Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.47750/jptcp.2023.30.04.061

Risk Assessment of Diabetes Using the Indian Diabetes Risk Score: A Study on Young pharmacy students from Tirupati District

K. Rohith Chandra[1]*, Rizwan Shaik. M[2], Ganga Maheswar Reddy[3], C. Akhila[3], D. P. Sujala[3], B. Vani[3], Dheeraj[3], Sai Santosh Reddy[3], Jeevan kumar[4], Aman Khandelwal[5]

[1]Assistant professor Sree Vidyanikethan College of Pharmacy, Department of Pharmacy Practice, Tirupathi, Andhra Pradesh.

[2]Pharm.D JSS College of Pharmacy, Department of Pharmacy Practice, Ooty, Tamil Nadu.

[3]Bachelors of Pharmacy final year students, Sree Vidyanikethan College of Pharmacy, Tirupathi, Andhra Pradesh.

[4]Assistant Professor Sree Vidyanikethan College of Pharmacy, Department of Pharmacy Practice, Tirupathi, Andhra Pradesh.

[5]Research Scholar, JSS College of Pharmacy, Dept. of Pharmacy Practice, Ooty, Tamil Nadu

***Corresponding author:** K. Rohith Chandra, Assistant professor Sree Vidyanikethan College of Pharmacy, Department of Pharmacy Practice, Tirupathi, Andhra Pradesh.

Submitted: 12 January 2023; Accepted: 18 February 2023; Published: 16 March 2023

ABSTRACT

Context: Young people must be educated about diabetes risk factors because the disease is now spreading at an epidemic rate among them. An efficient and established tool to assess population diabetes risk is the Indian Diabetes Risk Score (IDRS).

Aim: Young pharmacy students were used in the current investigation to assess the risk of type 2 diabetes mellitus (T2DM) using the IDRS and to investigate the relationship between the risk of diabetes and other parameters.

Materials and Methods: Between January 2023 and April 2023, a prospective study involving 310 pharmacy students in first grade was carried out. For data gathering, a semi-structured interview schedule was created. informed written consent was obtained.

Statistical Analysis Used: The data analysis uses SPSS version 25. It was deemed statistically significant if "P"< 0.05.

Results: The study involved 310 pharmacy students in total. According to the IDRS classification, 72.90%, 26.10%, and 1% of pupils fell into the low-, moderate-, and high-risk categories, respectively. A statistically significant relationship between gender, a family history of diabetes, a lack of/mild physical activity, and a body mass index (BMI) of less than 23 kg/m2 was found to be associated with a moderate- high diabetes risk.

Conclusion: According to the results of the current study, many young pharmacy students (27.10%) were in the moderate-high risk group of acquiring type 2 diabetes, and health practitioners should be especially watchful of young obese guys who engage in little physical activity and have a strong family history of the condition. Therefore, it is vital to promote behavior change communication among young pharmacy students so that risk mitigation techniques and lifestyle modifications can be put into place early in their lives.

Keywords: *Indian Diabetes Risk Score, Pharmacy students, type 2 diabetes mellitus*

J Popul Ther Clin Pharmacol Vol 30(4):e604–e616; 16 March 2023.

INTRODUCTION

All age groups are affected by the serious public health issue of diabetes mellitus, which has recently been linked to youth. The Madras Diabetes Research Foundation's Indian diabetes risk score (IDRS), created and developed by Mohan et al., is a validated instrument for identifying people who are at a high risk of eventually acquiring type 2 diabetes mellitus (T2DM). Age, family history, abdominal obesity, and physical activity are the four risk factors taken into account. Due to academic requirements, pharmacy students typically lead sedentary lives, and there have been few pieces of research on diabetes screening among them. Thus,the current study was designed to evaluate risk scores using the IDRS and to investigate the relationship between T2DM risk and other characteristics among pharmacy students. All age groups are affected by the serious public health issue of diabetes mellitus, which has recently been linked to youth. The madras diabetes research foundation's Indian diabetes risk score (IDRS), created and developed by Mohan et al., is a validatedinstrument for identifying people who are at a high risk of eventually acquiring type 2 diabetes mellitus (T2DM). Age, family history, abdominal obesity, and physical activity are the four risk factors taken into account [1].

SUBJECTS AND METHODS

The current prospective study was carried out between January 2023 and April 2023 among first-grade pharmacy students at a medical institution in the Tirupati area.

Data collection tools were

a. A semi-structured interview schedule for subjects such as age, gender, total number of family members, parents' education/occupation, and physical activity. The World Health Organization (WHO) nutritional assessment questionnaire was used to collect a dietary history of fruit and vegetable intake. Kuppuswamy's approach to social classification was used to classify education and occupation status. BMI grades (modified for Asians) were utilized [2]. Dietary history was taken as per the National Nutrition Guidelines [3]. In a typical week, consume 100 g of fruit (portion size = 100 g many servings = 1) every day. One serving of fruit was defined as 100g or 2/3 of an average size apple, 37g of guava, 12 bananas, or one average-sized orange (92 g). Adequate vegetable consumption was defined as consuming 300 g of vegetables (portion size = 100 g number of portions = 3) per day during an average week. One vegetable portion was defined as 50 g of green leafy vegetable or potato, 200 g of other vegetables, and 50 g of roots and tubers. Anthropometric measurements (height, weight, waist circumference, hip circumference, and blood pressure) were measured using standard methods and noted.

b. The risk factor profile was determined using the IDRS. 35 years were marked as 0 (score: 0), 35-49 years as 1 (score: 20), and 50 years as 2 (score: 30).

c. The waist circumference was used to determine abdominal obesity. Subjects with waist circumferences of 80cm (female), 90cm (male) were coded as 0 (score: 0); waist circumferences of 81-89cm (female), 91-99cm (male) as 1 (score: 10) and waist circumferences of 90cm (female), 100 cm (male) as 2 (score: 20).

d. Vigorous intensity exercises were classified as those that require a significant amount of effort, fast breathing, and a significant increase in heart rate for at least 10 minutes consistently. Moderate-intensity exercises were classified as those that required a moderate level of effort and a visibly increased heart rate for at least 10 minutes continuously. Subjects performing regular vigorous exercise or strenuous (manual) activities at home/work were coded as 0 (score: 0); subjects performing regular moderate exercise or moderate physical activities at home/work were coded as 1 (score: 10); subjects performing regular mild exercise or mild physical activities at home/work were coded as 2 (score: 20); and subjects performing no exercise and/or sedentary activities at home/work were coded as 2 (score: 30).

e. Test subjects without a history of diabetes were given a score of 0, one diabetic parent received a score of 10, and both parents received a score of 2. IDRS30 subjects were classified as low risk, 30-50 as medium risk, and 60 as high risk. Subjects having a diabetes risk score of more than 30 were referred to a tertiary care institution for blood sugar testing and additional follow-up.

J Popul Ther Clin Pharmacol Vol 30(4):e604–e616; 16 March 2023.

Data analysis

Data were entered and analyzed using the SPSS version 25. Quantitative data were expressed as mean, median, standard deviation, and 95% confidence interval (CI) was calculated. Qualitative data were expressed as percentages/proportions and the Chi-square test ($\chi 2$) was used. 'P' < 0.05 was considered statistically significant.

Ethical considerations

Ethical clearance was taken from the Ethical committee. Written informed consent was taken from study participants. Confidentiality of the data was maintained at all steps and data were used only for this research.

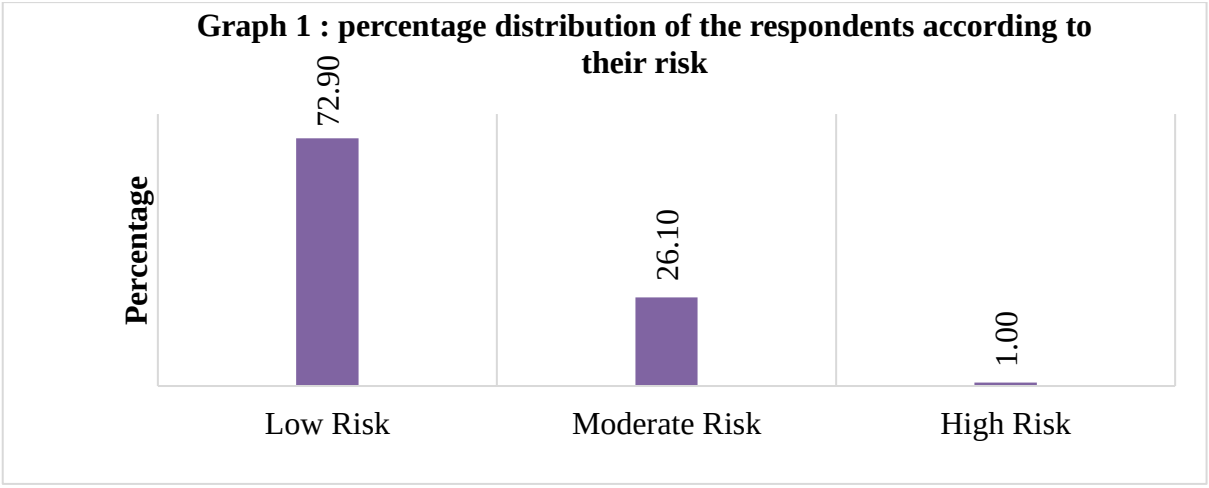
RESULTS

A total of 310 pharmacy students were included in the study, of which 122 (39.35%) were males and 188(60.65%) were females. Table 1 shows the Group-wise distribution of subjects in IDRS risk groups.

TABLE 1: Group-wise distribution of subjects in risk groups (n=310)

Group (risk score)	No. of subjects (%)	Mean risk score
Group I (<30)	226(72.90)	21.62
Group II (30-50)	81(26.10)	43.01
Group III (≥60)	3(1.00)	66.67
Total no. (%)	310(100)	

This table provides information on the distribution of subjects in different risk groups based on their risk score, along with the number of subjects and the mean risk score for each group. There are three risk groupsdefined in the table based on the risk score ranges: Group I (<30), Group II (30-50), and Group III (≥60). The table shows that the majority of subjects (226 out of 310 or 72.90%) are in Group I, with a mean risk score of 21.62. Group II has 81 subjects (26.10%) with a mean risk score of 43.01, while only 3 subjects (1.00%) are in Group III with a mean risk score of 66.67. Overall, this table provides a summary of the distribution of subjects across different risk groups based on their risk scores.



Age

The mean age for the dataset (n=310) is 20.28, which is the average of all the age groups in the dataset. Themedian age is 20.00, which is the middle value when the dataset is arranged in order. The mode age value is21.00, which is the most frequently occurring value in the dataset. The standard deviation of the dataset is 1.52, which indicates the amount of variation in the dataset. The minimum value in the dataset is

14.00, whilethe maximum value is 23.00. The quartiles are also provided, with the 25th percentile (Q1) being 19.00, the 50th percentile (Q2, which is the same as the median) being 20.00, and the 75th percentile (Q3) being 21.00.

TABLE 2: Descriptive Statistics for a Dataset of 310 Subjects

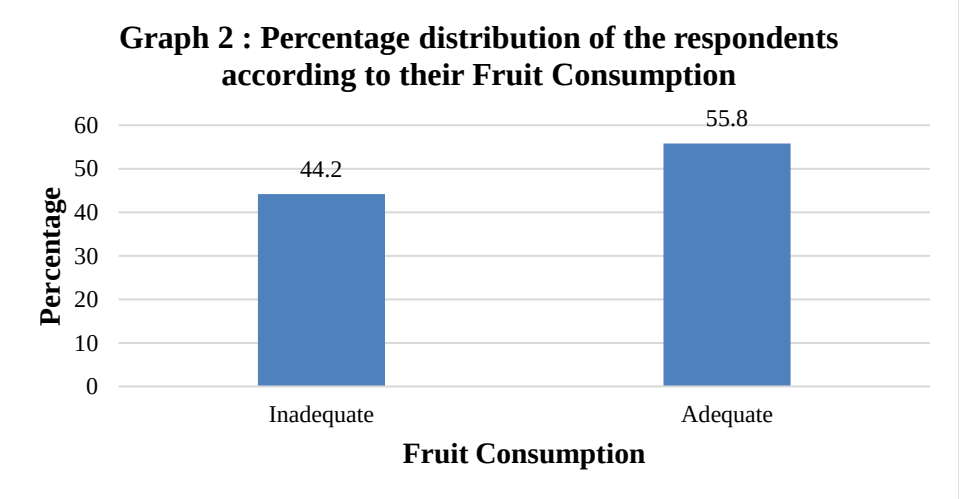
Frequency		**Number of subjects (n=310)**
Mean		20.28
Median		20.00
Mode		21.00
Std. Deviation		1.52
Minimum		14.00
Maximum		23.00
Quartile	25	19.00
	50	20.00
	75	21.00

Dietary Habits

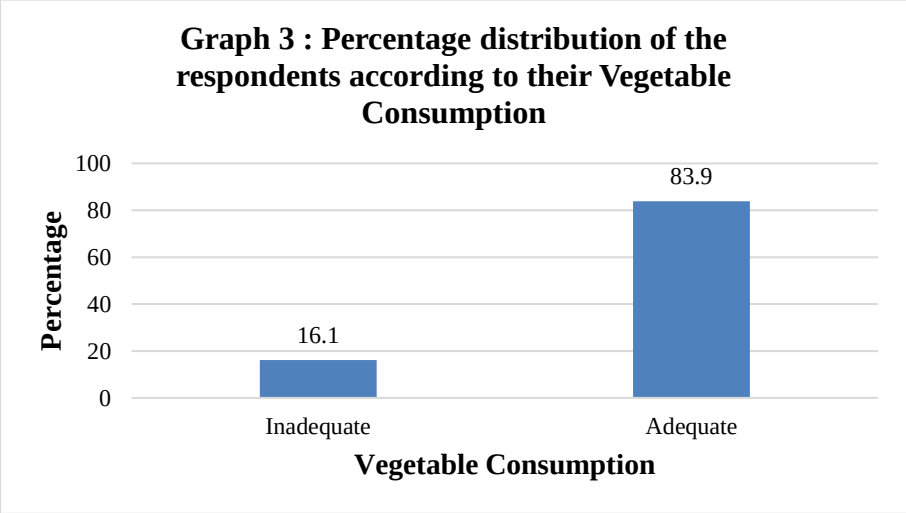
Fruit consumption was adequate in 173 (55.80%) and inadequate in 137 (44.20%) subjects. Vegetable consumption was adequate in 260(83.90%) and inadequate in 50(16.10%) subjects. The average intake of fruits and vegetables was two portions per day. The average number of days in a typical week with fruit consumption and the average number of servings consumed on those days were 5 days a week and two portions, respectively. The average number of days in a typical week with vegetable consumption and the average number ofportions consumed on those days were 6 days a week and two servings, respectively.

TABLE 3: Frequency Table for Fruit and Vegetable Consumption among a Population

Fruit Consumption	**Frequency**	**Percent**
Inadequate	137	44.20
Adequate	173	55.80
Total	310	100.00
Vegetable Consumption		
Inadequate	50	16.10
Adequate	260	83.90
Total	310	100.00



J Popul Ther Clin Pharmacol Vol 30(4):e604–e616; 16 March 2023.

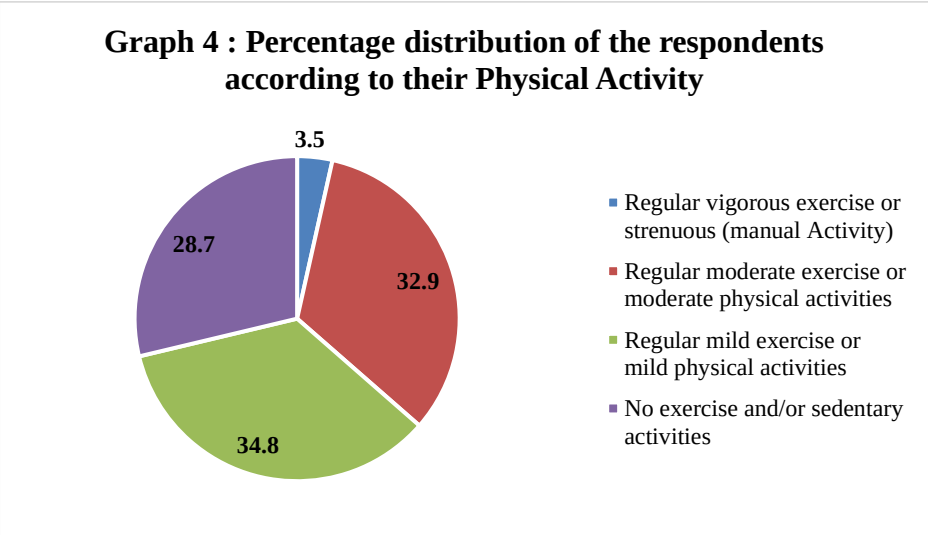


Physical Activity

Vigorous intensity activities were carried out by 11(3.50%) subjects, the average number of days in the atypical week, in which these activities were carried out, was 1 day per week and the average time spent doing them was24 min per day. Moderate-intensity activities were carried out by 102 (32.90%) subjects, the average number ofdays in an atypical week, in which these activities were carried out, was 2 days per week and the average time spentdoing them was 30 min per day. Mild-intensity activities are carried out by 108(34.80) subjects and 89(28.70) subjects were leading sedentary activities.

TABLE 4: Frequency Table for Physical Activity among a Population

Physical Activity	Frequency	Percent
Regular vigorous exercise or strenuous (manual Activity)	11	3.50
Regular moderate exercise or moderate physical activities	102	32.90
Regular mild exercise or mild physical activities	108	34.80
No exercise and/or sedentary activities	89	28.70
Total	310	100.00



J Popul Ther Clin Pharmacol Vol 30(4):e604–e616; 16 March 2023.

Anthropometric Examination

The mean height of males and females (cm) was 166.90 ± 6.40 and 154.73 ± 7.03, respectively. The mean weight (kg)of males and females was 66.45 ± 14.53 and 52.94 ± 10.24, respectively. The mean waist circumference and hip circumference (cm) of males and females were 84.09 ± 8.00 and 77.96 ± 10.27, 93.35 ± 9.97, and 89.18 ± 10.88, respectively. Waist–hip ratio of <0.8 and ≥ 0.8 was seen in 32 (17.02%) and 156(82.98%) female subjects. A waist-hip ratio of <0.9 and ≥0.9 was seen in 58 (47.54%) and 64 (52.46%) male subjects.

TABLE 5: Descriptive Statistics for Anthropometric Measurements by Gender in a Population

Gender		Waist Circumference	HIP Circumference	Height	Weight
Male	Mean	84.09	93.35	166.90	66.45
	Std. Deviation	8.00	9.97	6.40	14.53
Female	Mean	77.96	89.18	154.73	52.94
	Std. Deviation	10.27	10.88	7.03	10.24
Total	Mean	80.37	90.82	159.52	58.26
	Std. Deviation	9.90	10.71	9.02	13.78

TABLE 6: Frequency Table for Waist-Hip Ratio by Gender in a Population

Waist Hip Ratio Females		Frequency	Percent
1	< 0.8	32	17.02
2	>=0.8	156	82.98
Waist Hip Ratio Males			
1	< 0.9	58	47.54
2	>=0.9	64	52.46

Table 7 shows IDRS component-wise distribution among subjects

The table provides information on risk score components of a study population consisting of 310 subjects. The risk score components include waist circumference, physical activity, and family history of diabetes, which are important factors in assessing the risk of developing type 2 diabetes.

The waist circumference of the subjects was categorized into different groups based on gender-specific cut-off values. Among females, 59.04% had a waist circumference of 80cm or less, while among males, 80.33% has a waist circumference of 90cm or less. A small proportion of females (12.77%) and males (4.10%) had a waist circumference of 90 cm or more and 100 cm or more, respectively.

The physical activity level of the subjects was also categorized into four groups ranging from no exercise/sedentary activities to regular vigorous exercise or strenuous manual activities. About one-third of the population reported regular moderate exercise, while 34.80% reported regular mild exercise, and 28.70% reported no exercise or sedentary activities.

The family history of diabetes was categorized into three groups based on the presence or absence of diabetesin the parents. The majority of the subjects (59.70%) reported no diabetes in their parents, while 30.60% reported having one parent with diabetes, and 9.70% reported having both parents with diabetes.

Overall, this table provides insight into the risk score components of the study population, which can be usedto assess the risk of developing type 2 diabetes and develop targeted prevention and management strategies.

TABLE 7: Risk score components of study subjects (n=310)

IDRS components	No of subjects	Percentage (%)
Waist circumference(cm)		
≤80 (females)	111	59.04
≤90 (males)	98	80.33
81-89(females)	53	28.19
≥91-99 (male)	19	15.57
≥90 (female)	24	12.77
≥ 100 (male)	5	4.10
PHYSICAL ACTIVITY		
Regular vigorous exercise or strenuous (manual) activities	11	3.50
Regular moderate exercise or moderate physical activities	102	32.90
Regular mild exercises or mild physical activities	108	34.80
No exercise and or sedentary activities	89	28.70
FAMILY HISTORY OF DIABETES		
No diabetes in parents	185	59.70
One parent is diabetic	95	30.60
Both parents are diabetic	30	9.70

IDRS = Indian diabetes risk score

Table 8 shows the distribution of characteristics with the IDRS among study subjects

In male subjects -low and moderate- high diabetes risk was present in 86.10% and 13.90%, respectively. Infemale subjects -low, moderate-high diabetes risk was present in 64.40% and 35.60%, respectively. This table also includes information on the father's education, the mother's education, the father's occupation, the mother's occupation, and BMI (Body Mass Index) based on modified Asian criteria. In general, individuals with higher levels of education and more professional's occupations tend to have a lower risk of diabetes, while those with lower BMI tend to have a lower risk of diabetes.

TABLE 8: Distribution of characteristics among subjects with IDRS (n= 310)

Characteristic	Low risk (%)	Moderate risk (%)	High risk (%)	Total (%)
Gender				
Males	105 (86.105%)	16 (13.10%)	1 (0.80%)	122 (100.00%)
Females	121 (64.40%)	65 (34.60%)	2 (1.10%)	188 (100.00%)
Father's Education				
Illiterate	22 (75.90%)	7 (24.10%)	0 (0.00%)	29 (100.00%)
Primary school	23 (82.10%)	4 (14.30%)	1 (3.60%)	28 (100.00%)
Middle school certificate	20 (80.00%)	5 (20.00%)	0 (0.00%)	25 (100.00%)
High school certificate	60 (71.40%)	23 (27.40%)	1 (1.20%)	84 (100.00%)
$>10^{th}$ class	101 (70.10%)	42 (29.20%)	1 (0.70%)	144 (100.00%)
Mother's Education				
Illiterate	44 (84.60%)	8 (15.40%)	0 (0.00%)	52 (100.00%)
Primary school	25 (73.50%)	8(23.50%)	1 (2.90%)	34 (100.00%)
Middle school certificate	25 (78.10%0	7 (21.90%)	0 (0.00%)	32 (100.00%)
High school certificate	62 (70.50%)	24 (27.30%)	2 (2.30%)	88 (100.00%)
$>10^{th}$ class	70 (67.30%)	34 (32.70%)	0 (0.00%)	104 (100.00%)
Father's Occupation				

Unskilled workers, unemployed	12 (63.20%)	7 (36.80%)	0 (0.00%)	19 (100.00%)
Semi-skilled worker; skilled worker; clerk, shop owner, farm owner	148 (75.50%)	46 (23.50%)	2(1.00%)	196 (100.00%)
Semi-professional, professional	66 (69.50%)	28 (29.50%)	1 (1.10%)	95 (100.00%)
Mother's Occupation				
Unskilled workers, unemployed	3 (50.00%)	3 (50.00%)	0 (0.00%)	6 (100.00%)
Semi-skilled worker; skilled worker; clerk, shop owner, farm owner	19(63.30%)	11 36.70%)	0 (0.00%)	30 (100.00%)
Semi-professional, professional	18(64.30%)	9 (32.10%)	1(3.60%)	28 (100.00%)
BMI (Kg/M^2) As Per Modified Asian Criteria				
Underweight (<18.5)	46 (90.20%)	5 (9.80%)	0 (0.00%)	51 (100.00%)
Normal (18.5-23)	99 (75.00%)	33 (25.00%)	0 (0.00%)	132 (100.00%)
Overweight (23-27.5)	60 (71.40%)	24 (28.60%)	0 (0.00%)	84(100.00%)
Obese (≥27.5)	21 (48.80%)	19 (44.20%)	3 (7.00%)	43 (100.00%)

Table 9 shows an association of characteristics with IDRS

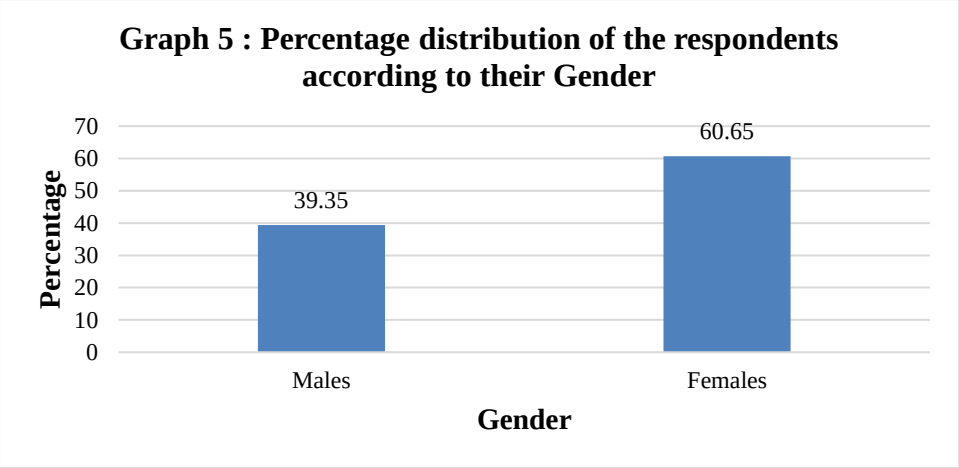
Statistically significant association of moderate-high diabetes risk with male gender (P = 0.0000), positivefamily history of diabetes (P = 0.000), no/mild physical activity (P = 0.0000), and body mass index (BMI) ≥23.0 kg/m2 (P = 0.003) was found.

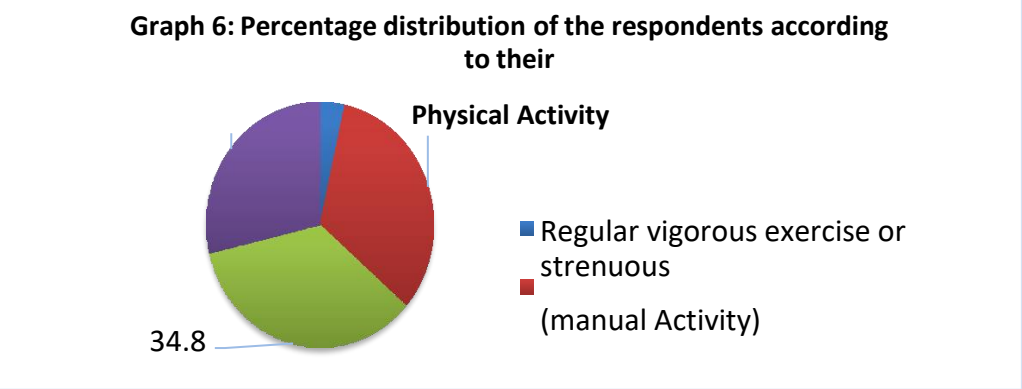
TABLE 9: Association of Characteristics among Subjects with IDRS (N=310)

Characteristic	**Low risk (%)**	**Moderate -high risk (%)**	**Total (%)**	**Odds ratio (Unadjusted)**	**95% CI**	**χ^2, df, '*P*'**
Gender						
Males	105 (86.10%)	17 (13.90)	122 (39.35%)			
Females	121 (64.40%)	67 (35.60%)	188 (60.65%)	3.42	1.89-6.188	17.643,1,0.000
Father's education						
≤10th class	125 (75.30%)	41 (24.70%)	166 (53.55%)			
>10th class	101 (70.1%)	43 (29.90%)	144 (46.45%)	1.298	0.786-2.144	1.04,1,0.308
Mother's education						
≤10th class	156 (75.70%)	50 (24.30%)	206 (66.45%)			
>10th class	70 (67.30%)	34 (32.70%)	104 (33.55%)	1.515	0.902-2.546	2.481,1,0.115
Father's occupation						
Unskilled/unemployed/semi-skilled/skilled worker	160 (74.40%)	55 (25.60%)	215 (69.35%)			
Semi-professional/professional	66 (69.50%)	29 (30.50%)	95 (30.65%)	1.278	0.750-2.179	0.816,1, 0.366
Mother's occupation						
Unskilled/unemployed/semi-skilled/skilled worker	208 (73.80%)	74 (26.20%)	282 (90.97%)			

Semi-professional, professional	18 (64.30%)	10 (35.70%)	28 (9.03%)	1.562	0.690-3.536	1.157,1,0.282
Dietary habits						
Mixed	207 (74.50%)	71 (25.50%)	278 (89.68%)	0.501	0.236-1.067	3.306,1,0.069
Vegetarian	19 (59.40%)	13 (40.60%)	32 (10.32%)			
Family history						
Present	64 (51.20%)	61 (48.80%)	125 (40.32%)	0.149	0.085-0.261	49.944,1,0.000
Absent	162 (87.60%)	23 (12.40%)	185 (59.68%)			
Physical Activity						
No/mild physical activity	123 (62.40%)	74 (37.60%)	197 (63.55%)	0.161	0.079-0.328	29.971,1,0.000
Moderate to vigorous	103 (91.20%)	10 (8.80%)	113 (36.45%)			
BMI (kg/m^2)						
BMI ≥23	81 (63.80%)	46 (36.20%)	1277 (40.97%)	0.461	0.278-0.767	9.066,1,0.003
BMI <23	145 (79.20%)	38 (20.80%)	183 (59.03%)			

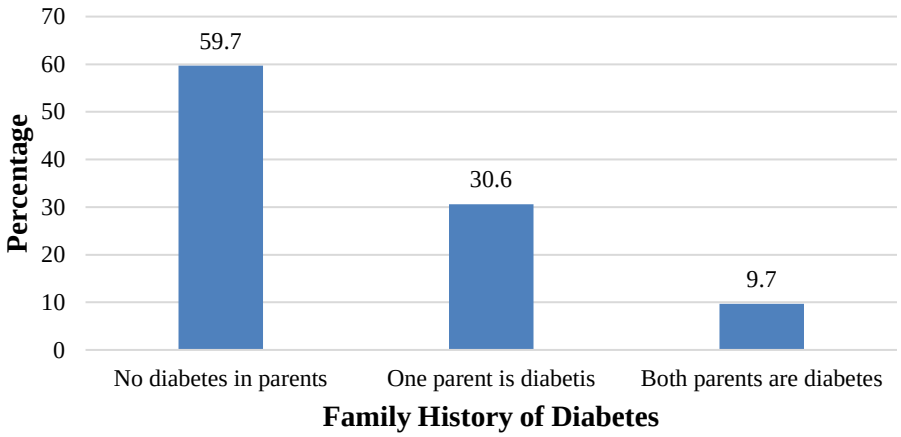
IDRS = Indian diabetes risk score, BMI = Body mass index



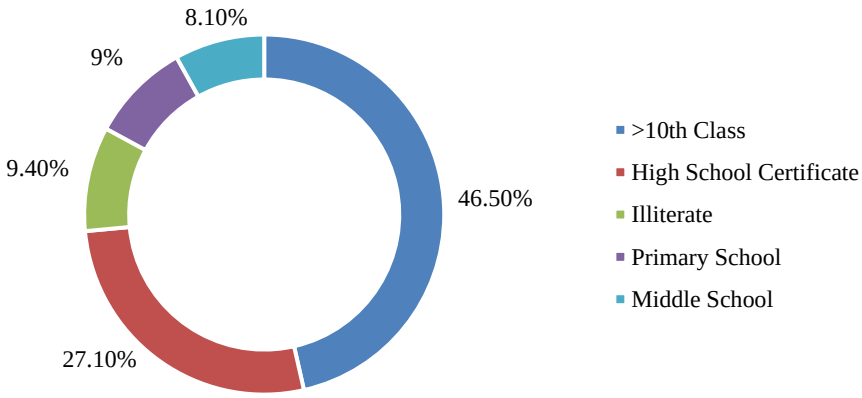


J Popul Ther Clin Pharmacol Vol 30(4):e604–e616; 16 March 2023.

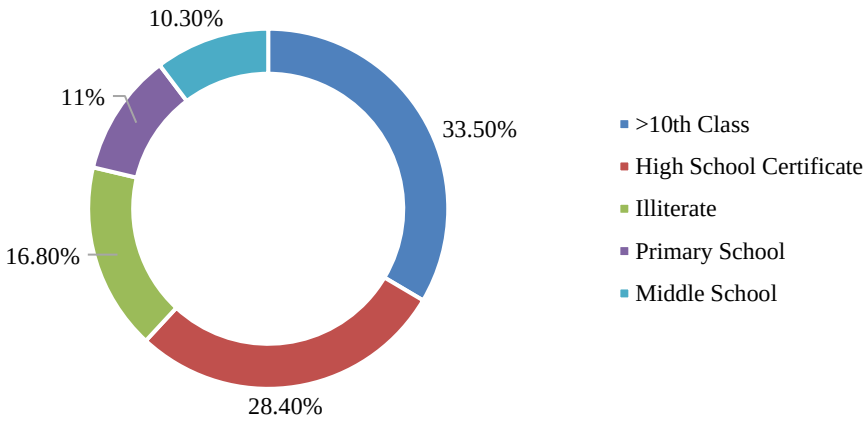
Graph 7 : Percentage distribution of the respondents according to their Family History of Diabetes



Graph 8 : Percentage distribution of the respondents according to their Father Education

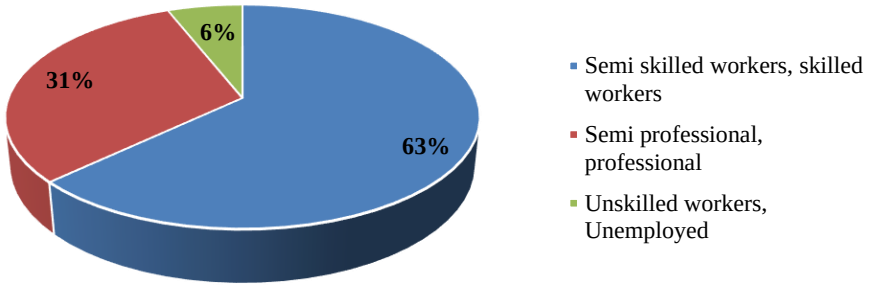


Graph 9: Percentage distribution of the respondents according to their Mother Education

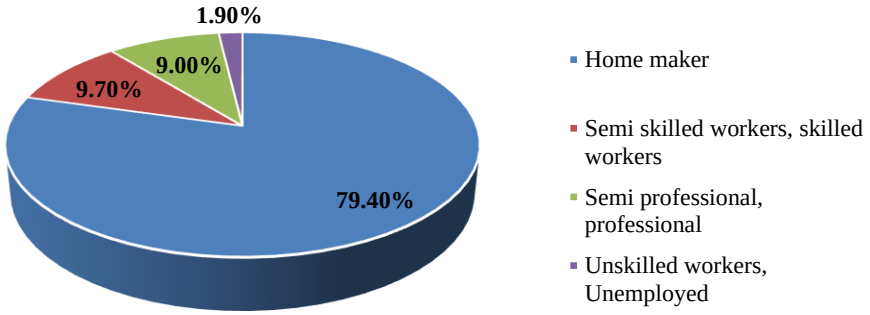


J Popul Ther Clin Pharmacol Vol 30(4):e604–e616; 16 March 2023.

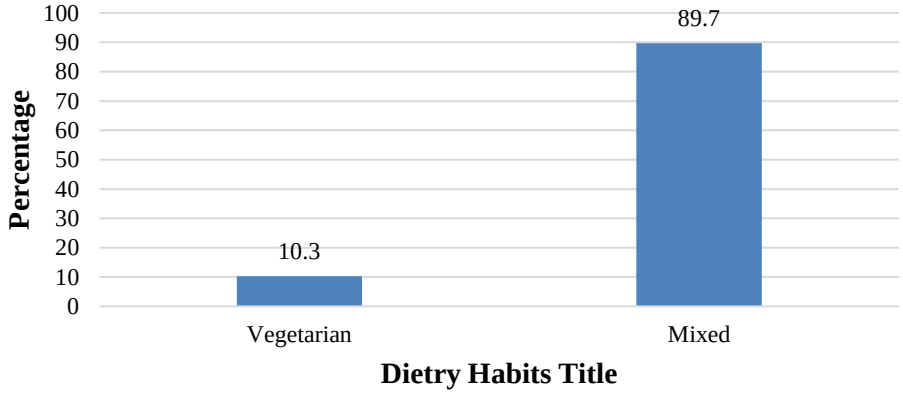
Graph 10 : Percentage distribution of the respondents according to their Fathers Occupation



Graph 11 : Percentage distribution of the respondents according to their Mothers Occupation



Graph 12 : Percentage distribution of the respondents according to their Dietry habits



This table presents the result of a study on the risk factors associated with a certain health condition. The characteristics being analyzed are gender, education level, occupation, dietary habits, family history, physicalactivity level, and body mass index (BMI).

J Popul Ther Clin Pharmacol Vol 30(4):e604–e616; 16 March 2023.

For each characteristic, the table shows the percentage of individuals with low-risk and moderate-high risk of the health condition, as well as the total percentage for that characteristic. It also includes the odds ratio (unadjusted), the 95% confidence interval (CI), and the statistical significance level (χ2, df, 'P').

The odds ratio is a measure of the strength of association between the characteristic and the health condition. An odds ratio greater than 1 indicates that the characteristic is associated with an increased risk of the healthcondition, while an odds ratio less than 1 indicates that the characteristic is associated with a decreased risk. Based on the results in the table, some of the key findings are:

- Males have a significantly higher risk of health conditions compared to females (odds ratio = 3.42,p < 0.001).
- There is no significant difference in risk based on education level.
- Individuals in unskilled, unemployed, semi-skilled, or skilled worker occupations have a slightly higher risk compared to those in semi-professional or professional occupations, but the difference is not statistically significant.
- Vegetarians have a slightly lower risk compared to those with mixed dietary habits, but the difference is not statistically significant.
- Family history is strongly associated with the health condition, with those with a family history have a significantly higher risk (odds ratio = 0.149, p < 0.001).
- Those with no or mild physical activity have a significantly higher risk compared to those with moderate to vigorous physical activity (odds ratio = 0.161, p < 0.001)
- Individuals with a BMI greater than or equal to 23 have a significantly lower risk compared to thosewith a BMI less than 23 (odds ratio = 0.461, p = 0.003).

It is important to note that these results are based on an unadjusted odds ratio and other factors may need tobe taken into account when interpreting these findings. Additionally, the sample size and characteristics of the study population may impact the generalizability of these results to other populations.

DISCUSSION

The current study included 310 young Pharmacy students and found that 226 (72.90%), 81 (26.10%), and 3 (1%) subjects were in the low-, moderate-, and high-risk categories, respectively, according to the IDRS. The findings for the high-risk category matched those of *Gopalakrishnan et al*. (1.9%) and Bhatia et al. (1%) [4,5]. *Subramani et al*., Kumar et al., Mohan et al., and *Chowdhury et al.* found 12.1%, 18.6%, 31.2%, and 31.5% of the population to be at high risk, respectively [6-9]. Vardhan et al. discovered a similar observation for the moderate-risk category (28%) [10]. Chowdhury et al. (46%), Mohan et al. (50.3%), Bhatia et al. (68%), and Subramani et al. (74.7%) observed higher results for the moderate-risk category [5,6,8,9]. The current study found a statistically significant relationship between female gender and greater BMI with the risk of moderate-high diabetes (P = 0.000 and 0.003, respectively). This conclusion could be attributed to the fact that young pharmacy female students are more likely to develop diabetes, and those with greater BMI tend to develop T2DM at a younger age [11]. A study conducted by Gopalakrishnan et al. and Chowdhury et al. found a statistically significant link between male gender and greater BMI and an increased risk of diabetes [4-9].

Idrs Risk Components Findings

IDRS risk components - positive family history of diabetes, decreased physical activity, and increased belly circumference - were found in 125 (40.32%), 197 (63.55%), and 133 (45.9%) students, respectively.

In our study, 61 (48.80%) of those with moderate-high diabetes risk had a positive family history of diabetes, which was statistically significant (P = 0.000). According to research, family history is an independent risk factor for T2DM [12]. A study conducted by Subramani et al. (16.6%), Bhatia et al. (32%), and Gopalakrishnan et al. (46.6%) revealed almost identical proportions of positive family history of diabetes [4-6]. Adhikari et al. discovered that 45-80% of children with T2DM have a parent who has the illness [13].

In our study, vigorous and moderate, mild and no physical activity was carried out by 11 (3.50%), 102(32.90%), 108(34.80%), and 89(28.70%)

subjects respectively. The association between no/mild physical activity and moderate-high diabetes risk was statistically significant (*P*= 0.0000). Our study corroborates with the findings from several studies which have shown that physical activity less than the recommended values for moderate exercise (<150 min per week) does increase the risk of T2DM [14]. Findings for moderate physical activity are similar to the results of the study conducted by Bhatia *et al*. (49%) [5]. A higher figure for moderatephysical activity was seen in a study conducted by Gopalakrishnan *et al*. (76.5%) and Subramani *et al*. (74.7%) [4,6].

CONCLUSION

The present investigation concluded that 67 (35.70%) of female subjects and 17 (13.90%) of male subjects have a moderate-high risk of developing T2DM, and the association with gender, positive family history of diabetes, mild physical activity, and higher BMI was statistically significant (P 0.000). The current study findings emphasize the significance of focusing on and strengthening health promotion, information education, and communication initiatives in the young population to lessen the future burden of disease. There is an urgent need to identify our at-risk demographic of young pharmacy students and raise awareness among our future healthcare workers so that interventions can be implemented. behavioral modification Communication and lifestyle changes can be implemented as early as possible to prevent/delay the onset of diabetes mellitus and its problems later in life. Large community-based research is needed to determine the population-based prevalence rate of diabetes risk factors among the young.

REFERENCES

1. Singh MM, Mangla V, Pangtey R, Garg S. Risk Assessment of Diabetes Using the Indian DiabetesRisk Score: A Study on Young Medical Students from Northern India. Indian Journal of Endocrinology and Metabolism. (2019) Jan-Feb;23(1):86-90.
2. Geissler C, Powers HJ, editors. Human Nutrition: Obesity.13th ed. United Kingdom: Oxford University Press; 2017;20:406-23.
3. Krishnaswamy K, Bhaskaram P, Bhat RV, Ghafoorunissa RT, Raghuramulu N. Dietary Guidelinesfor Indians: A Manual. Hyderabad: National Institute of Nutrition, Indian Council of Medical Research; 2011.
4. Gopalakrishnan S, Rama R, Muthulakshmi M. Assessing the risk of developing type 2 diabetes mellitus among medical students in Chennai using Indian diabetes risk score. Int J Community MedPublic Health 2017;4:2366-72.
5. Bhatia T, Maitreyi O, Vimisha D, Sonalika B, Gerhard F, Vaidehi L, et al. Type 2 diabetes mellitus: Risk evaluation and advice in undergraduate students in Mumbai. Int J Pharm Sci Invent 2014:3:37-40.
6. Subramani R, Devi U, Shankar U, Stephen T, Karthik RC, Seshadhri S, et al. Assessment of risk of type 2 diabetes mellitus among rural population in Tamil Nadu by using Indian Diabetic Risk Score. Middle-East J Sci Res 2014;21:223-5.
7. Gupta SK, Singh Z, Purty AJ, Vishwanathan M. Diabetes prevalence and its risk factors in urban Pondicherry. Int J Diabetes Dev Ctries2009;29:166-9.
8. Mohan V, Sandeep S, Deepa R, Shah B, Varghese C. Epidemiology of type 2 diabetes: Indian scenario. Indian J Med Res 2007;125:217-30.
9. Chowdhury R, Mukherjee A, Lahiri SK. A study on distribution and determinants of Indian Diabetic Risk Score (IDRS) among the rural population of West Bengal. National J Med Res 2012;2:282-6.
10. Vardhan A, Prabha MRA, Shashidhar MK, Shankar N, Gupta S, Tripathy A. Value of Indian Diabetes Risk Score among medical students and its correlation with fasting plasma glucose, blood pressure, and lipid profile. J Clin Diagn Res 2012;6:1528-30.
11. Rhee EJ. Diabetes in Asians. Endocrinol Metab2015;30:263-9.
12. InterAct Consortium. The link between family history and risk of type 2 diabetes is not explained by anthropometric, lifestyle, or genetic risk factors: The EPIC-InterAct study. Diabetologia2013;56:60-9.
13. Adhikari P, Pathak R, Kotian S. Validation of the MDRF-Indian Diabetes Risk Score (IDRS) in another South Indian population through the Boloor Diabetes Study (BDS). J Assoc Physicians India2010;58:434-6.
14. Ghaderpanahi M, Fakhrzadeh H, Sharifi F, Badamchizade Z, Mirarefin M, Ebrahim RP, et al. Association of physical activity with risk of type 2 diabetes. Iran J Public Health 2011;40:86-93.