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General Medicine

A HOSPITAL BASED COMPARATIVE STUDY OF ANTHROPOMETRY, CLINICAL FEATURES AND COMPLICATIONS IN YOUNG AND ELDERLY ONSET TYPE II DIABETES MELLITUS PATIENTS.

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) has been defined as the most prevalent metabolic condition and constituting one of the major health problems worldwide (1). The rising prevalence of the disease worldwide makes it a global public health threat with 180 million sufferers. We need to describe and understand the clinical and biochemical profile of diabetes population, to facilitate early diagnosis and suggest lifestyle modifications to curb the onward progression of the disease. Owing to a delay in diagnosis by an average of three to five years leads to a significant proportion of people with type 2 diabetes presenting with complications (both macrovascular and microvascular), usually subclinical and asymptomatic (2).The prognosis of the diabetic patients mainly depends on the development of complications which occur in the natural course of the illness and are governed by the clinical and biochemical profile of the patients. However, India being a highly diversified country, the T2DM population also have a varied profile. This diversity leads us to define the profile of the T2DM population in this part of northern India (10).

Aims & Objectives: To study and compare the anthropometric, clinical features, biochemical and haematological parameters between young onset (≤40 years) and elderly onset (≥60 years) patients of type 2 diabetes mellitus.

Materials & Methods: This cross-sectional observational study was conducted in the Department of Medicine, Himalayan Institute of Medical Sciences, Swami Rama Nagar, Dehradun within a period of 12 months. Study subjects were divided into two groups based on the age of onset of disease - young onset (≤ 40 years, n=50) and elderly onset (≥ 60 years, n=50) in a total of 100 study subjects. Various demographic, anthropometric, clinical, haematological and biochemical parameters of the two groups were recorded and compared. Data was analysed using SPSS software version 22 and p-value of less than 0.05 was considered significant.

Observation:

- 28 patients were smoker, 98 patients were non-alcoholic and 75 patients consumed mixed diet. 26 patients have above normal BMI, 14 have elderly onset diabetes.
- 94 patients have above normal FBS level, 47 have early onset diabetes.
- 93 patients have above normal PPBS level, 48 have early onset diabetes.
- 36 patients have hypertriglyceridemia, 23 have young onset diabetes.
- 69 patients have anemia, 35 have elderly onset diabetes.
- 42 patients have raised serum creatinine level, 23 have elderly onset diabetes.
- 47 patients have Retinopathy, 30 have young onset diabetes.
- 32 patients have Neuropathy, 19 have young onset diabetes.
- 21 patients have Fatty liver on USG, 13 have young onset diabetes.

Result & Conclusion:

- FBS and PPBS were significantly high in Young onset T2DM female cases whereas in male cases, PPBS was significantly high in Young onset T2DM patients.
- Triglyceride was significantly high in Young onset T2DM patients.
- Alanine transferase (ALT) was significantly more in Elderly onset T2DM male patients.
- Prevalence of Retinopathy (NPDR) (63.8%) was significantly more in Young onset T2DM patients. However, prevalence of Neuropathy (60% in Young onset) and Nephropathy (45% in Young onset) were insignificantly associated with the initial age of onset of T2DM.

KEYWORDS : Type 2 Diabetes Mellitus, Non-proliferative diabetic retinopathy, Body-Mass Index, hypertriglyceridemia

INTRODUCTION:

Type 2 diabetes mellitus (T2DM) has been defined as the most prevalent metabolic condition and constituting one of the major health problems worldwide (1). Its alarming increase, especially in Asia, indicates that more than 60% of the world's diabetic population will be in Asia, with India and China bearing more than 75% of the diabetic subjects by year 2025 (2).

The major predisposing factors contributing in the development of diabetes includes insulin resistance, central obesity, lifestyle changes and familial aggregation. T2DM developed because of insulin resistance, condition in which muscles, liver and fat cells are not able to use insulin properly.

These predisposing factors have known to contribute individually in the development of diabetes, yet the relative role of these factors individually and their relationship amongst them is poorly understood and studied (3).

At the time of diagnosis of diabetes, macrovascular and microvascular complications may be present because of the insidious nature of the disease. So, all the patients should be screened for the presence of complications and if they are present, further progression can be slowed by appropriate management (4).

We need to describe and understand the clinical and biochemical profile of diabetes population, to facilitate early diagnosis and to curb the onward progression of the disease. Owing to a delay in diagnosis by an average of three to five years leads to a significant proportion of patients presenting with complications, usually subclinical and asymptomatic (5).

The prognosis of the diabetic patients mainly depends on the development of complications which occur in the natural course of the illness and are governed by the clinical and biochemical profile of the patients. However, India being a highly diversified country, the diabetic population also have a varied profile. This diversity leads us to define the profile of the T2DM population in this part of northern India (6).

In this study, we investigated the anthropometric, clinical features and biochemical parameters in young and elderly onset T2DM patients and try to find out association between them in developing the complications later.

AIMS & OBJECTIVES:

1.To study the anthropometric, clinical features, biochemical and haematological parameters between young (≤ 40 years) and elderly (≥

60 years) onset patients of type 2 diabetes mellitus.

2.To compare the anthropometric, clinical features, biochemical and haematological parameters between young (≤ 40 years) and elderly (≥ 60 years) onset patients of type 2 diabetes mellitus.

MATERIALS & METHODS:

This cross-sectional observational study was conducted in the Department of Medicine, Himalayan Institute of Medical Sciences, Swami Rama Nagar, Dehradun within a period of 12 months. Study subjects were divided into two groups based on the age of onset of disease - young onset (≤ 40 years, n=50) and elderly onset (≥ 60 years, n=50) in a total of 100 study subjects. Diagnosis of type 2 diabetes mellitus was based on American Diabetes Association (ADA) criteria (7). Any seriously ill patient, patient with acute critical illness like MI and patient with any pre-existing chronic illness like Chronic liver disease or Chronic kidney disease were excluded from the study. Various demographic, anthropometric, clinical, haematological and biochemical parameters of the two groups were recorded and compared. Data was analysed using SPSS software version 22 and p-value of less than 0.05 was considered significant.

OBSERVATIONS:

Table 1: Prevalence Of Various Demographic Parameters And Risk Factors In Our Study

T2DM	Mean age of onset	Std. Deviation	P-value
Young onset (≤40)	48.84	± 9.067	**0.004**
Elderly onset (≥60)	68.94	± 6.179	
Variable	**Categories**	**Cases**	
Gender	Female	50	
	Male	50	
Education	Primary	60	
	Secondary	22	
	Graduated	18	
Smoking	No	72	
	Yes	28	
Alcohol	No	98	
	Yes	2	

Table 2: SBP And DBP In Young Onset And Elderly Onset T2DM Patients

Variable	Categories	AGE(T2DM)		P-value
		AGE (T2DM) (≤40)	AGE (T2DM) (≥60)	
SBP (mm of Hg)	**<129**	31(62%)	35(70%)	0.256
	≥130	19(38%)	15(30%)	
DBP (mm of Hg)	**<80**	38(76%)	43(86%)	0.154
	≥80	12(24%)	7(14%)	

Statistical test used: Chi-square test

Table 3: Association Of BMI In Young Onset And Elderly Onset T2dm Patients

Variable	Categories	AGE(T2DM)		
		AGE (T2DM) (≤40)	AGE (T2DM) (≥60)	P-value
BMI(Kg/m2)	<18.5	7(14%)	3(6%)	0.326
	18.5-24.9	31(62%)	33(66%)	
	25-29.9	9(18%)	12(24%)	
	30-39.9	3(6%)	2(4%)	

Statistical test used: Chi-square test

Table 4: FBS, PPBS and HbA1C In Young Onset And Elderly Onset T2DM Patients

Variable	Categories	AGE (T2DM) (≤40)	AGE (T2DM) (≥60)	P-value
FBS (mg/dl)	**≤125**	3(6%)	3(6%)	0.661
	>125	47(94%)	47(94%)	
PPBS (mg/dl)	**≤140**	2(4%)	5(10%)	0.414
	>140	48(96%)	45(90%)	
HbA1C (%)	**<5.7**	5(10%)	6(12%)	0.649
	5.7-6.5	2(4%)	4(8%)	
	>6.5	43(86%)	40(80%)	

Statistical test used: Chi-square test

Table 5: FBS And PPBS In Young And Elderly Onset T2DM Patients According To Gender

		Female			Male		
Variable	**AGE (T2DM)**	**Mean**	**Std. Deviation**	**p-value**	**Mean**	**Std. Deviation**	**p-value**
FBS (mg/dl)	≤40	187.1	±81.582	0.04	192.8	±90.315	0.061
	≥60	146.5	±52.158		164.1	±58.845	
PPBS (mg/dl)	≤40	238.1	±76.013	0.02	247.2	±88.943	0.047
	≥60	191	±65.016		213.6	±77.735	

Statistical test used: Independent t-test

Table 6: Lipid Profile Parameters In Young Onset And Elderly Onset T2DM Patients

Variable	Categories	AGE (T2DM) (≤40)	AGE (T2DM) (≥60)	P-value
TC(mg/dl)	≤200	41(82%)	44(88%)	0.401
	>200	9(18%)	6(12%)	
HDL(mg/dl)	≤40	35(70%)	27(54%)	0.099
	>40	15(30%)	23(46%)	
LDL(mg/dl)	≤130	43(86%)	45(90%)	0.538
	>130	7(14%)	5(10%)	
TG(mg/dl)	≤150	27(54%)	37(74%)	**0.036**
	>150	23(46%)	13(26%)	

Statistical test used: Chi-square test

Table 7: Biochemical Parameters In Young Onset And Elderly Onset T2DM Patients According To Gender

		Female			Male		
Variable	**AGE (T2DM)**	**Mean**	**Std. Deviation**	**p-value**	**Mean**	**Std. Deviation**	**p-value**
Hb (g/dl)	≤40	11.43	±2.15	0.999	11.73	±2.41	0.059
	≥60	11.43	±2.46		10.79	±2.49	
Albumin (g/dl)	≤40	19.37	±78.74	0.308	15.49	±63.02	0.172
	≥60	3.47	±0.72		3.1	±0.79	
ALT (U/L)	≤40	38.08	±25.81	0.134	31.78	±20.6	**0.037**
	≥60	58.15	±59.54		51.9	±63.9	
AST (U/L)	≤40	49	±52.97	0.301	41.78	±38.62	0.142
	≥60	66.65	±65.17		73.48	±146.61	

Statistical test used: Independent t-test

Table 8: Complications In Young Onset And Elderly Onset T2DM Patients

Variable	Categories	AGE (T2DM) (≤40)	AGE (T2DM (≥60)	P-value
Nephropathy	**Absent**	31(62%)	27(54%)	0.417
	Present	19(38%)	23(46%)	
Retinopathy	**Absent**	20(40%)	33(66%)	0.009
	Present	30(60%)	17(34%)	
Neuropathy	**Absent**	37(74%)	31(62%)	0.142
	Present	13(26%)	19(38%)	

Statistical test used: Chi-square test

Table 9: Serum Insulin Level In Young Onset And Elderly Onset T2DM Patients

Variable	Categories	AGE (T2DM) (≤40)	AGE (T2DM) (≥60)	P-value
S. Insulin [mU/L]	<2	32(64%)	35(70%)	0.809
	2-25	17(34%)	14(28%)	
	>25	1(2%)	1(2%)	

Statistical test used: Chi-square test

Table 10: Different Variables In Young Onset And Elderly Onset T2DM Patients

Variable	Categories	Age (T2DM) (≤40)	Age (T2DM) (≥60)	P-value
Urine RM (Albumin)	**Absent**	34(68%)	36(72%)	0.663
	Present	16(32%)	14(28%)	
USG W/A (Medical Renal Disease)	**Absent**	44(88%)	48(96%)	0.14
	Present	6(12%)	2(4%)	

USG W/A (Fatty liver)	**Absent**	37(74%)	42(84%)	0.22
	Present	13(26%)	8(16%)	
ECG	**LVH**	9(18%)	7(14%)	0.855
	Normal	31(62%)	33(66%)	
	Sinus tachycardia	10(20%)	10(20%)	

Statistical test used: Chi-square test

DISCUSSION:

Lipid abnormalities are commonly seen in T2DM patients. In our study there was significant ($p<0.05$) association found between triglycerides and the initial age of onset of T2DM (more in patients with age of onset ≥60 years) but no significant association with Total cholesterol, low-density lipoprotein and high-density lipoprotein. These findings are similar with a study conducted by Ozder on lipid abnormalities in T2DM patients showing the high prevalence of dyslipidemia in diabetic patients and it may also play a major role in the development of cardiovascular and cerebrovascular diseases in diabetics (8). Similar results were reported by previous investigators like Bitzur et. al (9). A close association was also obtained between TG and type 2 diabetes mellitus by Chan et al (10).

In our study, there is a significant difference between FBS and PPBS with the initial age of onset of T2DM in female cases whereas in male cases, significant difference was observed only in FBS category and not in PPBS category. There was no significant difference found between the HbA1C level and the initial age of onset of T2DM. But according to the studies by Bhardwaj et. al (11) and Adu et. al (12), the best criteria for the control and prevention of development of complications in diabetics is HbA1C. A reduction of 1% in the level of HbA1c could prevent the development of 30-35% of microvascular and 14-16% of macrovascular complications.

Being overweight or obese was associated with increased risk of diabetes in many studies but it is found to be statistically insignificant in our study. Talaei et. al showed the increased risk (1.94 times) of developing diabetes in individuals who were obese or overweight at a younger age in a longitudinal study comprising adults aged above 35 years with BMI cut-off of 30 kg/m^2 (13). Jeffreys et. al also demonstrated the increased risk of developing diabetes in adults who were overweight at any point in their lifetime (14). Njolstad et. al. concluded the positive association between BMI and diabetes in men (15). Logue J. et. al and Karastergiou K. et. al demonstrated that males are more susceptible to diabetes than females (men are diagnosed to have diabetes at lower BMI levels than females). They also concluded that abdominal fat is positively associated with the risk of developing diabetes (males usually carry weight in their abdominal region while females carry weight in their hips and thighs region) (16,17).

There was significant association observed in the prevalence of Retinopathy (NPDR) and the initial age of onset of T2DM in our study and it was more in Young onset T2DM patients. The JADE cohort comprises both recently diagnosed and previously diagnosed young onset diabetes mellitus patients, regardless of the diabetes duration and found out the prevalence rates of both microvascular and macrovascular complications was very high. This further emphasize the need of screening of all patients of diabetes for the presence of complications as early detection and prompt treatment can delay the progression of these complications. JADE programme compared the clinical characteristics, metabolic risk factors and the prevalence of complications in patients of young onset and late onset T2DM. Result of this programme was that patients with young-onset diabetes had longer duration of disease (median 10 years [IQR 3–18]), has higher concentrations of HbA1c (mean 8.32%), has higher prevalence of retinopathy (20%) and they were less likely to receive statins and renin-angiotensin-system inhibitors as compared to patients with late-onset diabetes. Moreover, these young onset diabetes patients have poor metabolic control and very few of them received organ-protective drugs as compared to patients with late onset diabetes. All these suggest an impending epidemic of complications in young onset diabetic patients due to the presence of long-term suboptimum metabolic control (18). Studies like SEARCH (Search for Diabetes in Youth) and TODAY (Treatment Options for Type 2 Diabetes in Adolescents and Youth) concluded that the young onset T2DM is aggressive in nature and emphasises the various challenges in the management of these patients (19,20).

CONCLUSION:

1. No statistically significant difference was found in the anthropometric variables (like weight, Height, waist and BMI) between both the groups.
2. FBS and PPBS were significantly high in Young onset T2DM female cases whereas in male cases, PPBS was significantly high in Young onset T2DM patients.
3. HBA1C valve did not show any significant difference between both the groups.
4. No statistically significant difference was observed in the haematological & biochemical values (like CH, LFT, KFT) between young onset and elderly onset diabetes patients.
5. Alanine transferase (ALT) was significantly more in elderly onset T2DM male patients (p value: 0.037).
6. Triglyceride was significantly high in Young onset T2DM patients (p value: 0.036).
7. No statistically significant difference was observed in the levels of T. Cholesterol, HDL, LDL and triglycerides between both the groups gender wise.
8. No statistically significant difference was observed in the serum insulin level between both the groups.
9. No statistically significant difference was observed with respect to Hypertension and Smoking between young onset and elderly onset diabetes patients.
10. Prevalence of Retinopathy (NPDR) (63.8%) was significantly more in Young onset T2DM patients. However, prevalence of Neuropathy (60% in Young onset) and Nephropathy (45% in Young onset) were insignificantly associated with the initial age of onset of T2DM.

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