

SCREENING OF MEDICAL STUDENTS OF TALEGAON DABHADE FOR DIABETES MELLITUS

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ABSTRACT

Background: WHO estimates that 422 million people, world over, are presently afflicted with Diabetes Mellitus, with about 90% cases being Type 2. In India, Diabetes has reached epidemic proportions, with a rising incidence among the younger population, directly associated with rise in prevalence of obesity. The objective of this study was to screen for, and assess the risk for Diabetes among medical students, considering them as representative of the young adult population. **Study Design:** Cross-sectional Observational Study. **Methodology:** The study was carried out among 174 students (aged 18-23 years) of MIMER Medical College, Talegaon Dabhade, and Pune. A detailed family history of Diabetes was taken Height, weight, BMI, waist circumference, Waist /Hip ratio (WHR), Blood pressure were measured. Random Blood Sugar Level (BSL-R) was used as a screening tool. Finally, Indian Diabetes Risk Score (IDRS) was calculated for each student. **Result:** 174 students were studied - 66 males and 108 females (M: F = 0.61:1). 32.2% (n=56) had a positive parental history for Diabetes, 2.9% (n=5) were obese, and 12.6% (n=22) had a high Waist/Hip Ratio. 1.7% (n=3) were found to have an abnormal BSL-R. 51.7% (n=90) were found to be in Medium risk category as per IDRS. **Conclusion:** Incidence of Type 2 Diabetes Mellitus in younger ages are rising alarmingly, carrying with them a greater risk of complications and morbidity. The chief culprits are modifiable risk factors and hence screening for Diabetes at an early age is of utmost importance. All individuals, irrespective of age or family history, must endeavour to maintain a healthy diet and lifestyle, and be educated and counselled accordingly.

KEYWORDS: Diabetes Mellitus (DM), Students, Screening, BMI, BSL-R, IDRS (Indian Diabetes Risk Score).

INTRODUCTION

Diabetes Mellitus (DM) as a clinical entity needs no formal introduction. A complex, multifactorial metabolic disease arising, essentially, from a single lynchpin – Insulin – the actual or apparent lack of which, leads to its myriad symptoms and eventual complications, often culminating fatally.^[1] WHO has reported that Diabetes Mellitus, as of 2016, afflicts an estimated 422 million people worldwide,^[2] with a steep upward curve in prevalence rates^[3]. More than 90% of these comprise cases of Type 2 DM.^[2] In 2014, it was studied that the disease is reaching potentially epidemic levels in India,^[4] with the now-confirmed proclamation that India is indeed, the Diabetic capital of the world.^[5] Studies have already shown that Indians may be racially and ethnically more vulnerable to developing the disease,^[6] but, a more worrying trend is what is being called the ‘emerging epidemic’ in a younger population,^[7] as non-autoimmune forms of youth-onset DM have become increasingly prevalent over the past 20

years, rising parallel to the rates of obesity in children and adolescents. Early onset Type 2 DM patients are 80% more likely to begin Insulin therapy^[8] than those with usual onset (Hazards Ratio = 1.8). They are also 20% more likely to develop microalbuminuria (HR = 1.2), have twice the risk for macrovascular complications compared to usual-onset (HR of 7.9 vs. 3.8), as well as increased risk of developing MI (HR of 14.0 vs. 3.7). Early-onset patients, at the time of diagnosis, also have a higher BMI (37.2 vs. 33.3) and higher HbA_{1c} values (8.7 vs. 8.1).^[8] A number of factors including rapid urbanization, sedentary lifestyle, dietary habits and stress, among others have been implicated in this trend. Screening for diabetes at a young age has thus gained great importance, with due emphasis on key risk factors,^[9] the chief among them being relevant family history, obesity and evaluation of Blood Sugar Level (BSL)^[10] Of utmost importance also, is the spread of awareness among the young population, especially medical students,^[11] who must be thoroughly educated in

aspects of prevention, screening and management of diabetes. This study endeavours to screen for Type 2 Diabetes Mellitus in a young age group (18-23 years) of undergraduate Medical students using Random Blood Sugar Level (BSL-R), and to assess as well as stratify the risk for Diabetes Mellitus using the Indian Diabetes Risk Score (IDRS), an aggregate based on four risk factors - Age, Family history of Diabetes Mellitus, Physical activity and Waist circumference. Since this resultant evaluation of risk factors will be based on a study of their own bodies' health status, it will hitherto serve to increase their awareness, improve their knowledge and enable these future medical professionals to provide primary and where possible, primordial prevention as well as requisite treatment, care and counselling.

MATERIALS AND METHODS

AIM

To screen the student population of MIMER Medical College for Diabetes Mellitus and assess risk for Diabetes Mellitus by measuring Random Blood Sugar Level (BSL-R) and Indian Diabetes Risk Score (IDRS).

OBJECTIVES

- To carry out Anthropometric assessment so as to calculate Body Mass Index (BMI) and Waist: Hip Ratio (WHR).
- To carry out General Examination and record Blood Pressure.
- To estimate Random Blood Sugar Level, and to use these parameters to screen for, as well as assess the risk for DM.

A Cross-sectional Observational Study, duly approved by the Institutional Ethical Committee (IEC) was carried out amongst 174 apparently healthy students, from 1st, 2nd and 3rd year MBBS and BPT (age 18-23 yrs) of MIMER Medical College. This was conducted as a two-day screening camp on college premises.

Those already diagnosed with Type 1 or Type 2 Diabetes Mellitus or on medication for Diabetes, Hypertension, Obesity or any endocrine disorder were excluded.

Each student was given an Information Sheet and screening proforma, explained the procedure and consent was taken. Personal information and details were filled in. Relevant personal history and family history was recorded, followed by physical examination and anthropometry - Height, Weight, BMI, Waist Circumference, Hip Circumference, Waist/Hip Ratio. General examination - Pulse, Blood Pressure was recorded.

After wiping the fingertip (left ring finger) with spirit, under all aseptic precautions, blood sample was collected with a disposable lancet. Random Blood Sugar Level (BSL-R) was estimated, using glucometers. Data was compiled and tabulated using MS Office Excel. Indian Diabetes Risk Score (IDRS) and Risk Category was

calculated for each student. Statistical analysis was done in consultation with the biostatistician.

The IDRS parameters are as follows

AGE	
Less than 35 years	0
35 – 49 years	20
More than or equal to 50 years	30
WAIST CIRCUMFERENCE	
Less than 80 cm (F), Less than 90 cm (M)	0
80 - 89 cm (F), 90 – 99 cm (M)	10
More than or equal to 90 cm (F), More than or equal to 100 cm (M)	20
PHYSICAL ACTIVITY	
Regular vigorous exercise or strenuous activity at home/work	0
Regular moderate exercise or moderate activity at home/work	10
Regular mild exercise or mild activity at home/work	20
No exercise or sedentary activity at home/work	30
FAMILY HISTORY OF DIABETES	
No diabetes in Parents	0
One parent is diabetic	10
Both parents are diabetic	20

RESULTS

a total of 174 students (aged 18-23 years) were enrolled for the study.

There were 37.9% (n=66) males and 62.1% (n=108) females, setting an M:F ratio of 0.61:1. 29.9% (n=52) had a history of Diabetes Mellitus in one parent (maternal or paternal), and 2.3% (n=4) students had history of DM in both parents.

2.9% (n=5) of the total students were Obese (BMI exceeding 30.0), with 4.5% (n=3) males and 1.9% (n=2) being rates of obesity in males and females, respectively. Mean BMI of the student population = 22.39.

12.6% (n=22) had a Waist/Hip Ratio exceeding normal for their gender, with 18.2% (n=12) of the male students (WHR exceeding 0.9) and 9.26% (n=10) of the female students (WHR exceeding 0.85) affected, as per the WHO Protocols for WHR and obesity.

1.7% (n=3) students were found to have BSL-R (above 140mg/dl). Amongst these, one student was also found to be obese (BMI exceeding 30.0), while the other two students were non-obese. These students were accordingly referred to the Medicine OPD and followed up. Mean value of BSL-R = 109.02 mg/dl.

51.7% (n=90) students were in the MEDIUM risk category (IDRS 30 to 50) and 48.3% (n=84) were assessed to be in the LOW risk category (IDRS above 30).

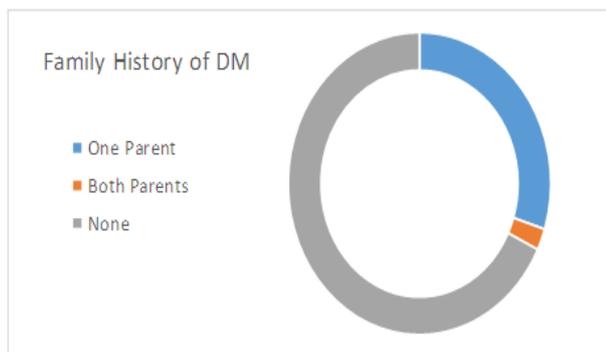


Figure 1: Pie Chart depicting Family History of Diabetes Mellitus.

Table 1: Family History of Diabetes Mellitus.

Family History of DM	Total	Male Students	Female Students
Both parents affected	2.3 % (n=4)	4.5 % (n=3)	0.9 % (n=1)
One parent affected	29.9 % (n=52)	24.2% (n=16)	33.3% (n=36)
No parental history of DM	67.8 % (n=118)	71.3% (n=47)	65.8% (n=71)

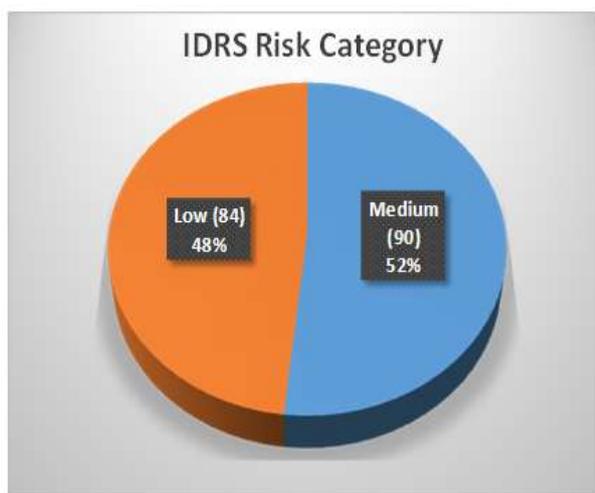


Figure 2: Bar Graph depicting Gender-wise distribution of the findings of Obesity (BMI above 30), Abdominal Adiposity (Raised WHR) and Raised BSL-R (above 140mg/dl).

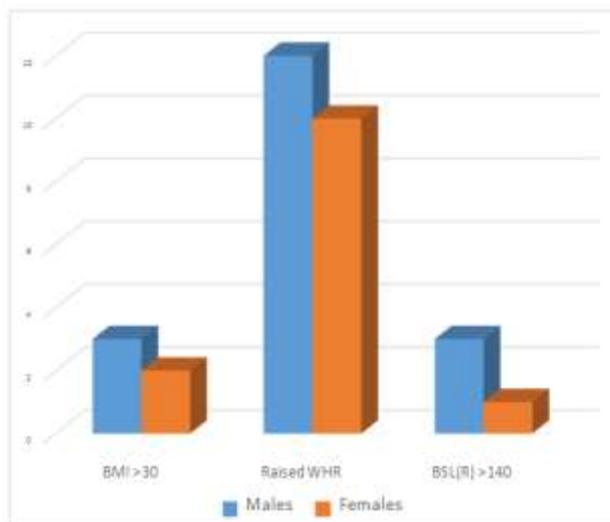


Figure 3: Pie Chart depicting distribution of students as per the Indian Diabetes Risk Score (IDRS) into Medium and Low Risk.

Table 2: Categorization according to Body Mass Index (BMI).

BMI (kg/m ²)	Category	Total	Male Students	Female Students
>30.0	OBESE	2.9% (n=5)	4.5% (n=3)	1.9% (n=2)
25.0-29.9	Overweight	21.3% (n=37)	27.3% (n=18)	17.6% (n=19)
18.5-24.9	Normal	62.6% (n=109)	59.1% (n=39)	64.8% (n=70)
<18.4	Underweight	13.2% (n=23)	9.1% (n=6)	15.7% (n=17)

DISCUSSION

Perhaps the most telling impact of urbanization has been the emergence of the non-communicable or ‘lifestyle’ diseases, with Diabetes Mellitus, Obesity and Hypertension being the three key players, the three pillars on which rests the infamous Metabolic Syndrome X – a clustering of inter-related modifiable risk factors, leading to cardiovascular disease, premature death and disability. It is a multiplex arising, essentially, from insulin resistance (impaired glucose tolerance)

accompanied by abnormal adipose deposition and function, further reinforcing its association with diabetes and obesity.

Several studies have indicated that Metabolic Syndrome may represent a variant of pre-diabetes showing different biomarkers. Apart from diabetes and coronary heart disease, it is linked to fatty liver, hyperuricemia, obstructive sleep apnoea, cerebrovascular accidents and multiple cancers. Prevalence of this syndrome has been

estimated to be 33.5% in the Indian population.^[12] 24.2% (n=42) of our study population was found to be either obese or overweight (BMI above 25.0), which was significant considering the age-group being studied. This fulfils one of required criteria for Metabolic Syndrome, making it imperative that steps be taken in order to prevent these students from falling into this cascade which culminates in an untimely death.

Incidence of early-onset Type 2 Diabetes Mellitus (diagnosed before the age of 35 yrs) has been increasing at an alarming rate in the recent years.^[13,14] What is more alarming is the risk of early development of advanced complications including, and not limited to early nephropathy, microangiopathy, neuropathy and accelerated Beta-cell failure. While greatly influencing Morbidity rates (Disease Burden), Disability-Adjusted Life Years (DALYs) and Years of Potential Life Lost (YPLL), it also inflates the healthcare-related expenditure and increases the consumption of healthcare resources.

Our study evaluated 174 students, placing 48.3% (n=84) in Low risk and 51.7% (n=90) in Medium risk, as per the Indian Diabetes Risk Score (IDRS). IDRS is a measure of risk of developing Type 2 Diabetes Mellitus in a person's lifetime based on two key non-modifiable factors (age and family history) and two key modifiable factors (waist circumference and physical activity). The findings of our study were found to be comparable with a study^[9] by Ashok P., et al, with 55% in Moderate risk and 38% in Low risk group. With over half the students at a significant risk of developing Diabetes Mellitus, the need for screening, timely detection and early initiation of treatment further gain importance, along with the need to address and amend modifiable risk factors, namely obesity, physical inactivity and diet.

32.2% students (n=56) had a family history of Diabetes Mellitus in one or both parents, similar to findings by Ashok P,^[9] et al, which found 25% students to have such history.

2.9% (n=5), 21.3% (n=37) and 13.2% (n=23) were found to be obese, overweight and underweight respectively, with a mean BMI of 22.39. These findings were comparable to a study by S. Gopalakrishnan, et al,^[14] which found 5.2% obese, 15.9% overweight and 14.8% underweight, as well as a study by Soma Gupta, et al,^[15] which found prevalence of obesity and overweight as 3.4% and 17.5%, respectively. All these trends are strongly suggestive of the rising rates of childhood and adolescent obesity, verified by several studies.^[7,15,16,17]

Abdominal adiposity, indicated by raised WHR, was found in 12.6% (n=22) overall, and the proportion in the male students (18.2%, n=12) was found to be nearly twice that of the females (9.26%, n=10). This correlates with the higher prevalence of central or 'apple-type' obesity in males and has been strongly linked to lack of

oestrogenic influence in men, which predisposes adult males to cardiovascular disease and metabolic syndrome.^[1] Similar findings were seen in a study by Shamail Zafar, et al,^[16] which found the prevalence to be 11.59%.

1.7% (n=3) were found to have an elevated BSL-R. Mean value of BSL-R was 109.02 mg/dl, similar to findings in a study^[9] by Ashok P, et al where mean BSL-R was 97.33 mg/dl.

CONCLUSION

- While incidence of Diabetes and Metabolic Syndrome is already on the upswing, what is more striking is the inflated rate of these conditions in younger people, siphoning off what was once considered to be the 'relative protection of youth'.
- Were these trends to continue, projections into the future appear to be bleak at best.
- Mass interventions, thus are the need of the hour, and herein lies the importance of screening, among the high-risk groups as well as the general population.
- Simple finger-prick methods now estimate blood sugar level (BSL) with speed, economy and accuracy, processing larger numbers of samples at once.
- This enables the screening process to be more efficient, and enables earlier detection of cases which can be appropriately referred, started on treatment and counselled, thereby improving quality of life and delaying complications.
- It is imperative that concerted efforts be taken to quash this emerging epidemic, in which the contribution of patients must go hand in hand with that of medical professionals.
- Not only is there a need to implement primordial prevention (prevent the occurrence of the risk factor itself), but also to integrate them with current healthcare standards in order to ensure that the burden of Diabetes Mellitus and its sequelae are reduced greatly.

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