VOLUME - 9, ISSUE - 8, August - 2020 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper | Community Medicine

ASSESSMENT OF PRE-DIABETES AMONG URBAN SLUM DWELLERS BASED ON INDIAN DIABETIC RISK SCORE: A COMMUNITY BASED CROSS SECTIONAL STUDY

Dr. Harikrishna BN*	Assistant Professor, Dept. of Community Medicine, ESIC Medical College, Sanathnagar, Hyderabad *Corresponding Author
Dr. Harshal Tukaram Pandve	Professor and Head, Dept. of Community, Medicine, ESIC Medical College, Sanathnagar, Hyderabad, Telangana, India
Ms. Amrutha M	MBBS Student, ESIC Medical College, Hyderabad
Mr. Venkatesham Animalla	Assistant Professor Cum Statistician, Dept. of Community Medicine, ESIC Medical College, Sanathnagar, Hyderabad

ABSTRACT

Back ground: Type2 Diabetes Mellitus is the most common non-communicable disease emerging as global burden now a days. Pre diabetes is a high risk state of developing T2DM. **Objectives:** 1. To determine the prevalence of pre-diabetes among urban slum dwellers by using Indian Diabetes Risk Score, 2. To evaluate factors associated with pre-diabetes among study population. **Material and Methods:** A community based cross-sectional study was conducted in 280 individuals by random sampling and the data was collected by using Indian Diabetes Risk Score, age more than 20 years, non diabetics were included in the study. Data collected was analysed using SPSS software. **Results:** Total 280 study subjects were included in the study. Majority of the participants 37.1% were in the age category of 20-30 years among them 57.50% were females. With respect to age 64.9% participants of age group 41-50 were at high risk, association between age and risk status was highly significant statistically (p=0.0001). Among high risk (33.9%) subjects, almost 3/4th subjects were having BMI >23.5kg/m2 that is 43.5% participants were overweight (23.5-28), 48.9% were obese (28.1-33) and 42.9% were grossly obese (>33.1) and association was highly significant. 58.7% high risk subjects have waist circumference in the range of 91-115 cm. High risk is predominant in participants with WC range of 91-115cm (p=0001.) With respect to physical activity 27.1% high risk subjects does either exercise or strenuous work. Among 100 sedentary worker 47% were at high risk who doesn't do any exercise (p=0.0001). 15.4% participants have family history of diabetes of either parent, the link between family history of Diabetes Mellitus and risk status was significant statistically (p=0.001). **Conclusions:** Urban slum population showed that one third of study population were at high risk according to IDRS scale.

KEYWORDS : Pre-diabetes, Type 2 Diabetes Mellitus, Indian Diabetes Risk Score (IDRS), Slum Dwellers

INTRODUCTION:

Type2 Diabetes Mellitus is the most common non-communicable disease emerging as global burden now a days. Pre diabetes [Intermediate Hyperglycemia] is a high risk state of developing T2DM.1 Indeed WHO used the term "Intermediate Hyperglycemia" (2) & an International Expert committee convened by the ADA the "High Risk State of Developing Diabetes".(3) The proportion of people with T2DM is increasing worldwide in many countries. According to International Diabetes Federation[IDF] (4),In 2017, 425 Million adults are living with diabetes ,it is estimated that by 2040 it will rise up to 629 million.1 in 2 people with diabetes were undiagnosed. 4 million deaths was noted due to diabetes.352 million people were at risk of developing T2DM. More than 21 million live births [1 in 7 births] were affected by diabetes during pregnancy.4 out of 5 people with diabetes live in low & middle income countries. Without lifestyle changes, 15-30% of people with prediabetes will develop type 2 diabetes within 3-5 years. Patients with diabetes & prediabetes can be diagnosed by FPG [Fasting Plasma Glucose], OGTT [Oral Glucose Tolerance Test] and HbA1c levels.[5]

ICMR-INDIAB study is the largest nationally representative study of diabetes in India. The cumulative data from 15 states was presented. According to that, overall prevalence of diabetes in India was estimated to be 7.3%& prediabetes to be 10.3%.[6]

The purpose of this study is to observe the risk of developing diabetes by using IDRS, a simplified questionnaire which is a non-invasive technique and assess the risk factors associated with it. There are no such studies done in this locality and also we need to study to prevent risk of developing T2DM& make awareness among people.

METHODOLOGY:

A community based cross-sectional study was carried out in urban slum and blighted area of Hyderabad city over the period of 2 months .

Inclusion criteria:

1. Age more than 20 years
2. Non diabetics (previously never diagnosed with Diabetes Mellitus)

Exclusion criteria:

1. Age less than 20 years
2. People not given consent
3. Diagnosed any type of Diabetes in the past and took medications.

Sample size: Calculation based on the following formula

$N = z2PQ/L2$

N= sample size, Z=1.96 at 95% CI, P (prevalence) = 10.6% (according to Anjana et al, overall prevalence of Pre-diabetes in 15 states 10.6%. This considered for sample size calculation)

$Q = 100 - 10.6 = 89.4\%$, $L = 4\%$ (Precision), $N = 3.84 \times 10.6 \times 89.4/4 \times 4$

$N = 227.433$

Making to near value, 20% non-response rate total sample size considered is 280.

Sampling technique:

All the study subjects selected based on stratified sampling technique. Urban slums and urban blighted areas were stratified; sample was collected randomly from both areas.

Study tool : Indian Diabetes Risk Score (IDRS) can help in cost

effective screening for diabetes as it uses simple, safe &inexpensive measures. Moreover it would help to do selective screening instead of universal screening.

The CURES is a classic cohort which has generated a risk score called IDRS with two modifiable risk factors (waist circumference& physical inactivity) & two non-modifiable factors (age & family history of diabetes). [6]

Statistical analysis: Data entry was done using M.S. Excel and it was statistically analyzed using Statistical package for social sciences (SPSS-20) software. Descriptive statistical analysis was carried out to explore the distribution of several categorical and quantitative variables. Categorical variables were summarized with frequency (n) and percentage (%). All results were presented in tabular form.

Inferential Statistics: The difference in the two groups were tested for Statistical Significance by using chi square test . P-value less than 0.05 considered to be statistically significant.

Ethical considerations: The study was conducted according to the Declaration of Helsinki; the protocol was reviewed and approved by the institutional ethics committee of the institute. A written informed consent was taken from all patients after explaining the procedure.

RESULTS:

Total 280 study subjects were included in the study.

Majority of the participants 37.1% were in the age category of 20-30 years.

Among study participants, majority of the study population 57.50% were females

The study group consists of 53.9% literates predominantly. Among literates, most of them 15.4% were high school passed. Among study subjects, most of them 93.6% were employed, majority of them 48.9% were labourers /workers. Based on socio economic status most of the study subjects 67.5% belongs to upper lower class according to modified kuppuswamy classification. Among study subjects, most of them 91.1% were married. 69.3% doesn't have any addictions whereas 30.7% have addictions like smoking, alcohol. Among addicted participants, majority 16.1% have addictions of both smoking and alcohol. More than half of the subjects 54% among study population were overweight, obese and grossly obese. 43.9% have waist circumference in the range of 76-90 cm and only 3.2% have waist circumference in the range of 110-130 cm. 63.2% does either exercise or strenuous work. 83.9% of study participants doesn't have any family history of Diabtes Mellitus, 15.4% of people only have family history of DM of either parent. Majority subjects 54.6% were at moderate risk (30-50years), followed by 33.9% were at high risk (≥60 years).

With respect to age, 37(64.9%) participants of age group 41-50 were at high risk, 78(75%) of age group 20-30 were at moderate risk. There is an evidence of increased risk from age group>40. The association between age and risk status was highly significant statistically (p=0.0001). Among study subjects 39.5% high risk, 51.2% moderate risk. Among high risk 95 subjects, more than half of them were illeterates.so there is evidence of increased risk in illiterates. The link between education and risk status was significant statistically (p=0.006).

34.9% high risk subjects, 55.3% moderate risk subjects are married. The link between marital status and risk status was highly significant statistically (p=0.000).

With respect to occupation, 29.2% high risk subjects, 56.2% moderate risk, 14.6% low risk subjects were workers/ labourers. Among 18 unemployed subjects, almost half of them were at high risk and among70 house wives, no low risk status was found. So this tells that sedentary work leads to increased risk of diabetes. The association between occupation and risk status was statistically significant (p=0.05).

33.5% high risk subjects ,56.4% moderate risk subjects consumes mixed diet .The link between risk status and diet was significant statistically(p=0.035).

Among high risk (33.9%) subjects, almost 3/4th subjects were having BMI >23.5kg/m2 that is 43.5% participants were overweight (23.5-28), 48.9% were obese (28.1-33) and 42.9% were grossly obese (>33.1). This indicates that there is strong association between high BMI and risk of diabetes. The association between BMI and risk status was highly significant statistically (p=0.000)

Among study subjects 58.7% high risk , 69.9% moderate risk and 43.6% low risk subjects have waist circumference in the range of 91-115 cm,76-90cm and 60-75 cm respectively. High risk is predominant in participants with WC range of 91-115cm. This indicates increase in WC leads to increase in risk of diabetes and the association between WC and risk status was highly significant statistically (p=0.000).

With respect to physical activity, 27.1% high risk, 55.4% moderate risk and 17.5% low risk subjects does either exercise or strenuous work. Among 100 sedentary worker, almost half of the subjects 447% were at high risk and remaining half were at moderate risk. This clearly indicates no exercise or strenuous work can lead to increased risk of diabetes and the link between physical activity and risk status was highly significant statistically (p=0.000).

Among subjects with family history of diabetes, majority 15.4% participants have family history of diabetes of either parent, subjects with family history of diabetes of either parent, more than half of the subjects were at high risk and among 2 subjects with family history of diabetes of both parents, and both were at high risk. So there is an evidence of high risk in association with family history of DM and the link between family h/o DM and risk status was significant statistically(p=0.001).

Table 1: Association b/w Diet and risk of Diabetes: (n=280)

Diet	Risk (%)			Total(%)
	High (>=60)	Moderate risk (30-50)	Low risk (<30)	
veg	9(39.1%)	8(34.8%)	6(26.1%)	23(100.0%)
mixed	86(33.5%)	145(56.4%)	26(10.1%)	257(100.0%)
Total	95(33.9%)	153(54.6%)	32(11.4%)	280(100.0%)

Table 2: Association b/w BMI and risk of Diabetes :(n=280)

BMI (Kg/m2)	Risk (%)			Total (%)
	High (>=60)	Moderate risk (30-50)	Low risk (<30)	
Normal (18-23)	26(22.4%)	72(62.1%)	18(15.5%)	116(100.0%)
Overweight (23.5-28)	40(43.5%)	46(50.0%)	6(6.5%)	92(100.0%)
obese(28.1-33)	22(48.9%)	21(46.7%)	2(4.4%)	45(100.0%)
Grossly obese(>33.1)	6(42.9%)	8(57.1%)	0(0.0%)	14(100.0%)
Under weight(<18)	1(7.7%)	6(46.2%)	6(46.2%)	13(100.0%)
Total	95(33.9%)	153(54.6%)	32(11.4%)	280(100%)

36.05; p = 0.0001 ; highly significant

Table 3:Association b/w waist circumference and risk of Diabetes :(n=280)

WC (cm)	Risk (%)			Total (%)
	High risk (>=60)	Moderate risk (30-50)	Low risk (<30)	
60-75	2(5.1%)	20(51.3%)	17(43.6%)	39(100.0%)
76-90	22(17.9%)	86(69.9%)	15(12.2%)	123(100.0 %)
91-115	64(58.7%)	45(41.3%)	0(0.0%)	109(100.0 %)
110-130	7(77.8%)	2(22.2%)	0(0.0%)	9(100.0%)
Total	95(33.9%)	153(54.6%)	32(11.4%)	280(100.0 %)

$X^2 = 103.17$; $p = 0.0001$; highly significant

DISCUSSION:

In present study, the proportion of participants at high risk (≥60) were 33.9%. Similar findings were found in a study by Brahmbhatt et al 9, where 34% of population categorised as high risk. In contrast to our findings, the distribution of population in high risk category was higher in a study done by Mohan et al 10conducted in Chennai, which is 43% of population were at high risk and was lower among similar studies by Subramani et al (11) with 12.1% and by Ramaiah et al (12) with 14.84% of population was found in high risk category. The difference in variations in results may be due to lifestyle variances, dietary changes and different study setting areas. BMI was one of the major risk factor contributing to increased risk. In our study increase in BMI associated with increased risk of diabetes. Similar findings were also found in some studies (13). In present study, People with sedentary and mild physical activity had higher risk. Similar findings were seen in Subramani et al (11) and Gupta et al (14). In our study, there was significant association between marital status and risk status similar findings were noted in a study by Khaled k. Aldossari et al (15). It may be due to the fact that after marriage the responsibilities of individuals increased so people don't enough have time for physical fitness and personal health care which leads to increased risk of prediabetes and diabetes. In present study, almost 83.7% of population doesn't have any family history which was similar in a study by Ramaiah et al (12). There was increased risk associated with family h/o DM which was similar in some studies. Arora et al (16), noted that majority of people with prediabetes have family h/o DM. In present study significant association was found between IDRS and age, abdominal obesity, physical activity and family h/o DM and similar findings were found in Gore et al [17].

In present study highly significant association was found between risk status and age, BMI, WC and marital status and similar findings were reported in Saudi Arabia, by Khaled k. Aldossari et al (15). According study conducted by to Bala and Pandve et al, IDRS is a cost effective tool which can be used for screening among undiagnosed cases. [18]

CONCLUSION:

The present study among urban population showed that one third of study population i.e., 33.9% were at high risk according to IDRS scale, 54.6% were at moderate risk and only 11.4% belongs to low risk category. Association of risk status with age, education, occupation, marital status, diet, physical activity, BMI, waist circumference and family h/o DM were found statistically significant. IDRS is a simple and cost effective tool for mass screening of population to find out high risk subjects and further confirmation with Glucose tolerance test (GTT), HbA1c levels is required among high risk subjects (IDRS≥ 60) and early detection of diabetes. Interventions like regular exercise, life style modifications and diet changes can reduce the risk of diabetes among people with prediabetes.

RECOMMENDATIONS:

Most of the study subjects are lacking knowledge towards the disease and the preventive measures, so awareness should be created through IEC activities and screening camps and more studies are required in this aspect.

ACKNOWLEDGMENT: This study was supported by the Indian Council of Medical Research Short Term Studentship Program 2019 (ICMR-STS 2019)

REFERENCES:

1. Tabak AG, Herder C, Rathmann W, Brunner EJ, Kivimaki M. Prediabetes: a high-risk state for diabetes development.Lancet. 2012;379(9833):2279-90.
2. World Health Organization, International DF. Definition and diagnosis of diabetes mellitus and intermediate hyperglycemia: report of a WHO/IDF consultation. Geneva: World Health Organization; 2006.
3. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2011; 34 Suppl 1(Suppl 1):S62-9.
4. IDF Diabetes Atlas Eighth edition 2017 https://www.idf.org/aboutdiabetes/what-is-diabetes/facts-figures.html
5. International Expert Committee. International Expert Committee report on the role of the A1C assay in the diagnosis of diabetes. Diabetes Care.2009; 32(7):1327-34.
6. Anjana RM et al, Prevalence of diabetes and prediabetes in 15 states of India: results from the ICMR-INDIAB population-based cross-sectional study. Lancet Diabetes Endocrinal. 2017 Aug; 5(8):585-596. doi: 10.1016/S2213-8587(17)30174-2
7. Dudeja P, Singh G, Gadekar T, Mukherji S. Performance of Indian Diabetes Risk Score (IDRS) as screening tool for diabetes in an urban slum. Med J Armed Forces India.2016; 73(2):123-128.
8. Mohan V, Deepa M, Deepa R, Shanthirani CS, Farooq S, Ganesan A, Datta M. Secular trends in the prevalence of diabetes and impaired glucose tolerance in urban South India – The Chennai Urban Rural Epidemiology Study (CURES –17). 2005, Diabetologia (under revision)
9. Brahmbhatt KR, Chakraborty T, Gopal C, Shwethashree M, Madappady S, Sowndarya TA, et al. Assessment of risk of type 2 diabetes using simplified Indian Diabetes Risk Score-Community-based cross-sectional study. Int J Med Sci Public Health. 2016;5:2522-5.
10. Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A simplified Indian Diabetes Risk Score for screening for undiagnosed diabetic subjects. J Assoc Physicians India. 2005; 53:759-63.
11. Subramani R, Devi U, Shankar V, Stephen Karthik, Seshadri. 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(1):223-5.
12. Ramaiah, R., Jayarama, S. . Assessment of risk of type 2 diabetes mellitus among rural population in Karnataka by using Indian diabetes risk score. International Journal of Community Medicine and Public Health,2017 4 (4), 1056-1059.
13. Dugg P, Cherian V, Upadhyay MK. Opportunistic screening for diabetes using Indian diabetes risk Score among patients aged 30 years and above attending rural health training center in Delhi. Int J Med Sci Public Health 2019;8(4):264-269
14. Gupta SK, Singh Z , Purty AJ,Mohan V. Diabetes prevalence and its risk factors in urban Pondicherry. Int J Diabetes Dev Ctries. 2009; 29(4):166–9. doi:10.4103/0973-3930.57348.
15. Aldossari KK, Aldiab A, Al-Zahrani JM, Al-Ghamdi SH, Abdelrazik M, Batais MA, Javad S, Nooruddin S, Razzak HA, El-Metwally A. Prevalence of prediabetes, diabetes, and its associated risk factors among males in Saudi Arabia: a population-based survey. Journal of diabetes research 2018;201–8
16. Arora V, Singh MJ, Khanna P, Goyal N, Kumar N, Singh M. Prevalence of diabetes in urban Haryana. Australas Med J. 2010; 3(8):488–94.
17. Gore CA, Subramanian M. Diabetes Risk in an Urban Slum Population in Bangalore, India. Int J Prevent Public Health Sci 2016;1(6):11-14.
18. Bala S, Pandve H, Kamala K, Dhanalakshmi A, Sarikonda H. Performance of Indian diabetic risk score as a screening tool of diabetes among women of industrial urban area. J Family Med Prim Care 2019;8:3569-73