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Original Research Article

Assessment of risk of developing type 2 diabetes mellitus in urban slums of central India: a community based cross sectional study

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ABSTRACT

Background: Diabetes mellitus (DM) is growing in prevalence globally with 171 million people in the year 2000, while it is estimated to rise to 366 million by the year 2030.Fifty percent or more of those with the disease are unaware of their condition. Most of these have non-insulin dependent diabetes mellitus (NIDDM). The onset of NIDDM may occur 4-7 years before the clinical diagnosis of the disease. Early detection and treatment reduce the complications of DM. Objective of the study was to assess the risk of developing of type 2 Diabetes Mellitus in Urban area of Central India.
Methods: Cross sectional study done in urban slum adopted area of tertiary care hospital from April 2016 to June 2016.Data collection includes sociodemographic profile and Finnish diabetes risk score.
Results: Out off total 150 participants, 45 are males and 105 are females. Mean age was 52.12(±12.70) years and 44.67% belongs to lower middle socioeconomic class. There was a high prevalence of physical inactivity of 53.33%, 24% of overweight (BMI ≥25 kg/m^2) and 5.33% of obesity (BMI≥ 30kg/m^2), 16% of large waist circumference and positive family history of Diabetes Mellitus of 15.34%. Overall, 11.33% of the participants have a high to very high risk of developing the disease within 10 year, while about 18.66% have moderate to high risk of developing Diabetes Mellitus.
Conclusions: This study has shown that 11.33% of urban populations have a high risk of developing Diabetes Mellitus due to high prevalence of physical inactivity, obesity, large waist circumference and family history of Diabetes Mellitus .There is urgent need to implement diabetes prevention strategies.

Keywords: Central India, Diabetes Mellitus, Early detection, Risk score, Urban slum

INTRODUCTION

Diabetes mellitus (DM) is growing in prevalence globally with 171 million people in the year 2000, while it is estimated to rise to 366 million by the year 2030.[1] Fifty percent or more of those with the disease are unaware of their condition.[2]

Early detection and treatment reduce the complications of DM. Early detection can be enhanced by screening people even when consulting the physician for other ailments.[3] The onset of NIDDM may occur 4-7 years before the clinical diagnosis of the disease. During this time, diabetic complications are silently setting in.

Studies have shown that many people with undiagnosed DM already have complications such as chronic kidney disease, heart failure, retinopathy and neuropathy.[4-6] Those who are not diagnosed of DM will not take steps to manage their blood glucose or change their life styles.

Among non-modifiable risk factors, family history of DM and age are of special importance as Indians have a tendency to develop DM at a younger age and are subjected to strong genetic predisposition. Asian Indian develop diabetes at a younger age, at least 0-15 years earlier than the Caucasian population.[7] Recent studies have shown that type 2 DM can be prevented or at least delayed in high risk subjects by life style modification or by combining life style intervention and drug treatment.[8,9]

The purpose of community-based screening for NCD is to differentiate asymptomatic individuals at high risk from individuals at low risk. Ideally, screening tests should be rapid, simple, and safe. When returned positive, the screening test only means that the person is more likely to have the disease than a person with a negative screening test. Screening for diabetes can identify patients at an early stage of the diseases, and identify those that will derive benefit from prevention and early treatment methods. The Finnish diabetes risk score is a simple, fast, inexpensive, non-invasive, and reliable tool to identify individuals at high.[10,11] It is valid and calibrated model with C statistics 0.75-0.80.[12] So main aim of the study is to assess the risk of development of type 2 DM in urban population by simple scoring system.

METHODS

A community based cross sectional study was undertaken in urban slum adopted area of tertiary care hospital, Indira Gandhi Government Medical College, Nagpur during April 2016 to June 2016. Study area constituting approximately 4500 population. There were around 750 houses in the study area. Houses were selected by simple random sampling technique and individuals >30 years of age group were purposively taken. Estimated Sample size was 111, considering the prevalence of diabetes 7.8% in India. We have collected data from 150 subjects. A pre-designed and pre-tested structured schedule was used for data collection.

Data collection includes sociodemographic profile and Finnish diabetes risk score. Data was collected by using interview technique. The Finnish risk assessment model was adopted for this study.[10,11]

Eight parameters were included in the questionnaire. Presence of family history of DM scored 3 if it occurred in the grandparent, aunt, uncle or first cousin, or 5 if it was present in the parent, brother or sister or zero if there was no family history. Consumption of vegetables in diet scored zero if they consumed fruits or vegetables daily or score1 if they did not. A history of taking regular anti-hypertensive medication scored 2 if this was positive or zero if it was negative. Daily exercise of at least 30minutes scored zero if positive and 2 if negative. Presence of high blood glucose in past examinations scored 2 if it was positive or zero if it was negative BMI<25 scored zero, 25-29.9 scored 1 while >30 scored 3. Age in years <45 scored zero, 45-54 scored 2, 55-64 scored 3 while 65 and above scored 4. Waist circumference of <95cm in a male and 80cm in a female scored zero, 95-102cm in a male and 80-88cm in a female scored 3 while >102cm and >88cm in a female was scored 4. The total risk score for each participant were summated.

Risk score values ranged from 0-20. The risk of developing type 2 diabetes within ten years was stratified into different scores; low risk (<7), slightly elevated risk (7-11), moderately elevated risk (12-14), high risk (15-20) and very high risk (>20). Study subjects above 30 years of age group, were included while less than 30 years of age, known case of diabetes mellitus and on treatment and who were not ready to give consent are excluded from study.

The data was analyzed using Epi info 7 software. Descriptive statistics was used to determine frequency, percentages, mean and standard deviation. Ethical clearance was obtained from the Health Research and Ethics Committee of Institute.

RESULTS

Table 1 shows sociodemographic variables. Out of 150 participants, 45 (30%) were males and 105 (70%) were females. Majority of participants 71.33% belongs to >45 years of age group and 28.67% belong to 30 to 45 years. . Mean ±SD age was 52.12 (±12.70) years. It also reveals that majority of study participant were literate 81.33% and 18.67% were illiterate. High proportion of participants 135 (90%) were married. 5 (3.33%) were unmarried and 10 (6.67%) were widowed. Majority 66.67% belongs to middle class and 6.67% belongs to upper class, and 26.66% belongs to lower class of socioeconomic status.

Table 1: Distribution of study subjects according to sociodemographic variables.

Variables	Number	Percentage
Gender		
Male	45	30
Female	105	70
Age		
<45years	43	28.67
>45years	107	71.33
Education		
Illiterate	28	18.67
Literate	122	81.33
Marital status		
Married	135	90
Unmarried/Divorced/widowed	15	10
Socio economic status*(Modified BG Prasad)		
Upper	10	6.67
Middle	100	66.67
Lower	40	26.66

Table 2 shows the parameters which were studied as per Finnish diabetes risk score and their distribution among study subjects. Majority of study subjects 107 (71.33%) are >45 years of age and were at risk, 44 (29.33%) of subjects had high BMI (>25kg/m^2), 73 (48.67%) had high risk score in waist circumference.

Majority of participants 80 (53.33) are physically inactive means not doing daily physical activity for 30 minutes other than daily routine work. Only 57 (38%) had regular daily intake of vegetables or fruits. 23 (15.33%) had presence of high blood glucose level in past and 31 (20.67%) are on regular antihypertensive treatment. 23 (15.34%) participants had positive family history.

Table 2: Distribution of study subjects according to scoring of risk parameter to develop type 2 DM in next 10 years.

Parameters	Score	Number	Percentage
Age (years)			
<45	0	43	28.67
45-54	2	39	26
55-64	3	35	23.33
>65	4	33	22
Body mass index (kg/m^2)			
<25	0	106	70.67
25-29.99	1	36	24.00
>30	3	8	5.33
Waist circumference (cm)			
<95(m),<80(f)	0	77	51.33
95-102(m),80-88(f)	3	49	32.67
>102(m),>88(f)	4	24	16.00
Daily Physical activity of 30 minutes			
Yes	0	70	46.67
No	2	80	53.33
Regular daily intake of fruits/ vegetables			
Yes	0	57	38
No	1	93	62
Presence of high blood glucose level in past (health examination, pregnancy)			
Yes	2	23	15.33
No	0	127	84.67
Regular intake of antihypertensive drugs			
Yes	2	31	20.67
No	0	119	79.33
Family history of diabetes mellitus			
No	0	127	84.67
Yes*(grandparents, uncle, aunt, cousins)	3	10	6.67
Yes**(Own parents, siblings, children)	5	13	8.67

Table 3 shows aggregate risk scoring for developing diabetes mellitus in next 10 years. 58 (38.67%) study subjects had low risk, while 64 (42.67%) had slightly elevated, 11 (7.33%) had moderate while 17 (11.33%) are at high to very high risk.

Table 3: Distribution of study subjects according to total risk for developing diabetes mellitus.

Risk score for developing diabetes mellitus	Number (n=150)	Percentage
Low risk (<7)	58	38.67
Slightly elevated risk (7-11)	64	42.67
Moderately elevated risk (12-14)	11	7.33
High risk (15-20)	15	10.00
Very high risk (>20)	2	1.33

DISCUSSION

This study shows 11.33% high risk to very high risk of developing type 2 DM in urban population as compared to Uloma Agu shown that 9% of the local government employees studied have a high risk of developing Diabetes Mellitus due to high prevalence of obesity, physical inactivity, sedentary life style, family history of Diabetes Mellitus and large waist circumference.[3] An international study by Dankyau M show only 5% of high risk of developing diabetes mellitus.[13]

A study done among employees of Finnish airlines by Viitasala K et al show that 15% of participants had a high risk and a further 15% had a moderate risk of type 2 Diabetes Mellitus in 10 years.[14] A population based study by Jølle A et al in a general adult population in Norway, show that 11% as being at high risk for diabetes.[15] Vandersmissen G have found that 12% percent of the employees had a moderate risk for type 2 diabetes of 17%, and another 5.5% had a high or very high risk of 33-50% to become diabetic in the next 10 years.[16]

In this study 24% were overweight (BMI ≥25 kg/m^2) and 5.33% were obesity (BMI≥30kg/m^2), which is less than Alebiosu OC et al shown 19.2% were obese and 28.9% overweight.[17] Also Bangladesh study by Saquib N et al shown 42 % overweight and 21.1% obese.[18] Also In Indian study prevalence of overweight is 59% and obesity 23% but cutoff value for BMI were for Asian population shown by Kapoor D.[19] In this study there is presence of 48.67% of large waist circumference less than study of Marinho N were it is 84%.[20]

In current study positive family history of Diabetes Mellitus was 15.34% among urban individuals which is less than study in Bangladesh by Saquib N et al shown 47.4%.[18] Also study by Marinho N shown 47% and also study by Shah SK shown positive family history of diabetes was present in 24.9%.[20,21] Insufficient physical activity was found to be associated with the development of Type 2 Diabetes Mellitus among adults with and without hypertension. Promoting higher physical activity

levels lowers the risk of developing type 2 Diabetes Mellitus in both hypertensive and non-hypertensive individuals.[22] In present study majority of subjects 53.33% are physical inactive.

CONCLUSION

There is need for the development of simple screening tools for use by health provider to identify those who are at high risk of developing DM in order to start preventive and health promotive activities and follow up. There is thus an urgent need to implement diabetes prevention strategies that geared toward adoption of healthy lifestyle measures that prevent or delay the onset of type 2 diabetes mellitus.

It is essential to design a mechanism to address and access of IEC for combating obesity, sedentary lifestyle, etc. The risk of developing type 2 Diabetes within 10 years is high among the study participants. Obesity and sedentary life style are modifiable risk factors. We, therefore recommend that health education should be stepped up among the population on the need to increase their physical activities by having organized exercises possibly on a daily basis.

It is also recommended that obesity reduction through exercises and dieting is included as a topic for the health education. Another need is the development of a population-specific diabetes risk score or validation of an existing tool for screening among a larger Asian Indian population. As Finnish Diabetes Risk Score (FINDRISC) is a feasible, non-invasive tool for identifying subjects at risk for undetected diabetes and pre-diabetes among Finnish population which is the limitation of this study. A tool such as this might be adapted for an Asian Indian population.

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REFERENCES

1. Rathmann W, Giani G. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes care. United States. 2004;2568-9.
2. Idf. Regional Fact Sheets. Diabetes Atlas, six edi. 2014;1-14.
3. Agu U, Agu MC, Nnaji G. Assessment of risk of developing diabetes mellitus among local government employees in Onitsha, south-eastern Nigeria. Epidemiol Reports. 2015;3(1):4.
4. Plantinga L, Crews D, Coresh J, Miller E, Saran R, Yee J et al. Prevalence of Chronic Kidney Disease in US Adults with Undiagnosed Diabetes or Prediabetes. Clinical Journal of the American Society of Nephrology. 2010;5(4):673-82.
5. Flores-Le Roux J, Comin J, Pedro-Botet J, Benaiges D, Puig-de Dou J, Chillarón J et al. Seven-year mortality in heart failure patients with undiagnosed diabetes: an observational study. Cardiovasc Diabetol. 2011;10(1):39.
6. Spijkerman A, Dekker J, Nijpels G, Adriaanse M, Kostense P, Ruwaard D et al. Microvascular Complications at Time of Diagnosis of Type 2 Diabetes Are Similar Among Diabetic Patients Detected by Targeted Screening and Patients Newly Diagnosed in General Practice: The Hoorn Screening Study. Diabetes Care. 2003;26(9):2604-8.
7. Ramachandran A, Snehalatha C. Current scenario of diabetes in India. J Diabetes. 2009;1(1):18-28.
8. Saaristo T, Peltonen M, Keinnen-Kiukaanniemi S, Vanhala M, Saltevo J, Niskanen L, et al. National type 2 diabetes prevention programme in Finland: FIN-D2D. Int J Circumpolar Health. 2007;66(2):101-12.
9. Alberti KGMM, Zimmet P, Shaw J. International Diabetes Federation: A consensus on Type 2 diabetes prevention. Diabet Med. 2007;24(5):451-63.
10. Lindström J, Tuomilehto J. The Diabetes Risk Score. Diabetes Care. 2003;26(3):725-31.
11. Score TR. Type 2 Diabetes Risk Assessment Form. Public Health. (5):1-2. Available from: http://www.diabetes.fi/ files/ 502/ eRiskitestilomake.pdf
12. Kengne AP, Beulens JWJ, Peelen LM, Moons KGM, van der Schouw YT, Schulze MB, et al. Non-invasive risk scores for prediction of type 2 diabetes (EPIC-InterAct): A validation of existing models. Lancet Diabetes Endocrinol. 2014;2(1):19-29.
13. Dankyau M, Shu'aibu arj, Oyebanji ae Mo. Diabetes risk score of staff of an urban mission hospital in Nigeria. Int J Clin Biomed Res. 2015;1:1-4.
14. Viitasalo K, Lindström J, Hemiö K, Puttonen S, Koho A, Härmä M et al. Occupational health care identifies risk for type 2 diabetes and cardiovascular disease. Primary Care Diabetes. 2012;6(2):95-102.
15. Jølle A, Midthjell K, Holmen J, Tuomilehto J, Carlsen S, Shaw J et al. Impact of sex and age on the performance of FINDRISC: the HUNT Study in Norway. BMJ Open Diab Res Care. 2016;4(1):e000217.
16. Vandersmissen Godderis L. Evaluation of the Finnish Diabetes Risk Score (FINDRISC) for diabetes screening in occupational health care. Int J Occup Med Environ Health. 2015.
17. Alebiosu OC, Familoni OB, Ogunsemi OO, Raimi TH, Balogun WO, Odusan O, et al. Community based diabetes risk assessment in Ogun state, Nigeria (World Diabetes Foundation project 08-321). Indian J Endocrinol Metab. 2013;17(4):653-8.

18. Saquib N, Khanam MA, Saquib J, Anand S, Chertow GM, Barry M, et al. High prevalence of type 2 diabetes among the urban middle class in Bangladesh. BMC Public Health. 2013;13(1):1-9.
19. Kapoor D, Bhardwaj AK, Kumar D, Raina SK. Prevalence of Diabetes Mellitus and Its Risk Factors among Permanently Settled Tribal Individuals in Tribal and Urban Areas in Northern State of Sub-Himalayan Region of India. Int J Chronic Dis. 2014;2014(July 2016):9.
20. Marinho NB, de Vasconcelos HC, Garcia Alencar AM, de Almeida PC, Coelho Damasceno MM. Risk for type 2 diabetes mellitus and associated factors. Acta Paul Enferm. 2013;26(6):569-74.
21. Shah S, Saikia M. High prevalence of type 2 diabetes in urban population in north eastern India. Int J Diabetes Dev. 1999;19:2-5.
22. Xu F, Ware RS, Tse LA, Wang Y, Wang Z, Hong X, et al. Joint associations of physical activity and hypertension with the development of type 2 diabetes among urban men and women in Mainland China. PLoS One. 2014;9(2).

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