and mean HbA1c was significantly higher (8.9} 2.1%) than the levels recommended by the American Diabetes Association and the ICMR guidelines in India. Poor glycemic control (HbA1c >7%) was present in 65.1% of patients. In Kuwait, 66.7% of the studied population had HbA1c ≥8% (Al-Sultan & Al-Zanki, 2005). In Saudi Arabia, only 27% of the patients reached target level of glycemic control (Akbar, 2001). In Pakistan (Habib & Aslam, 2003), 46.7% of patients had HbA1c >7.5%. In Trinidad, 85% had HbA1c >7% (Ezenwaka & Offiah, 2001). Furthermore, HbA1c reported from National Health and Nutrition Examination Survey III was >9% in 24.5% of patients (Saaddine et al., 2006). In UK, 69% had HbA1c >7.5% (Fox, Gerber, Bolinder, Chen, & Kumar, 2006). All the above mentioned studies clearly reveal the difficulty in attaining ideal glycemic control.

Conclusion

In our hospital study although conducted in small number of patients revealed:

1. Most of the patients belonged to age group 40-60.
2. Majority of diabetics were obese, having BMI more than 25 kg/m2 .
3. Very few new patients were studied in our study presenting with polydipsia, polyuria as common presentation.
4. Majority of our patients were having dyslipidemia, and it was seen that dyslipidemia was significantly preponderant in females.
5. There was dominance of female having metabolic syndrome almost reaching 91% which is much above the findings depicted by other Indian studies, Probably because of limited number of females in our study.
6. Our study revealed the level of glycemic control was near the target given by ADA in almost one third of patients, which can be attributed to comprehensive care imparted by endocrinology unit.
7. Neuropathy, Retinopathy and Nephropatahy, were present in one fourth of the patient and it was seen to be significantly associated with duration of diabetes. Further study with large number of patient is required to substantiate our study

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