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A study on assessment of risk of type 2 diabetes mellitus among Urban and Rural Population, using Indian diabetes risk score (IDRS), In Shivamogga

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INTRODUCTION:

Diabetes mellitus is characterized by a state of chronic hyperglycemia due to defective production or action of insulin [1]. Diabetes is one of non-communicable diseases in India which has become a global health problem. 347 million people worldwide have diabetes. [2] And the recent world health organization reports that 62.4 million (19%) of the world diabetic population currently resides in India. This is set to increase to over 100 million by 2030[3]. The majority of the people with diabetes (90%) have Type 2 diabetes mellitus and predominantly affects older individuals in developed countries , in developing countries it affects the younger population in the prime of their working lives specially among the low socio economic status group and thus poses an even greater threat to the health of these individuals [3,4]

Unfortunately, more than 50% of people with Type 2 diabetes mellitus (T2DM) remain undiagnosed. [5] Thus the priority is to screen, diagnose and treat as many people with T2DM as possible. In a hugely populated developing country like India with over 1.2 billion people with diverse cultures, the screening and diagnosing methods for diabetes should be simple, cost-effective and less time-consuming. The Indian Diabetes Risk Score (IDRS) was initially developed and validated at the Madras Diabetes Research Foundation (MDRF, Chennai) as a screening tool which is simple, safe, and inexpensive questionnaire consisting of four simple parameters i.e. age, obesity status, exercise status, and family history to help detect undiagnosed

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T2DM in the community. With this back ground the study of assessment of risk of diabetes (Type-2) and associated risk factors among urban and rural population will be undertaken with the help of IDRS (Indian Diabetic Risk Score).

OBJECTIVES:

- To assess the risk of Type 2 diabetes mellitus/ prediabetic condition among urban and rural population of Shivamogga, with the help of Indian diabetes risk score (IDRS)

MATERIALS AND METHOD:

Study design: An observational analytical cross sectional study was conducted on 219 subjects urban and rural people (***study subjects***) of Shivamogga.

Sample Size:

Considering the prevalence of diabetes mellitus p= 10% and an expected response rate of 80%, the study would require a sample size of **173** for estimating the expected proportion with 5% absolute precision and 95% confidence (p=0.05). The minimum sample sample size requirement is 173, but we could able to cover 219 samples. The Sample size was calculated with the help of Epi-info free software. (Recommended by WHO)

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Methodology: In urban health center of Kote, there are 900 households. There are 3 Junior Health assistants in UHC, each cover around 300 households. In each JH's area 77 (35% Urban population) subjects were assessed for diabetic risk by using systematic random sampling. In rural area around 142 subjects (65% of Rural population) were assessed, in Sirigere Sub centre area. There are 30 villages in Sirigere subcentre, among them 4 villages were selected and 50 subjects were assessed for the diabetic risk in each of the selected villages. Subjects were informed about the study purpose and confidentiality of the collected data. After taking informed consent each selected subjects were interviewed to collect data on the factors mentioned in IDRS score: age, family history of diabetes mellitus and physical activity status and the waist circumference (measured according to standards). All the physical factors were measured according to standards given for anthropometric measurements in **WHO STEPS -wise** approach for ***assessment of risk factors of non- communicable diseases***. [11]

The score for IDRS was given according to the score mentioned in **Table-1**. After this the participant with high IDRS score were counseled to get done the **Oral glucose tolerance test (OGTT).** Ethical clearance for the study had taken from ethical committee of Shimoga Institute of Medical Sciences- Shimoga before starting the study proper.

Statistical tests like Chi-square test, student T test , proportions were used for analysis of collected data.

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Inclusion criteria:

- Participants with age above 20 years and below 60 years
- The participants with the unknown diabetic status were included in the study.

Exclusion criteria:

- Who did not give consent

RESULTS

A total of 219 subjects from both urban and rural areas of Shivamogga were enrolled in our study. 54.33% i.e., 119 subjects were male and 45.77% i.e., 100 were women. Maximum subjects (around 67%) were belonged to the group of above 35 years. More than half i.e., 56.2% study subjects were Muslim by religion. (Table 3)

In could able detect around 31% of Diabetic and IFG (Impaired fasting Glucose) patients, and remaining 153 subjects were belonged non-diabetic/ non diabetic risk category. We had assessed study population using IDRS risk tool for presence of risk factors and as a result we found that 51 subjects were having high risk for Diabetes Mellitus, remaining 168 subjects belong to low to moderate risk category.[12] Further on a detail analysis it is found that 18 out of 51 high risk patients and 48 of low to moderate risk patients were either Diabetic or Pre-diabetic, thus gives the inference that odds of detection of diabetes/prediabetic conditions are high with the help of IDRS tool (Table 4)

DISCUSSION

This study was conducted in 219 people of Rural and Urban areas of Shivamogga. Study revealed that 47(21%), 121(55%) and 51(24%) were belonging to low, moderate and high risk category as per IDRS risk assessment study tool. The findings were similar to a study conducted by Neha Choudhary et al where 53.5% were at moderate and 37.5% were at high risk of Diabetes.[13] A study conducted by Gupta S K et al also reported similar findings where 50.32% were at moderate and 31.20% were at high risk of Diabetes Mellitus.[14] Another study conducted by Ranadip Chowdhury also revealed similar findings, where 46% were at moderate risk and 31.5% were at high risk for Diabetes Mellitus.[15] Among the people belonged to high risk category 19.6 and 15.7% of people were had diabetes mellitus and Impaired Fasting Glucose (IFG). Impaired fasting glucose is considered as one of the pre diabetic conditions.

In our study both male and female were equally placed at risk for Diabetes Mellitus (Odd's ratio = 0.92), where as the studies conducted by Gopalkrishnan et. al and Chowdhury et.al showed increased risk of Type 2 Diabetes Mellitus with male gender. [16,15]

IDRS risk components findings

Present study showed increased abdominal obesity, decreased physical activity and positive family history in 51.5%, 23.8% and 48.9% study subjects respectively. Positive family history of Diabetes in our study subjects 107(48.85%) was significantly associated with Diabetes

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Mellitus (p=0.006). A study by R A Scott et. al revealed family history as a independent risk factor for type 2 Diabetes Mellitus.[17]

In our study 24(11%) were doing vigorous work/strenuous exercise, 143(65.3%) moderate 52(23.8%) were doing mild physical activity. Association between physical activity with Diabetes Mellitus as outcome was found to be statistically significant(p=0.016). Studies conducted by M Ghadarpanahi et. al and Subramani et.al showed significant association of physical activity with decreased risk of type 2 Diabetes Mellitus. [18,19]

CONCLUSION

More than half of study subjects are at moderate risk of Type 2 Diabetes Mellitus and if they don't adopt healthy life style they will soon enter into high risk category. High risk individuals are 1.36 times at more risk of getting Diabetes Mellitus compared to low risk and moderate risk groups. Among the high risk individuals prevalence of Diabetes and Pre diabetes was 35.29%. Lack of physical activity increased Odds of getting Diabetes by 2.13 times.

From this study we can conclude that screening of individuals with this simple tool and identification of their risk at the earliest will help in changing their life style and prevention of development of diabetes mellitus in future. This low-cost non-invasive tool is helpful in cutting the cost of detection of diabetes and prediabetic conditions at field level.

Table 1: MDRF‐Indian diabetes risk score[12]

Categorized risk factors	Score
Age	
35 years	0
35–49 years	20
≥50 years	30
Abdominal obesity	
Waist circumference female <80 cm, Male<90 cm (Reference)	0
Female 80–89 cm, Male 90–99 cm	10
Female ≥90 cm, Male≥100 cm	20
Physical activity	
Vigorous exercise or strenuous at work	0
Moderate exercise at work/home	10
Mild exercise at work/home	20
No exercise and sedentary at work/home	30

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Family history	
Two non‑diabetic parents	0
Either parent diabetic	10
Both parents diabetic	20
Maximum score	100
Score : ≥60:High risk, 30-50: Medium risk, 30: Low risk	

TABLE 2 : Socio-demographic characteristics of study population (n=219)

GENDER	LOW RISK	MODERATE RISK	HIGH RISK	TOTAL (%)
MALE	32(26.05%)	60(50.42%)	27(23.52%)	119(54.33%)
FEMALE	15(15%)	61(61%)	24(24%)	100(45.77%)
TOTAL	47(21.46%))	121(55.25%)	51(23.28%)	219(100%)
MEAN IDRS SCORE	21.52+_9.82	39.17+_8.22	67.45+_10.92	

Table 3: Distribution of population according to Age group and Religion

AGE GROUP	NUMBER (Percentage)	RELIGION	Number (Percentage)
>50years	60(27.4%)	**Hindu**	95(43.4%)
35-50years	87(39.7%)	**Muslim**	123(56.2%)
<35years	72(32.9%)	**Others**	01(0.5%)

TABLE 4 Distribution of Diabetes Risk among Risk Categories

IDRS DM RISk	DM	IFG	NORMAL	Total
High Risk	10 (19.6 %)	8 (15.7 %)	33 (64.7 %)	51 (100.0 %)
Moderate Risk	13 (10.7%)	24 (19.8%)	84 (69.4%)	121 (100.0 %)
Low Risk	3 (6.5%)	8 (17.4%)	36 (76.1%)	47 (100.0 %)
Total	26 (11.9%)	40 (18.3%)	152 (69.7%)	218 (100.0 %)

IDRS-Indian Diabetes Risk Score, DM-Diabetes Mellitus, IFG-Impaired Fasting Glucose.

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