



A PROSPECTIVE OBSERVATIONAL STUDY OF CLINICAL PROFILE IN EARLY ONSET ADULT TYPE 2 DIABETES MELLITUS

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ABSTRACT AIM: To assess clinical profile in early onset adult type 2 DM.

OBJECTIVES:

1. To know the burden of type 2 DM in young adults.
2. To find correlation between early onset of type 2 DM and demographic characteristics.
3. to see whether demographic characteristics have effect on glycemic control and cholesterol levels

MATERIALS & METHODS: All the patients coming to outpatient department of internal medicine and endocrinology and admitted patients with random blood glucose >200 on routine screening or with osmotic symptoms were screened and after taking into account the exclusion and inclusion criteria, suitable patient is selected for the study. In the present study during the specific period time, we could enroll 184 patients satisfying inclusion and exclusion criteria.

RESULTS: Frequency of diabetes in age group 19-35 years is 42.9 percent compared to 57.15% in age group 36-44 years. Male to female ratio is 1.6: 1.

Family history seen 31.6 percent of type 2 DM patients.

Hypertension is seen in 15.2% of type 2 DM patients.

BMI (measure of general obesity) and WHR (measure of Central obesity) are independent risk factors for type 2 DM.

In our study statistically significant association is seen between high BMI/WHR and elevated lipid

KEYWORDS : Diabetes mellitus, adult type 2 dm, early onset, life style modifications, glycemic control.

INTRODUCTION:

In the past three decades there has been a progressive increase in the prevalence of early onset type 2 diabetes mellitus (1). type 2 DM was once considered a disease of older adults but the age of diagnosis is falling and it is now being increasingly diagnosed in adolescence and young adults. Inverse relationship exists between body mass index and the age of onset of type 2 DM (2) with severe weight gain <40 years associated with a higher risk of T2DM (3).

India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the "diabetes capital of the world". According to the diabetes Atlas 2006 published by the international diabetes federation (IDF) the number of people with diabetes in India currently around 40.9 million is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken. "Asian Indian phenotype" refers to certain unique clinical and biochemical abnormalities in Indians which include increased insulin resistance, greater abdominal adiposity, 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 (4). however, the primary driver of the epidemic of diabetes is the rapid epidemiological transition associated with changes in dietary patterns and decrease in physical activity as evident from the higher prevalence of diabetes in the urban population.

Insulin resistance is largely driven by obesity. however, it is not the degree of obesity which matters, rather the distribution of fat. a combination of high intramyocellular lipid content, increased visceral, decreased subcutaneous and ectopic liver fat deposition is most likely to result in glucose dysregulation in both young adult and pediatric populations (5).

Non-Alcoholic fatty liver disease (NAFLD) is an important marker of insulin resistance (6).

Recent studies demonstrated that adult early onset type 2 diabetes is a

more progressive disease from a cardiovascular standpoint than later onset type 2 diabetes (2,7,8).

Indians are genetically predisposed to the development of coronary artery disease due to dyslipidemia and low levels of high-density lipoproteins and these determinants are responsible for complication of diabetes at an early age and hence diabetes to be screened irrespective of patients age in India (9).

Type 2 DM starting during adolescence puts the individual at risk for Major morbidity and even mortality, right during the productive years of life.

AIM:

To assess clinical profile in early onset adult type 2 DM.

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MATERIALS AND METHODS:

STUDY SITE:

Department of internal medicine and endocrinology, KIMS, Secunderabad.

DURATION OF THE STUDY

20 months.

STUDY DESIGN:

Prospective observational study.

SAMPLE SIZE

For this observation and study sample size was calculated based on

study by Aguilar-Salinas CA et al, in which among 993 subjects with type 2 DM 143 subjects were aged between 20-39(14%). Utilizing the formula: sample size=Z

STUDY POPULATION;

In the present study during the specific period time, we could enroll 184 patients satisfying inclusion and exclusion criteria.

INCLUSION CRITERIA:

- 1) Age >19years and <45years.
- 2) patients with new onset type 2 DM.

EXCLUSION CRITERIA:

- 1) Patients with type 1 DM.
- 2) Patients with type 2 DM on treatment.
- 3) Pregnancy/Gestational diabetes mellitus.

STUDY METHODS AND PROCEDURE:

All the patients coming to outpatient department of internal medicine and endocrinology and admitted patients with random blood glucose >200 on routine screening or with osmotic symptoms were screened and after taking into account the exclusion and inclusion criteria, suitable patient is selected for the study. patients were explained about the study and he/ she was reassured that there will be no effect whatsoever on the treatment because of the study. the patient was explained in his/her own language about the study and what are its implications. the patient was also explained that he/she can leave the study whenever they wish to and no implications of this will be there on the treatment of the patient. after explaining about the study and reassuring the patient, we have taken the informed consent from the patient for the study.

DIAGNOSIS:

By oral glucose tolerance test (OGTT) according to ADA criteria.

- 1) HbA1c >6.5%. (or)
- 2) Blood glucose greater than or equal to 7mmol/l(126mg/dl) after overnight fasting. (or)
- 3) Blood glucose greater than or equal to 11.1mmol/l(200mg/dl) 2 hours after 75 gm oral glucose load.

After diagnosis differentiation of type 1 and type 2 DM was done based on c peptide levels.

Clinical history, demographic data, lipid parameters were noted.

STATISTICAL ANALYSIS:

In the present study we have taken informed consent from 184 patients and collected their demographic data laboratory data. The data were analyzed using SPSS version 17.0. continuous variables were expressed as mean±SD values. Appropriate statistical test was to evaluate the clinical profile in early onset adult type 2 DM probability value (p value) was used to determine level of significance value <0.01 is considered highly significant.

RESULTS

In the present study it is observed that 52.7 percent or in the age group 31-40 years followed by 26.6 in the age group 41-50 years 19% in the age group 21-30 years and 1.6% in age group less than or equal to 20 years.

TABLE 1: DISTRIBUTION OF PATIENTS BASED ON AGE:

Age group(years)	No	%
<=20.00	3	1.6
21.00-30.00	35	19.0
31.00-40.00	97	52.7
41.00-50.00	49	26.2
Total	184	100.0

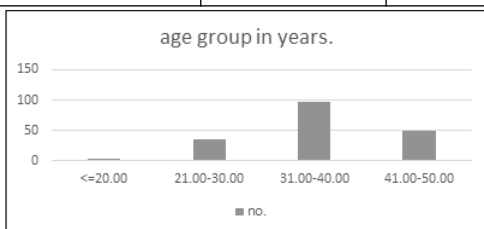


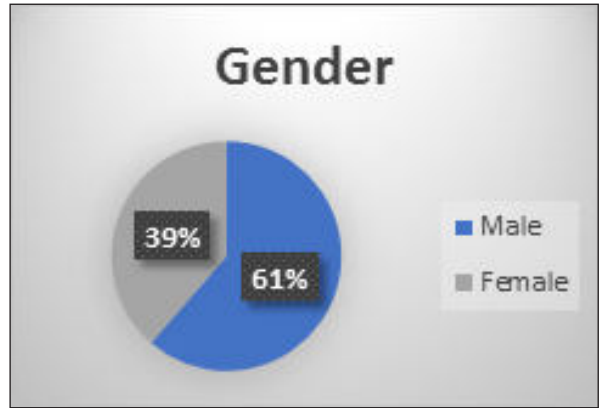
TABLE 2: MEAN AGE IN THE STUDY POPULATION

	Mean	Sd	Minimum	maximum
age	35.65	6.25	19.00	44.00

The mean age in the study population is 35.62±6.25. The age range is between 19-44 years.

TABLE 3: DISTRIBUTION BASED ON GENDER:

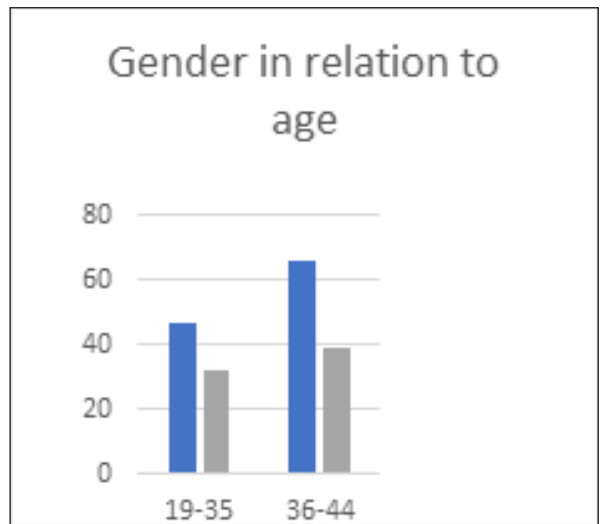
	Frequency	Percent
Male	113	61.4
Female	71	38.6
Total	184	100



In the present study 61.4% are males and 38.6% are females.

TABLE 4: GENDER IN RELATION TO AGE

Gender	19-35		36-44	
	No	%	No	%
Male	47	59.5	66	62.9
Female	32	40.5	39	37.1
Total	79	100	105	100



In the present study 59.5% males are in the age group 19-35 years compared to 62.9% in the age group 36-44 years. 40.5% females are in the age group 19-35 years compared to 37.1% in age group 36-44 years.

TABLE 5: FREQUENCY OF DIABETES

Frequency of DM in age group	Frequency	Percent
19-35 years	79	42.9
36-44 years	105	57.1
Total	184	100

The frequency of diabetes in age group 19-35 years is 42.9% compared to 57.15 in the age group of 36-44 years.

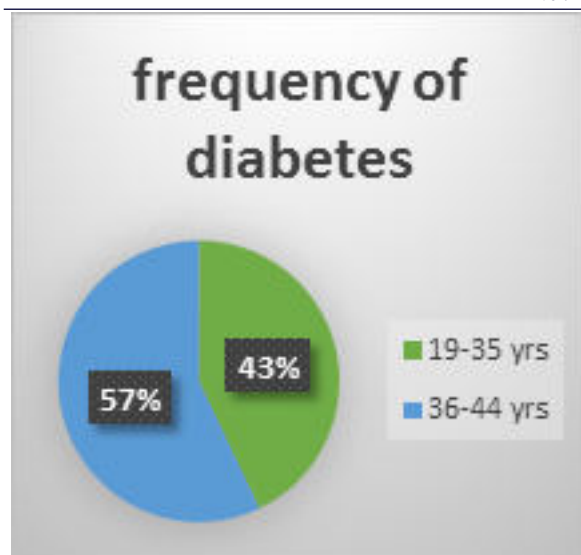
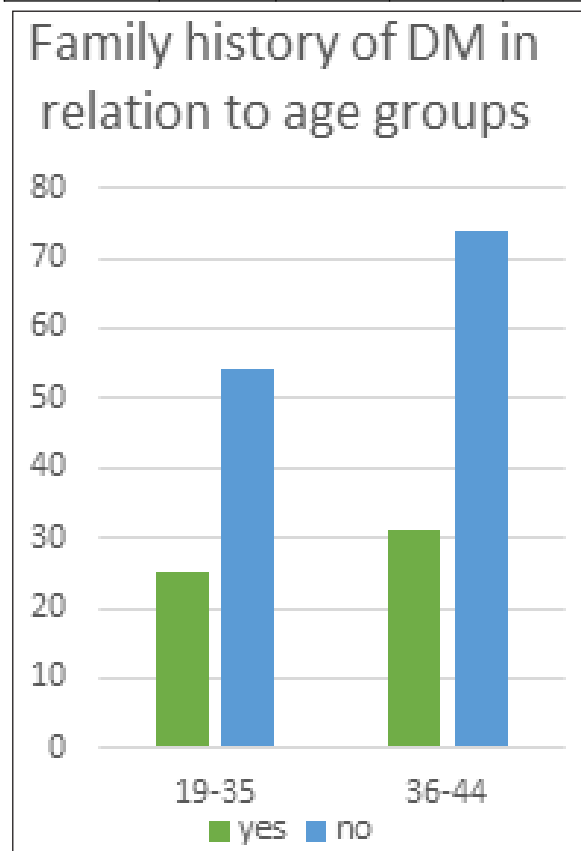


TABLE 6: FAMILY HISTORY OF DM IN RELATION TO AGE GROUP

In this study 31.6% have positive family history of diabetes in the age group of 19-35 years compared to 29.5% in the age group of 36-44 years. Of the patients who have positive family history of diabetes 55.4% the males and 44.6% are females.

Family H/o DM	19-35		36-44	
	No	%	No	%
Yes	25	31.6	31	29.5
No	54	68.4	74	70.5
Total	79	100	105	100

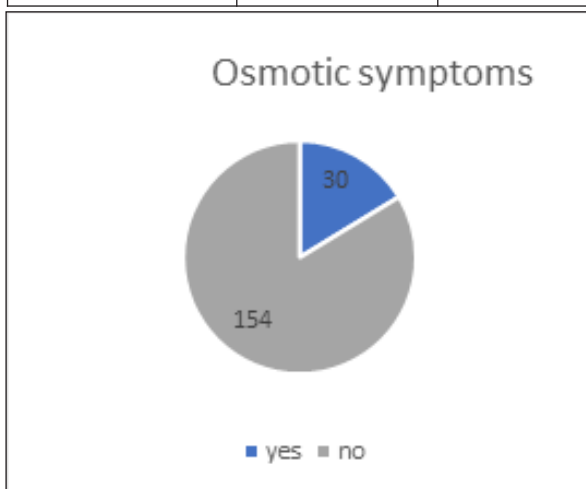


In the present study 69% of the patients have dyslipidemia.

TABLE 7: OSMOTIC SYMPTOMS

Osmotic symptoms	Frequency	Percent
Yes	30	16.3

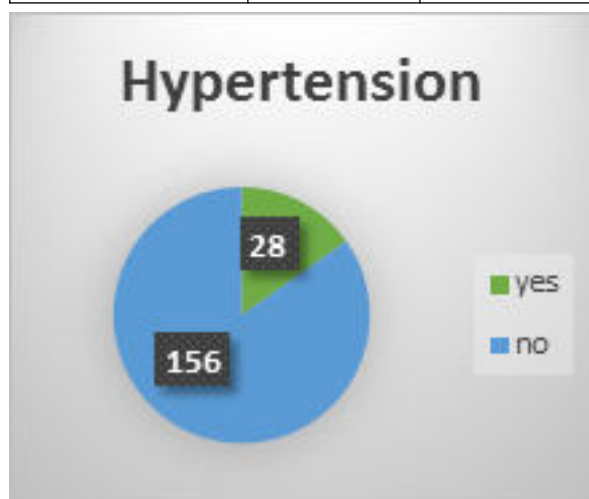
No	154	83.7
Total	184	100



Osmotic symptoms observed in 30 patients.

TABLE 8: HYPERTENSION

Hypertension	Frequency	Percentage
Yes	28	15.2
No	156	84.8
Total	184	100



Hypertension is observed in 15.2% of patients

TABLE 9: OVER ALL DYSLIPIDEMIA IN STUDY POPULATION

Dyslipidemia	Frequency	Percentage
Present	127	69
Absent	57	31

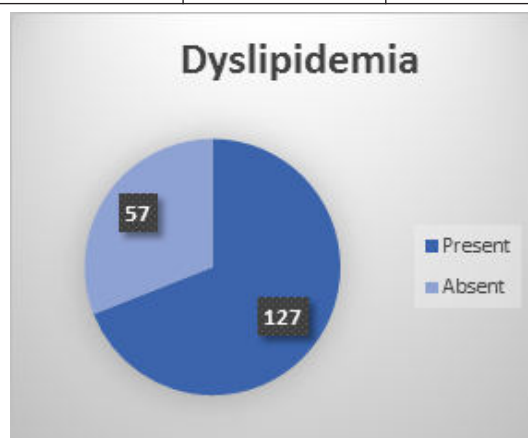


TABLE 10: BMI IN RELATION TO AGE GROUPS:

BMI	Gender	19-35		36-44	
		No	%	No	%
BMI<25	Males	22	56.4	26	66.7
	Females	17	43.6	13	33.3
BMI>25	Males	25	62.5	40	60.6
	Females	15	37.5	26	39.4

Chi square=0.867, p value=0.352

TABLE 11: WHR IN RELATION TO AGE GROUPS:

WHR	19-35		36-44	
	No	%	No	%
>0.9 Males	24	30.40%	39	37.1
<0.9 Males	23	29.10%	27	25.70%
>0.85 Females	18	22.80%	30	28.60%
<0.85 Females	14	17.70%	9	8.60%
Total	79	100%	105	100%

TABLE 12: COMPARISON OF HBA1C IN RELATION TO TOTAL CHOLESTEROL

Total cholesterol>200 is observed in 37.4% patients with HbA1c>8 compared to 20.3% in patients with HbA1c<8. There is a significantly higher incidence of hypercholesterolemia in patients with HbA1c>8. P value<0.05

Total cholesterol	<8		>8	
	No.	%	No.	%
Total cholesterol > 200	14	20.3	43	37.4
Total cholesterol < 200	55	79.7	72	62.6
Total	69	100	115	100

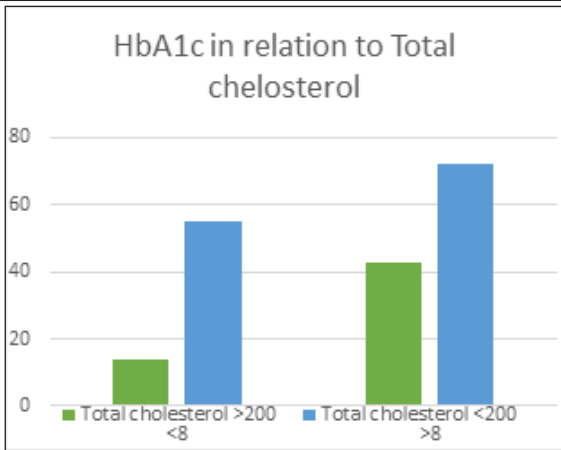
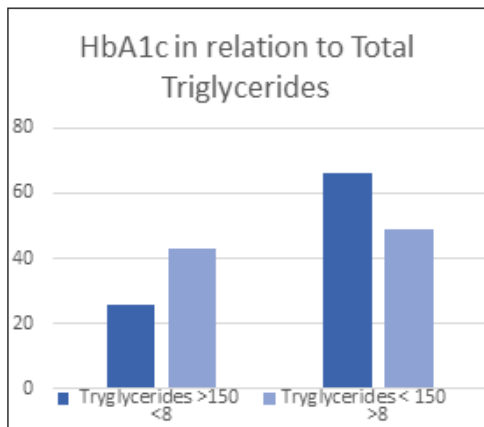


TABLE 13: HBA1C IN RELATION TO TRIGLYCERIDES

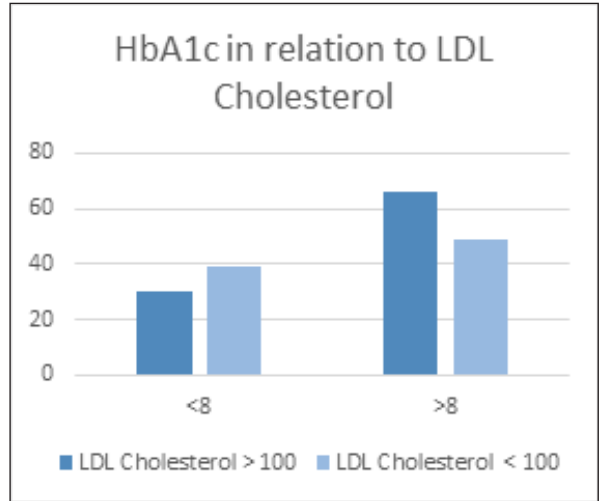
Triglycerides	<8		>8	
	No.	%	No.	%
Triglycerides > 150	26	37.7	66	57.4
Triglycerides < 150	43	62.3	49	42.6
Total	69	100	115	100



Chi square 6.7, P value=0.05.

TABLE 14: COMPARISON OF HBA1C IN RELATION TO LDL CHOLESTEROL

LDL Cholesterol	<8		>8	
	No.	%	No.	%
LDL cholesterol > 100	30	43.5	66	57.4
LDL cholesterol < 100	39	56.6	49	42.6
Total	69	100	115	100

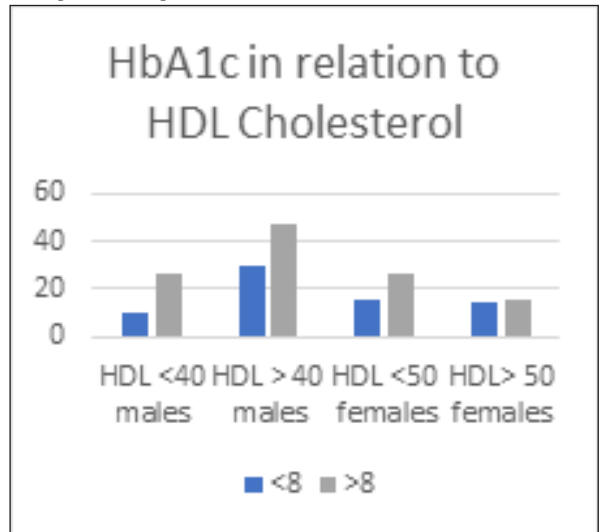


Chi square=3.34, p value>0.05

TABLE 15: COMPARISON OF HBA1C IN RELATION TO HDL CHOLESTEROL

HDL Cholesterol	<8		>8	
	No.	%	No.	%
HDL < 40 males	10	14.5	26	22.6
HDL > 40 males	30	43.5	47	40.9
HDL < 50 females	15	21.7	26	22.6
HDL > 50 females	14	20.3	16	13.9
HDL	69	100	115	100

Chi square= 2.61, p value=0.455



There was no statistically significant difference observed in HDL cholesterol<40 in males and <50 in females in relation to HbA1c, p value>0.05.

TABLE 16: CORRELATION OF BMI&WHR WITH DYSLIPIDEMIA

In the present study it is observed that BMI and WHR have a significant positive correlation with total cholesterol, triglycerides, LDL p<0.05.

However, the r value of for WHR is greater than BMI.

		TC	TGL	LDL	HDL
BMI	r value	0.479	0.304	0.477	-0.371
	p value	<0.001	<0.001	<0.001	<0.001
WHR	r value	0.529	0.358	0.516	-0.296
	p value	<0.001	<0.001	<0.001	<0.001

BMI and WHR have a significant negative correlation with HDL levels, $p < 0.05$, r value for WHR is greater than BMI.

TABLE 17: FREQUENCY OF METABOLIC SYNDROME

Metabolic syndrome	Frequency	Percent
Yes	66	35.9
No	118	64.1
Total	184	100.0



In the present study 66 patients have metabolic syndrome among which 53% are males and 47% are females.

DISCUSSION:

Present study is conducted in age group of 19-44 years. Cutoff 44 years is taken because usual onset of type 2 DM is being considered from 45 years of age. This study includes clinical profile of young adults between 19-35 years of age and middle-aged adults between 36-44 years of age.

We have included 184 patients of newly diagnosed type 2 DM, of which 52.7 % of patients were in 31-40 years age group, 26% of patients were in 41-44 years, 19% of patients were in 21-30 years and 1.6 % were in age group equal to or less than 20 years, with mean age in the study population being 35.62 ± 6.25 . this is also comparable to study done by Soni.P. et al in 2015, where they included 136 patients between age groups 20-40 years with mean age of 32 ± 4.3 years (10).

In the present study 61.4 % were males and 38.6 % were females, male to female ratio is 1.6:1. This is comparable to study done by Soni.P. et al(10), where 58% were males and 42% were females and comparable to study done by Kusum bali et al(11) in 2016, where male to female ratio was 1.2:1. In the present study 59.5% were males in the age group of 19-35 years compared 62.9% in age group 36-44 years and 40.5% females were in age group of 19-35 years of age compared to 37.1 % in age group of 36 to 44 years.

In the present study 56 patients have positive family history, 31.6 percent in age group 19-35 years compared to 29.5% in age group of 36-44 years. slightly higher frequency of family history is seen in young adults compared to middle age adults, but the result was not statistically significant. One study conducted by Xiantong zou et al, in 2017 where family history was associated with early onset of type 2 DM (12).

Hypertension was seen in 15.2 % of patients in the present study. In the present study in patients with age group 19-35 years, 56.4% males have BMI<25 compared to 66.7% males with BMI<25 in the

age group of 36 to 44 years. 43.6 percent females in age group 19-3`5 years have BMI<25 compared to 33.3% in the age group of 36 to 44 years.

In patients with age group 19-35 years 62.5% males have BMI>25 compared to 16.6% males with BMI>25 in the age group of 36-44 years. 37.5% females in the age group of 19-35 years have BMI>25 compared to 39.4% in the age group 36-44 years.

The present study early-onset type 2 DM are more overweight or obese this is consistent with study done by Michael I ganz et al (13) and Teresa a hillier et al (2) which concluded that high BMI is independent risk factor for type 2 DM.

The present study early-onset type 2 DM patients tend to have Central obesity. BMI (measure of general obesity) and WHR (measure of central obesity) show would similar significance in the present study.

In this study, 69% have dyslipidemia, this is comparable to study done by Aishwarya et al in 2017(14), where 70.16% had dyslipidemia and also comparable to study done by Teresa a Hillier et al, where 82% had dyslipidemia (2). Our study showed female preponderance to dyslipidemia in early onset type 2 DM.

In the present study it is observed that BMI and WHR have a significant positive correlation with levels of total cholesterol, triglycerides, and LDL cholesterol. WHR has higher r" value compared to BMI.

BMI and WHR have significant negative correlation with HDL cholesterol levels. WHR has a greater r" value compared to BMI. this shows that central obesity is a better measure of dyslipidemia than general obesity.

In the present study poor glycemic control was associated with higher values total cholesterol and triglycerides but no statistically significant relation is seen with LDL and HDL cholesterol. This study is comparable to study done by Aishwarya et al (14), Tiwari et al (15), Raju lodhia et al (16), Jayesh Seth et al (17), Vasanth devakar et al (18), valamarthy et al (19), where they concluded that there is significant relation with high HbA1c levels and dyslipidemia and HbA1c can be used as a biomarker for dyslipidemia.

Vasanth devakar et al (18), observed that poor glycemic control associated with dyslipidemia in 62% of patients, similar to our study.

Soni P et al (10), observed that only 8% of patients had family history of DM, but in our study, we found 31.6% of DM patients.

Metabolic syndrome is observed in 35.9% of patients of which 53% are males and 47% of females. when compared to study done by Neha Sudhera et al (20), which revealed prevalence was higher in females particularly in age group of 30-40 years, present study showed slight male preponderance in young adults but equal proportions of them had metabolic syndrome in middle age group.

CONCLUSIONS:

Many younger age people are affected with Type 2 diabetes and that number is increasing day by day. In our study modifiable risk factors like hypertension, BMI&WHR (obesity), Dyslipidemia is responsible for developing diabetes in younger patients. Strict lifestyle modifications (weight reduction, physical activity, healthy diet) at on younger age is crucial for decreasing the occurrence of Type 2 DM in adults. So, there is an urgent need for identifying and implementing new strategies to prevent the disease occurrence in the younger age group. Early diagnosis and good glycemic control are required on long term basis, to improve the quality of life and preventing diabetic complications in younger age peoples.

LIMITATIONS:

The significance of any study increases as the sample size increases. in the present study sample size is 184. this number is small to extrapolate the findings to overall population. along with sample size, duration of the study is also important. the present study was done over one and half years. in this time period, we could collect 184 cases which have fulfilled the inclusion criteria. A multicenter study is always beneficial this is a single-center study done in a multispecialty hospital situated in metropolitan city. There may be variability in the number of cases coming to different hospital and in rural areas.

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