Original Article

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Risk of Type 2 Diabetes Mellitus in Adolescents in a Medical College in Bangalore, India

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Abstract

Introduction: India is home to more than one-sixth of the world's population, and this proportion is expected to increase with time. India is also expected to become the Diabetes Capital of the World, by 2025. Diabetes mellitus (DM), which is a leading cause of morbidity and mortality in developing countries, is an ice-berg disease. More than 50% of the diabetic patients in India are unaware of their diabetic status.

Materials and Methods: In this study, risk assessment of Type 2 DM (T2DM) among adolescents in 1st year medical students was done using the Indian Diabetes Risk Score that includes age, exercise status, waist circumference, and family history of DM.

Results: Of 238 students, 114 (47.9%) were found to be in medium and high-risk category. According to the obesity classification, for Asians 43 (18.1%) were overweight, and 68 (28.6%) were obese.

Conclusion: Information, education, and communication need to be highlighted on healthy lifestyle incorporating a balanced diet and physical activity to reduce obesity in view of reducing the risk of T2DM in the future. Awareness program on diabetes and its prevention are the need of the hour.

Key words: Adolescents, Diabetes mellitus, Obesity

INTRODUCTION

India is home to more than one-sixth of the world's population, and this proportion is expected to increase with time. It is also expected to become the Diabetes Capital of the World, by 2025. Diabetes mellitus (DM), which is a leading cause of morbidity and mortality in developing countries, is an ice-berg disease.[1] More than 50% of the diabetic patients in India are unaware of their diabetic status.

Traditionally, Type 2 DM (T2DM) has been a disease of adults. However, the same now occurs in increased numbers among obese adolescents.[2] The evidence is emerging of growing prevalence of type 2 diabetes among urban Indian children, as well.[3]

The increasing evidence on the risk factors for developing DM has made it possible to develop screening tools, and now, there are several strategies for screening for diabetes in the population.[4]

Living conditions in India have improved considerably including dramatic improvements in food habits and transport facilities. Lifestyle also has changed namely increased television viewing and decreased physical activity. The changing lifestyle was found to be a contributory factor for the rising rates of obesity and associated metabolic diseases like diabetes.[5]

The roots for cardiovascular diseases and T2DM are found in childhood; particularly in children and adolescents with obesity.[6] The prevalence of overweight in adolescents is

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increasing, and this is a major public health problem worldwide, as well as in India. This is associated with urbanization and technological advances that affect lifestyle. Obesity, specifically abdominal obesity is a major trigger factor for insulin resistance. The insulin receptor signaling pathway is altered in the presence of excessive free fatty acids and inflammatory substances, which further leads to metabolic alterations that comprise metabolic syndrome. Metabolic syndrome has been detected in the younger age group with increasing rate.[7] The opportunities are rising for lifestyle interventions in at-risk individuals for prevention or delaying future diseases namely diabetes, hypertension, and coronary heart disease.

Obesity in adolescents and children has risen to significant levels globally with serious public health consequences. In addition to endocrine, cardiovascular, emotional, and social issues, it poses a serious hazard to basic health care delivery system.[8]

Adolescence is a critical time for young people with diabetes when they learn to take increasing responsibility for the management of their disease. Teenagers experience the relationship between their actions and blood glucose readings, which influences their beliefs about diabetes, its treatment and how they will manage it.[9]

This study is an attempt to evaluate the risk of diabetes among 1st year medical students in a medical college, as there are few studies in this area.

MATERIALS AND METHODS

A cross-sectional study was done at Vydehi Institute of Medical Sciences and Research Centre, Bangalore, from September to October 2014. The college Ethical Committee approved the research protocol, and verbal informed consent was obtained from the participants.

The study population consisted of 1st year medical students studying at Vydehi Institute of Medical Sciences and Research Centre. Of 250 medical students in the 1st year of medical college, 238 took part in the study. The exclusion criteria comprised of three students who were chronic absentees, six students who did not give consent for the study, and three students who were above the age of 19 years. They were assessed for Indian Diabetes Risk Score (IDRS).[10] A semi-structured questionnaire was administered to all of them comprising of general information such as age, gender, family, history of diabetes, and physical activity. Anthropometric measurements were taken. Height of all the students was measured using a stadiometer and weight in kilograms with an electronic weighing scale. Waist circumference was also measured in centimeters. Body Mass Index (BMI) was calculated and the students were categorized as overweight and obese, according to the obesity classification for Asians.[11]

The data obtained were tabulated in Excel sheet and analyzed using SPSS version 21. The scoring was done, according to the IDRS criterion. The students were scored with a minimum score of 0 and a maximum score of 100. Depending upon the score obtained the students were divided into three category of diabetic risk, score ≤ 30 were low risk, score of 40-50 were medium risk, and a score ≥ 60 were high-risk candidates for diabetes. The chi-square test was used to study the association among various parameters and the risk of DM.

RESULTS

The mean age of the 238 students who participated in the study was 17.8 ± 0.6 years.

There were 91 (38.24%) males and 147 (61.76%) females. Among the students 124 (52.1%) were in low-risk category, 102 (42.9%) were in medium risk category, of which 73 (71.6%) were females, and 12 (5.0%) were in the high-risk category. A significant association was found between gender and risk (Table 1) ($P < 0.05$).

Among them 121 (50.8%) students had increased waist circumference, 184 (77.3%) students did not take part in any physical activity, 59 (24.8%) had family history of diabetes either in the father, mother or both (Table 2). A significant association was found between physical activity and waist circumference (Table 3) ($P < 0.05$).

According to the obesity classification, for Asians 43 (18.1%) students were over-weight, and 68 (28.6%) students were obese (Table 4). A significant association was found between BMI and physical activity (Table 5) ($P < 0.01$).

A positive correlation was seen between the BMI and waist circumference, that is, if BMI score increases by one then the waist circumference increases by 0.763 cm.

DISCUSSION

The present study revealed that 12 (5%) students are in the high-risk category, 102 (42.9%) in medium risk category and 124 (52.1%) in the low-risk category. In a similar study, conducted in Pune, where 99 female students and 162 male students participated 4%, 76%, and 20% had high, moderate, and low-risk, respectively, for developing T2DM.[12]

Table 1: Distribution of gender and risk of DM

Risk	Gender		Total
	Male	Female	
Low	60 (48.4)	64 (51.6)	124 (52.1)
Medium	29 (28.4)	73 (71.6)	102 (42.9)
High	02 (16.7)	10 (83.3)	12 (5.0)
Total	91 (38.24)	147 (61.76)	238 (100)

χ^2=11.93, DF=2, *P*<0.05. DM: Diabetes mellitus

Table 2: Indian diabetes risk score

Parameters	Number	Percent
Waist circumference		
<80 cm females and <90 cm males	117	49.2
≥80 cm females and ≥90 cm males	79	33.2
≥90 cm female and ≥100 cm males	42	17.6
Physical activity		
No exercise/sedentary life style	184	77.3
Mild exercise	13	5.5
Moderate exercise	27	11.3
Vigorous exercise	14	5.9
Family history		
No family history	179	75.2
One parent diabetic	55	23.1
Both parents diabetic	4	1.7

Table 3: Relation between physical activity and waist circumference

Waist circumference	Physical activity (%)		Total
	Present	Absent	
Normal	97 (82.9)	20 (17.09)	117
Increased	87 (71.9)	34 (28.09)	121
Total	184 (77.31)	54 (22.69)	238

χ^2=4.11, DF=1, *P*<0.05

Table 4: Body mass index

BMI	Number	Percent
Under weight	28	11.8
Normal	99	41.6
Over weight	43	18.1
Obese	68	28.6

BMI: Body mass index

Table 5: Relation between physical activity and BMI

BMI	Physical activity		Total
	Present	Absent	
Under weight	27	1	28
Normal	85	14	99
Over weight and obese	72	39	111
Total	184	54	238

χ^2=19.76, DF=2, *P*<0.01. BMI: Body mass index

In a study conducted in Mangalore, 150 medical students were assessed, out of which 75 were females and 75 were males. A total of 8.6% students had abnormal waist circumferences while 12.4% had a family history of diabetes. In the present study, 50.8% had increased waist circumference and 24.8% had family history of diabetes.[13]

A similar study was conducted in Kolar, on 300 medical students, and it was observed that the mean age was 19.3 ± 1.4 years and 85% students had sedentary lifestyle. In the current study, the mean age was 17.8 ± 0.6 years and 77% students had sedentary lifestyle.[14]

A study among 702 college students at Universidade Federal do Ceará, comprised of 237 students in the age group of 16-19 years of which 70.6% had a sedentary lifestyle, and 22.8% were overweight.[15] In the present study, 43 (18.1%) were overweight and 68 (28.6%) were obese, according to the obesity classification for Asians.

CONCLUSION

Among medical students, 47.9% had moderate to high-risk score for T2DM. Information, education, and communication need to be highlighted on healthy lifestyle incorporating a balanced diet and physical activity to reduce obesity, in view of reducing the risk of T2DM in the future.

The simple and cost-effective IDRS could serve as a basic tool for the grass root health workers to identify at risk individuals at the earliest and enable primary prevention of T2DM.

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