"Identification of modifiable risk factors in young type 2 diabetes mellitus – a rural hospital based study"

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Abstract:
Background:
we aimed to study the sociodemographic profile of young type 2 diabetes mellitus patients of age between 20 to 32 years and to identify the modifiable risk factors contributing to young type 2 diabetes mellitus patients.
Methods:
It was a cross sectional study done in a tertiary care centre in rural puducherry,India for a period of six months from july 2019 to December 2019. Socio demographic data, family history, level of physical activity (using International physical activity questionnaire IPAQ), addictions were collected using a structured questionnaire. Details of anthropometry, blood pressure and glycemic status were collected with help of appropriate instruments. Data were analysed using SPSS version 21.
Results:
A total of 22 type 2 diabetes mellitus patients belonging to age group between 24 to 31 years were included. Higher proportion of patients followed a sedentary lifestyle or no physical activities i.e., 17 (77.3%). Mean Body mass index (BMI) of the study participants were 25.72 ± 2.29. Of which 7 (31.8%) patients were belonging to overweight BMI category and 13 (59.1%) patients to obese BMI category. Mean systolic blood pressure was 112.5 ± 7.2 mmHg. Association between physical activities and body mass index was statistically significant (P value 0.006). All patients had multiple modifiable risk factors.
Conclusion:
It was observed that multiple modifiable risk factors occurred in young diabetic patients. Of which physical inactivity and obesity played a major role. Hence aggressive intervention strategies (primodial and primary prevention) are required at community levels to control the diabetes epidemic in rural India particularly among young patients.

I. Introduction

India has been designated as "diabetes capital" of the world, and 10-16% of urban population and 5-8% of rural population in India alone are affected by diabetes mellitus.[3]The causation of diabetes mellitus involves multiple factors containing both non-modifiable factors like age, genetic defects, family history and modifiable factors like diet, obesity, sedentary lifestyle, socioeconomic status, stress, alcohol, viral infections etc.

Type 2 diabetes mellitus, earlier considered a disorder of middle age or elderly, is increasingly being reported among young adults and adolescence.[2] Diabetes mellitus screening for children and adolescents is not recommended and hence adequate data and estimated young population affected by type 2 diabetes mellitus are lacking. The ICMR-INDIAB study also showed that there is a shift of type 2 diabetes mellitus to younger age groups and diabetes are occurring at the ages 25–34 years in India.[1] They have a risk of developing early microvascular and macrovascular complications early affecting their productive years of life.

The present study aims to identify the modifiable risk factors in young individuals of this region and if identified early remedial measures can be implemented at community level aggressively, thus preventing or delaying the onset of type of diabetes mellitus.

The data which obtained in this study can be used to do further research in the future

II. Materials and Methods:

This study was a cross sectional study done at Sri ManakulaVinayagar medical college and hospital, which is a tertiary care hospital located in rural Puducherry, for a period of six months from July 2019 to December 2019. Patients with type 2 diabetes mellitus visiting medical outpatient department were recruited for

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the study after informed consent.

The objectives of the study were to study the socio demographic profile of young patients of age between 20 to 32 years and to identify the modifiable risk factors contributing to type 2 diabetes mellitus. Patients with type 1 diabetes mellitus and pregnant female were excluded from the study.

III. Methodology:

Socio demographic data consisting of age, sex, education, family history, level of physical activity (using International physical activity questionnaire IPAQ[8]), addiction to tobacco and alcohol were collected using a structured questionnaire from the patients.

Details of anthropometry (height, weight, body mass index, and waist circumference), blood pressure and glycemic status (fasting, post prandial and HbA1c) were collected from the recruited participants.

Statistical Analysis:

Data were entered and analyzed using software SPSS version 24.0. Description of categorical variables were done in proportions and frequency and that of continuous variables in mean and standard deviation. The associations were assessed using Chi-square test. P value <0.05 were considered statistically significant.

IV. Results:

Sociodemographic characteristics:

A total of 22 type 2 diabetes mellitus patients belonging to age group between 24 to 32 years were included in this study after applying inclusion and exclusion criterias. Among 22 participants 17 (77.3%) were male and 5 (22.7%) were female participants. Mean age of participants were 28.82 ± 2.03. The majority of patients were graduate i.e., 13(59.1%) followed by primary education 5(22.7%) and secondary education 4(18.2%). Socioeconomic status were defined according to modified kuppusamyscale ; upper middle class 2 (9.1%), lower middle class 13(59.1%), upper lower class 4(18.2%), lower class 3(13.6%). (Table 1)

Table 1: Baseline sociodemographic characteristics of participants

Characteristics	Number
Gender:	
Male	17 (77.3%)
Female	5 (22.7%)
Mean age (in years)	28.82 ± 2.03
Education:	
Primary education	5 (22.7%)
Secondary education	4 (18.2%)
Graduate	13 (59.1%)
Socioeconomic status (modified kuppusamy scale):	
upper middle class	2 (9.1%)
lower middle class	13 (59.1%)
upper lower class	4 (18.2%)
lower class	3 (13.6%)
Occupation:	
Student	4 (18.2%)
Housewife	4 (18.2%)
Teacher	3 (13.6%)
Farmer	2 (9.1%)
Daily wage worker	3 (13.6%)
Shopkeeper	3 (13.6%)
supervisor	3 (13.6%)

Risk factors:

Out of total participants history of alcohol consumption was present in 11 (50%) individuals and smoking of tobacco in 6 (27.3%) individuals. Among all the patients significantly higher proportion of patients followed a sedentary lifestyle or no physical activities i.e., 17 (77.3%) whereas only 5 (22.7%) patients had some regular physical activities in their lifestyle. Positive family history of diabetes mellitus were seen in 8 (36.4%) and were not seen in 14 (63.6%) participants. Mean Body mass index (BMI) of the study participants were 25.72 ± 2.29 and it was noted that 7 (31.8%) patients were belonging to overweight BMI category and 13 (59.1%) patients to obese BMI category. Waist circumference for men > 90 cms were 10 (58.8%) participants and for women > 85cms were 3 (60%) participants. Mean systolic blood pressure measured was 112.5 ± 7.2 mmHg. (Table 2).
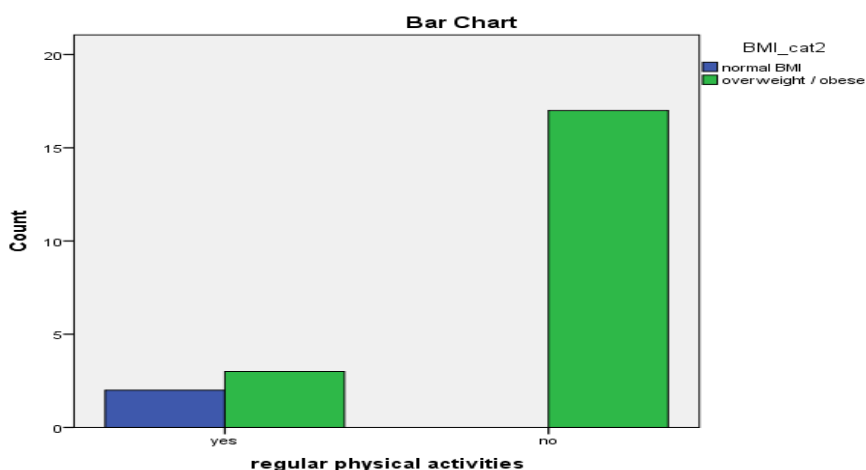
Table 2: Risk factors of type 2 diabetes mellitus

Risk factors	Number
History of alcohol consumption	
Yes	11 (50%)
No	11 (50%)
History of smoking	
Yes	6 (27.3%)
No	16 (72.7%)
Physical activities (according to international physical activity questionnaire)	
Yes	5 (22.7%)
No / sedentary lifestyle	17 (77.3%)
Family history of diabetes	
Yes	8 (36.4%)
No	14 (63.6%)
Mean Body mass index	25.72 ± 2.29
Normal BMI	2 (9.1%)
Overweight BMI	7 (31.8%)
Obese BMI	13 (59.1%)
Waist circumference	
Men (> 90 cms)	10 (58.8%)
Women (> 85 cms)	3 (60%)
Mean systolic blood pressure (mmHg)	112.5 ± 7.2
Mean diastolic blood pressure (mmHg)	73.8 ± 5.2

Maximum of 5 modifiable risk factors (alcohol history , smoking history, physical inactivity, high body mass index, high waist circumference) were all seen in 6 participants and 4 modifiable risk factors were seen in 5 participants and 3 modifiable risk factors in 11 participants.

Chi square statistical test was used to assess the association between the risk factors. It was found that association between physical activities and body mass index was statistically significant (P value 0.006) whereas association between family history of diabetes mellitus and body mass index was not statistically significant (P value 0.67).

	Body mass index		
	Normal BMI	Overweight / Obesity	
Regular physical activities			
yes	2	3	**P value = 0.006**
no	0	17	
Family history of diabetes mellitus			
yes	1	7	P value = 0.67
no	1	13	
Alcohol consumption			
yes	2	9	P value = 0.138
no	0	11	

Bar diagram showing association between physical activities and BMI

V. Discussion

This study was done to describe the sociodemographic features and identify modifiable risk factors in type 2 diabetes mellitus patients between age group 24 to 32 years residing in rural areas around Sri Manakulavinayagar medical college and hospital, puducherry.

Total prevalence of diabetes mellitus in young population was found maximum in males here. It was consistent with ICMR-INDIAB study which showed odds ratio of 1.3 for male sex.[1]

Regarding educational status of the patients all were literate with more than half of the individuals were graduate which says that knowledge and awareness about the personal hygiene and health does not necessarily result in action.

Most of the patients (90.1%) here belong to lower middle and lower class socioeconomic status. Study by Swannaphant et al.[4] also revealed similar results however study done by Xu Z et al.[5] and Corsi DJ et al.[6] had concluded that higher socioeconomic status were at increased risk of developing type 2 diabetes mellitus.

Positive family history of diabetes is related with a range of metabolic abnormalities and is a strong risk factor for the development of type 2 diabetes mellitus.[1] However, in this study majority individuals do not have positive family history of diabetes.

Abdominal obesity commonly found in Indian population was more prevalent in our diabetic participants also. Significant percentage of subjects have more waist circumference 58.8% in males and 60% in females and are falling in the 'Indian criteria for metabolic syndrome'[10].

This study also shows obesity as a major risk factor for developing diabetes mellitus. It was similar with many previous studies like Anjana RM et al.[1], Al Goblan AS et al.[7] even though those studies included patients above age 32 years also. The mechanisms linking the two are increased production of adipokines or cytokines, ectopic fat deposition and mitochondrial dysfunction. These can lead to insulin resistance and compromised β-cell function of pancreas.

IPAQ[8] revealed only 5 (22.7%) participants have inculcated regular physical activities in their lifestyle rest were following no physical activities or sedentary lifestyle. According to Wang Q et al.[9] physical inactivity is an important modifiable risk factor for middle age and elderly adults in modern times. Our study showed that physical inactivity is seen increasingly in young population residing in rural areas.

Also strong association was found in this study between sedentary life style and obesity which was statistically significant (P 0.006). Hence apart from genetics, physical activity plays a major factor in obesity development which ultimately result in hastening the occurrence of type 2 diabetes mellitus in age group less than 32 years.

All the patients here had multiple modifiable risk factors leading upto diabetes mellitus. Therefore tackling multiple risk factors is as essential as concentrating on one certain risk factor.

LIMITATIONS:1. Small sample size and short duration study ,2. Only those who were already diagnosed with type 2 diabetes mellitus were included

VI. Conclusion

It was observed that multiple modifiable risk factors occurred in young diabetic patients. Of which physical inactivity and obesity played a major role here. Hence aggressive intervention strategies (primodial and primary prevention) are required at community levels to control the diabetes epidemic in rural India particularly among young patients.

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