International Journal of Research in Medical Sciences
Dasaraju S et al. Int J Res Med Sci. 2020 Jan;8(1):48-51
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20195642

Original Research Article

Risk assessment for type 2 diabetes mellitus in Muttanallur village, Bangalore, India

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Received: 08 December 2019
Accepted: 16 December 2019

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ABSTRACT

Background: Diabetes is a major cause of morbidity and mortality worldwide. There are certain risk factors involved in the development of type 2 DM. Affordable, quick and easily available validated tools are required for assessment of risk factors for type 2 DM. Using one such questionnaire, Finnish Diabetes Risk Score [FINDRISK], we have conducted an observational study in a rural area to identify and assess the risks for the development of type 2 DM.
Methods: This cross sectional, observational, community-based study was undertaken, in Muttanallur Village, Bangalore. After the application of inclusion and exclusion criteria, 487 subjects were included. According to the final score obtained with the FINDRISK questionnaire, the individuals were classified into mild, moderate, high and very high-risk groups.
Results: After the analysis of the variables, 253 individuals (52%) came under moderate risk with a score of (7-14) and 6 (1.2%) were categorized as having very high risk. Females, subjects above the age group of 45 years, having BMI ≥30 kg/m^2, waist circumference of ≥37 inches, not having 30 minutes of daily physical activity and consumption of vegetables and fruits, with history of hypertension, high blood glucose during pregnancy or in the past, were having higher moderate to high risk prevalence and had more chances of developing type 2 DM (p value <0.001).
Conclusions: As per the results of this study authors concluded that there was a statistically significant association between certain clinical variables with the development of future type 2 DM.

Keywords: Body mass index, Findrisk questionnaire, Risk factors, Type 2 diabetes mellitus

INTRODUCTION

Mortality from communicable diseases is declining in less developed countries in association with increasing diabetes prevalence, which will inevitably result in increasing proportions of deaths from cardiovascular disease in these countries, as well as increased prevalence and associated consequences of other complications of diabetes.[1] Diabetes is a major cause of morbidity and mortality worldwide. The prevalence of Diabetes Mellitus [DM] has dramatically risen over the past two decades. Although the prevalence of both type 1 and type 2 DM is increasing worldwide, the prevalence of type 2 DM is rising much more rapidly, presumably because of increasing obesity, reduced activity levels as countries become more industrialized and the ageing of the population.[2]

Indians are at more risk of developing type 2 DM due to genetic predisposition, more insulin resistance and increasing urbanization.[3] There are certain risk factors involved in the development of type 2 DM. These risk factors are family history of diabetes, obesity, and physical inactivity, and ethnicity, history of diabetes during pregnancy, hypertension and dyslipidaemia.[2]

To modify few risk factors, initial identification and assessment of these risk factors becomes necessary.

Certain readily and easily available validated tool required for assessment of risk factors for type 2 DM. Using one such questionnaire, 'FINDRISK 'questionnaire, author have conducted an observational study in a rural area to identify and assess the risks for the development of type 2 DM.

METHODS

This is a cross sectional, community-based study that was undertaken, in Muttanallur Village. Muttanallur village is situated in Anekal Taluk of Bangalore district, India. It is a rural teaching area of the Department of Community Medicine, The Oxford Medical College, Hospital and Research Institute, Bangalore. Ethics committee clearance of authors Institution was obtained before starting the study.

Inclusion criteria

- The individuals of both the genders
- Above the age of 18 year

Exclusion criteria

- People less than 18 years of age
- Those who were already diabetic
- Pregnant ladies
- Not willing to take part in the study

Study period was March 2017 to September 2017. Study population was sample selected was the whole population of Muttanallur village which was around 1800. After applying the inclusion exclusion criteria, total of 487 people was included in this study.

Informed written consent from participants in their own understandable language was obtained. Then they were given a diabetes risk score questionnaire to answer. The survey instrument used in this study was the Finnish Diabetes Risk Score [FINDRISK]. This questionnaire was developed in Finland. It is an easily accessible validated risk score questionnaire.

This questionnaire consists of eight items

- Age
- Body mass index
- Waist circumference
- Physical activity practice
- Daily intake of fruits and/or vegetables
- Use of antihypertensive drugs in the past
- History of high blood glucose in the past or during pragnency
- Family history of diabetes in first- and second-degree relatives.

This questionnaire had shown a sensitivity of 81% and specificity of 76%. It was validated from the Department of Public Health of the University of Helsinki, Finland to assess the risk factors for type 2 DM. The questionnaire allows a maximum score of 28 points and evaluates the risk of a person developing type 2 diabetes mellitus within 10 years. According to the final score obtained with the questionnaire, the individuals were classified into the following risk levels:

- Low risk (<7 points)
- Moderate risk (7-14 points)
- High risk (15-20 points)
- Very high risk (higher than 20 points)

Those people who score 0 to 14 (low to moderate risk), have 1-17% chances of developing diabetes mellitus within 10 years. Those who score 15-20 have 33% chances and those who score 21-30% have 50% chances of developing DM in next 10 years. Patients coming under high risk group need HbA1c evaluation every year.

Data collection was done between March 2017 to September 2017 by interview method and clinical variables of the study population were measured by authors technicians, to help the participants to fill the given questionnaire.

Statistical analysis

The Statistical software namely SPSS 18.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel had been used to generate graphs and tables. Chi-square/ Fisher Exact test had been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis.

RESULTS

After the application of inclusion and exclusion criteria a total of 487 people participated in this study. Among them 301 (61.8%) people were in the age group of 18 to 44 years, 82 (16.8%) people were in the age group of 45 to 54 years and 104 (21.4%) people were in the age group of 55 to 64 years. The gender distribution of the population studied was almost equal, with 254 (52.2%) males and 233 (47.8%) females.

About 72.2% (354 people) had BMI less than 25 kg/m^2, 26.1% (127 people) had BMI between 25-29.9 kg/m^2 and only 1.2% (6 people) had BMI ≥30 kg/m^2. The waist circumference of the population studied showed that 316 people (64.9%) had waist circumference of less than 37 inches, 123 (25.3%) had waist circumference between 37-40 inches and 48 people (9.9%) had waist circumference >40 inches. About 350 people (71.9%) were not physically active for more than 30 minutes and 338 people (69.4%) did not include vegetables and fruits in their diet every day. Among 487 people, 469 (96.3%) people did not have any history of hypertension in the

past or taken any kind of treatment for hypertension. About 475 people (97.5%) had no history of high blood glucose in the past or history of gestational diabetes mellitus. Total of 175 people (35.9%) had history of diabetes mellitus in first degree relative, 205 people (42.1%) had second degree relatives who were diabetic. After the analysis of the variables, among 487 people, 253 people (52%) came under moderate risk with a score of (7-14) and 6 people were categorized has having very high risk (Table 1 and Figure 1).

Table 1: Total score distribution of patients studied.

Total score	Interpretation	No. of patients	%
<7	Low	110	22.6
7-14	Moderate	253	52.0
15-20	High	118	24.2
>20	Very high	6	1.2
Total		487	100.0

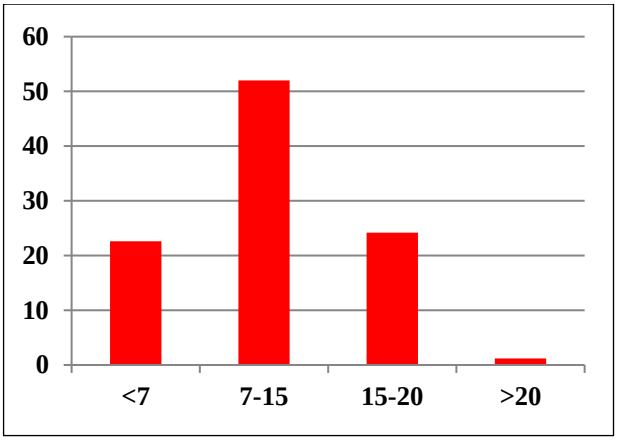

Figure 1: Total score distribution of patients studied.

Comparison of clinical variables according to Total score of the patients studied is shown in Table 2.

Table 2: Comparison of clinical variables according to Total score patients studied.

Variables		No. of patients	Total score <7 (N=110)	7-14 (N=253)	15-20 (N=118)	>20 (N=6)	p value
Age in years	18-44	301	101(33.6%)	175(58.1%)	25(8.3%)	0(0%)	<0.001
	45-54	82	7(8.5%)	37(45.1%)	38(46.3%)	0(0%)	
	55-64	104	2(1.9%)	41(39.4%)	55(52.9%)	6(5.8%)	
Gender	Female	233	38(16.3%)	122(52.4%)	70(30%)	3(1.3%)	0.003
	Male	254	72(28.3%)	131(51.6%)	48(18.9%)	3(1.2%)	
BMI (kg/m^2)	<25	354	87(24.6%)	197(55.6%)	67(18.9%)	3(0.8%)	0.001
	25-29.9	127	23(18.1%)	53(41.7%)	48(37.8%)	3(2.4%)	
	≥30	6	0(0%)	3(50%)	3(50%)	0(0%)	
Waist circumference	<37	316	86(27.2%)	180(57%)	50(15.8%)	0(0%)	<0.001
	37-40	123	21(17.1%)	55(44.7%)	46(37.4%)	1(0.8%)	
	>40	48	3(6.3%)	18(37.5%)	22(45.8%)	5(10.4%)	
Physically active	Yes	137	65(47.4%)	64(46.7%)	7(5.1%)	1(0.7%)	<0.001
	No	350	45(12.9%)	189(54%)	111(31.7%)	5(1.4%)	
Eat vegetables and fruits	Everyday	149	72(48.3%)	57(38.3%)	18(12.1%)	2(1.3%)	<0.001
	No every day	338	38(11.2%)	196(58%)	100(29.6%)	4(1.2%)	
Treated HTN	No	469	109(23.2%)	251(53.5%)	108(23%)	1(0.2%)	<0.001
	Yes	18	1(5.6%)	2(11.1%)	10(55.6%)	5(27.8%)	
H/O High BG/ Pregnancy	No	475	110(23.2%)	250(52.6%)	115(24.2%)	0(0%)	<0.001
	Yes	12	0(0%)	3(25%)	3(25%)	6(50%)	
Family H/O Diabetes	No	107	56(52.3%)	47(43.9%)	4(3.7%)	0(0%)	<0.001
	1 relative	205	8(3.9%)	111(54.1%)	80(39%)	6(2.9%)	
	2 relatives	175	46(26.3%)	95(54.3%)	34(19.4%)	0(0%)	

DISCUSSION

As this study is a cross-sectional study, authors were unable to calculate the strength of associations between risk factors and disease onset. But the results of this study show significant increase of prevalence of risk factors associated with DM. Authors categorized the people with each variable into mild, moderate, high and very high-risk scores to find those who are at increased risk of developing type 2 DM. Clinical variables are compared according to the scores (Table 2).

People between the age group of 18-44 years and 45-54 years had moderate risk and also 55-64 years, had high risk prevalence which is statistically significant (p value <0.001) for developing type 2 DM. So, as age advances people were at increased risk. This result of this study is comparable with the study done by Marinho PNB and others.[4]

Most people with risk factors for type 2 Diabetes were in the age group of 50-60 years in the study 'Risk factors of type-2 diabetes mellitus in rural Wardha: A community based study', conducted by Khatib MN and others.[5] Females who come under moderate risk have statistically significant higher risk compared to males (p value 0.003) and therefore females have higher prevalence of high risk (30%) compared to males (18.9%). Studies conducted by Suvd J et al, and Mc Keigue PM has shown high prevalence of type 2 diabetes among females.[6,7] According to BMI calculated, people with BMI ≥30, had moderate to high risk chances of developing DM (p value 0.001) which was statistically significant.

Among the population studied, as the waist circumference of the people increases from 37 to >40 would have higher high-risk prevalence and have more chances of developing type 2 DM (p value <0.001). Sedentary lifestyle without the required amount of physical activity every day is one of the major risks for the development of Type 2 DM. In this study people who did not have a 30 minute of physical activity per day and not eating vegetables and fruits everyday coming under moderate risk have higher chances of developing DM (p value <0.001).

Most of the studies have indicated that the prevalence of type 2 diabetes mellitus is associated with increased calories intake and decreased physical activity.[8-10] People with history of hypertension, high blood glucose during pregnancy or in the past had high to very high-risk prevalence (p value <0.001) and more chances of developing Type 2 DM.

Around 380 people had family history of type 2 DM and most of them were coming under moderate risk. These people have more chances of developing type 2 DM in next 10 years (p value <0.001). This result is comparable to the result got by Mahanta BN and Mahanta TG2 in their study 'Clinical profile of persons with family history of Diabetes Mellitus with Special Reference to Body Fat Percentage' indicating stronger the family history, higher the chance of getting diabetes. Similar results were shown in studies done by Ramachandran et al, and Vishwanathan et al, in India.[11,12]

CONCLUSION

As per the results of this study authors can conclude that there is a statistically significant association of certain clinical variables such as increasing age, female gender, increase in BMI and waist circumference, sedentary life style, unhealthy diet, past history of hypertension and high blood glucose and family history of diabetes mellitus, with the development of future type 2 DM.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Dasaraju S, Sudeepa D, Barik D, Hiremath LD. Risk assessment for type 2 diabetes mellitus in Muttanallur village, Bangalore, India. Int J Res Med Sci 2020;8:48-51.