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A cross sectional study on assessment of risk of diabetes mellitus using Indian diabetic risk score in a medical college teaching hospital

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ABSTRACT

The objective of the study was to evaluate the risk of diabetes mellitus in elderlywith age above 20 years in a hospital setting using Indian Diabetes risk score and to provide patient counselling regarding their life style modifications and health related quality of life among participants with high risk of developing diabetes.A total of 125 non diabetic patients were interviewed with a pre designed selfstructured questionnaire (IDRS). Participants were chosen voluntarily and a written consent was obtained before the administration of the questionnaire from individual patients.**:** In our study we observed that out of 125 patients,males 26[59%]and 18[41%] females were at high risk, males 39[58.2%] and 28[41.8%] females were at moderate risk, males 5[35.7%] and 9[64.3%] females were at low risk of developing diabetes mellitus.

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INTRODUCTION

Diabetes mellitus is a metabolic disorder caused either by inherited or acquired deficiency in production of insulin either by the pancreas or by the ineffectiveness of the insulin produced. Such deficiency leads to increased blood glucose concentration, which in turn damage many of the anatomical systems, especially blood vessels and nerves [1].

The sedentary life styleand ageing of our population is found to be the major causativefactors for the development of diabetes mellitus. Poor glycemic control for long term leads to several healthcomplications with increases hospitalization, morbidity and mortality [2]

Diabetes mellitus can be defined as a group of metabolic disorder with a distinctive nature of hyperglycemia resulting from imperfection in secretion or action of insulin, or both. The persistent hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of many organs, especially the eyes, nerves, kidneys, blood vessels and heart. Various pathogenic activities are involved in the development of DM ranges from autoimmune destruction of pancreatic cells with consequences of insulin deficiency to abnormalities that result in resistance to insulin action.The deficient-action of insulin on target-tissues is the basis of the abnormalities in protein, carbohydrate, and fat metabolism in diabetic patients. Inadequate insulin secretion and/or diminished tissue responses to insulin at one or more points in the complex pathways of hormone action leads to deficient insulin action [3].

Defects in action of insulinand Inadequate insulin secretion coexists in the samepatient very often, and

it is unclear which abnormality, if either alone, is the primary cause of thehyperglycemia. Symptomsof marked hyperglycemia include mainly three P'slike Polyuria, Polydipsia sometimes with Polyphagia & weight loss, [4].

MATERIALS AND METHODS

Classification

Type I diabetes mellitus

Type-1 diabetes(cell-destruction leads to absolute insulin deficiency) Immune-mediated diabetes.This diabetes, which accounts only 5-10% of total diabetic patients, previously encompassed in terms of insulin dependent diabetes, juvenile-onset diabetes or type I diabetes, between episodes. The Type I DM is strongly inherited & is not HLA associated and lacks immunological evidence for cell autoimmunity. A prerequisite for insulin replacement therapy in affected patients may occur again periodically [5].

Type II diabetes mellitus

(Ranging from more insulin resistance with relative insulin deficiency to an insulin secretory defect with insulin resistance) Which accounts for 90-95% of those with diabetes, previously referred to as non-insulin dependent diabetes, adult- onset diabetes or type II diabetes encompasses individuals with insulin resistance and usually have relative insulin deficiency at least initially, and often over the years in their lifetime, those don't need insulin treatment to survive. There are probably various etiological reasons for this form of diabetes [6].

Risk factors of diabetes mellitus

Weight

Over weight is a main risk factor for type II diabetes. How fatty the tissue, then cells become more insulin resistant.

Fat distribution

The storage of fat mainly in abdomen causes the greater risk of type II diabetes if body stores fat anywhere like hips and thighs [7].

Inactivity

The more inactive, the greater risk for having type II diabetes. Physical activity improves weight, uses glucose as energy source and cells become more sensitive to insulin.

Family history

The risk of type II diabetes increases if sibling or progenitor has type II diabetes.

Race

Although it's unknown why, people of defined races including blacks, American Indians, Hispanics,& Asian-Americans are more prone to develop type II diabetes than whites [8].

Age

The risk of type II diabetes mellitus increases in elderly, especially after 45 years of age. That's probably because of less body activity, loss of muscle mass and gain weight as they aged.

But type 2 diabetes is also drastically rising among children, adolescents and younger adults [9].

Prediabetes

It is a condition in which your blood sugar level is more than normal but not high enough to be classified, so it will be left untreated. There is more chance to progress Prediabetes into type II diabetes.

Gestational diabetes

If any patient had developed gestational diabetes during pregnancy, risk of developing type II diabetes is more. Giving birth to a baby weighing more than 9pounds (i.e. up to 4 kilograms), then there is more chance to get type II diabetes.

Polycystic ovarian syndrome

For women, having PCOD a common condition explained by irregular menstrual periods, obesity & excess facial hair growth increases the risk of occurring diabetes [10].

METHODOLOGY

This is a cross - sectional study conducted in THE OXFORD MEDICAL COLLEGE, Bengaluru. The study samples were collected from both male and female general medicine department. A total of 125 nondiabetic patients were interviewed with a pre designed self structured questionnaire (IDRS). Participants were chosen voluntarily and a written consent was obtained before the administration of the questionnaire from individual patients. Confidentiality of the participants as maintained. If the participants couldn't understand the questionnaires, due to language problem he/she are questioned in their preferred languages [11–13] (English, Hindi and Kannada)

Collection of data and method of data analysis

Step 1

All eligible candidates who were willing to submit informed consent form were enrolled in the study.

Step 2

Participants were briefed regarding the study.

Step 3

Data collection was done by using structured questionnaire form which contains 3 parts,

1. First part is about socio demographic information.
2. In second part IDRS score was estimated which was developed & validated by Madras Diabetic research foundation and Ramachandran A et al.
3. In the third part the risk factors were assessed [14, 15].

Step 4

Each participant risk score was analyzed using software spss 18.0 statistical tools.

STtep 5

Finally we created awareness through patient counselling with the help of leaflet regarding the risk factors of diabetes which were assessed among the risky population.

RESULTS AND DISCUSSION

A total of 125 patients who fulfilled the criteria were included in the study of which 44(35%) of the study participants are high- risk of developing type- 2 diabetes mellitus. As per IDRS assessment, similar type of the study was conducted by Mohan et al., constitutes 43% of study population were in high risk category [16–18]]. Our present study noted that 67(54%) of the participants with the moderate risk and 14(11%)of people with the low risk, while Gupta et al., found 50.3% of people at moderate risk and 18.5%were at low risk for diabetes. This may be due to the changes in life style and standard of living of people in both urban and rural areas, as a result of urbanization. in our present study noted that a high proportion of housewives were at high risk for developing diabetes. The main reason for this is that housewives are not doing anything other physical activity apart from their household work and are not involved in any other day to day exercise.Figures 1 and 2 .

Gender wise distribution of study participants showed that the number of male patients are more than that of female patients. The maximum number of patients enrolled belonged to the age group of 35-50 that is 65[52%] followed by the age group of <35 that is 50[40%] this showed that diabetes mellitus was not only the disease which is seen in elderly people but was also much prevalent among adult groups. Two more further studies found in a significant association between the highest age and undiagnosed diabetesFigures 3 and 4 .

From our study either parent diabetic is one of the major contributors that is 44[35.2%] and followed by both the parents diabetic that is 67[54%] similar findings observed in Reshma S et al., with family-history of diabetes is one of the major contributors in diabetesTable 5 .

Physical- activity- Globally physical activity accounts one of the major modifiable- risk factors of diabetes, and it act as a major risk factor for obesity which has a notified relationship with hyperglycaemia. In our current study majority of the patients were belongs to no exercise category 66[52.8%] followed by mild/moderate exercise 47[37.6%] similarly reported in Gupta et al., same findings to those in the present study, that individuals with an increased sedentary lifestyle or who were not doing any physical activity, had an increased risk for diabetes.Figures 5 and 6 .

We observed that following factors are found to be significant that is p value <0.05, in gender males [0.0014], in education under PUC [0.0129], in employment status employed [0.0169] and unemployed [0.0429], all the age groups, in family history of diabetes EPD[0.0036], in physical activity no exercise[0.0026] , in waist circumference males 90-99[0.0340], in BMI over weight [0.0015] and in rice intake/day twice group[0.0007], these people was at increased risk of developing type-2 diabetes [19, 20] .Table 6 .

Our project concluded with the risk of developing diabetes can be decreased or overcome by the change in modifiable risk factors in the high risk population. We created awareness regarding diabetes by counselling with the help of leaflet which includes thedevelopment of suitable primary and secondary preventive approaches like, life style modifications and dietary changes were recommended for those high risk participants and definitive testing is necessary to detect the range of diabetes in participants with a random blood glucose with more than 110mg/dl. We observed that IDRS calculator was less cost -effective method for diagnosis of pre-diabetes [21–23].

As we observed that, in our study majority of the patients were not having any addictions (smoking and alcohol consumption)that is 82(65.6%), followed by 21(16.8%) were smokers, 7(5.6%) were alcoholic, and 15(12%) were having both habitsTable 1Charts 1 and 2 .

In our study majority of patients were unemployed that is 51(40.8%), followed by 38(30.4%)

Table 1: Personal habits distribution

Personal habits	Frequency [n-125]	Percentage [%]
Smoker	21	16.8
Alcoholic	7	5.6
Both	15	12
Nil	82	65.5

Table 2: Employment distribution

Employment status	Frequency [n-125]	Percentage [%]
Employed	37	29.6
Self Employed	37	29.6
Unemployed	51	40.8

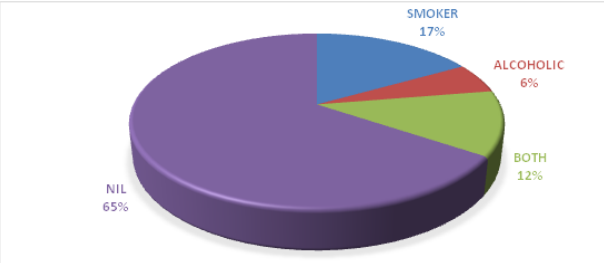

Chart 1: **Personal habits distribution**

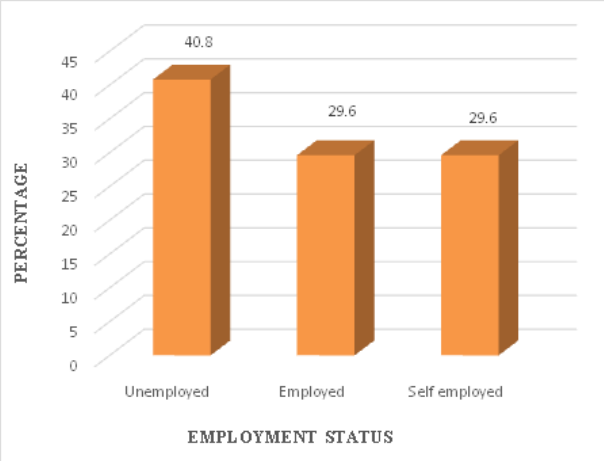

Chart 2: **Employment distribution**

were employed and 36(28.8%) were self employedTable 2 .

From the above table and graph, we found that majority were non hypertensive patients 102(81.6%) compared to 23(18.4%) hypertensive patientsTable 3Chart 3 .

In our study majority were taking rice only twice daily 92(73.6%),followed by 14(11.2%) were tak-

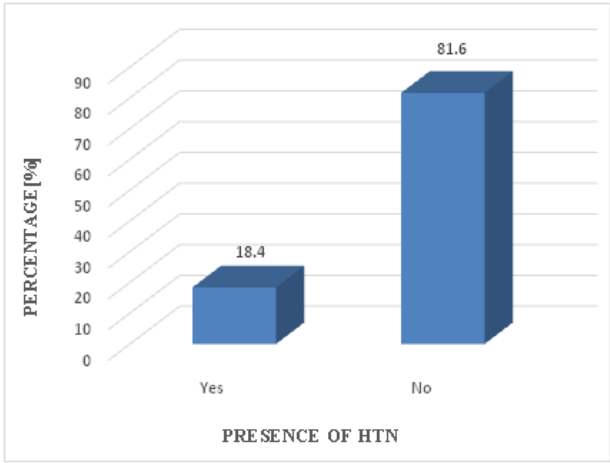

Chart 3: **Hypertension frequency distribution**

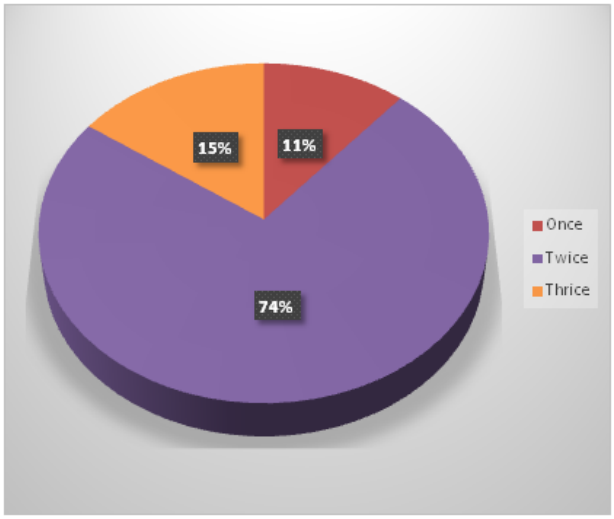

Chart 4: **Distribution of rice intake/day**

Table 3: Hypertension Frequency distribution

Presence of HTN	Frequency [n-125]	Percentage [%]
Yes	23	18.4
No	102	81.6

Table 4: Distribution of Rice intake/day

Rice Intake/Day	Frequency [n-125]	Percentage [%]
Once	14	11.2
Twice	92	73.6
Thrice	19	15.2

ing only once daily and 19(15.2%) were taking rice thrice in a dayTable 4Chart 4 .

Comparison of risk factors with IDRS score

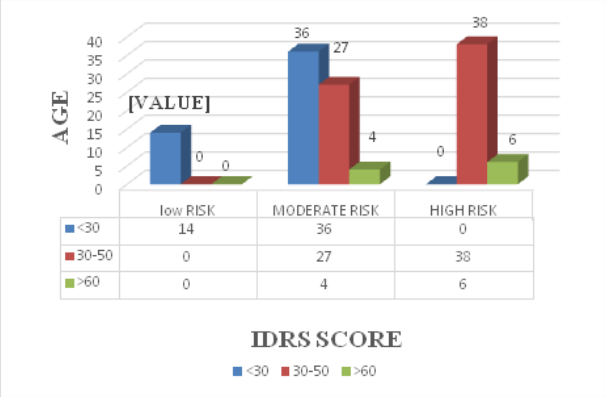

Figure 1: Age vs IDRS

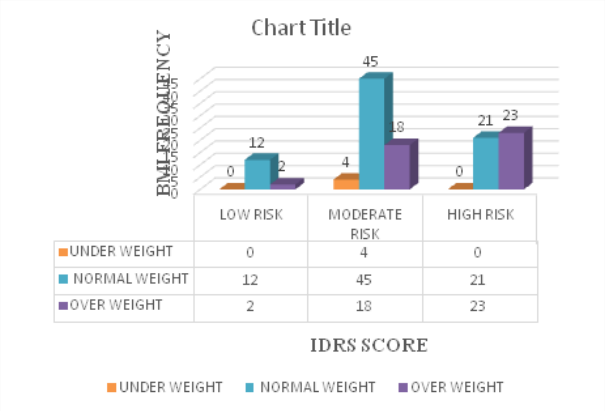

Figure 2: BMI Vs IDRS

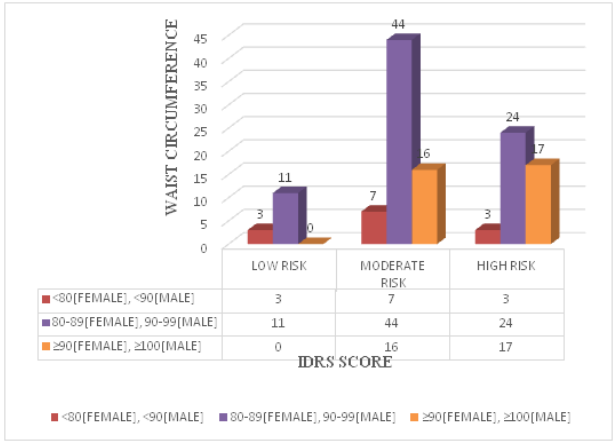

Figure 3: Waist circumference Vs IDRS

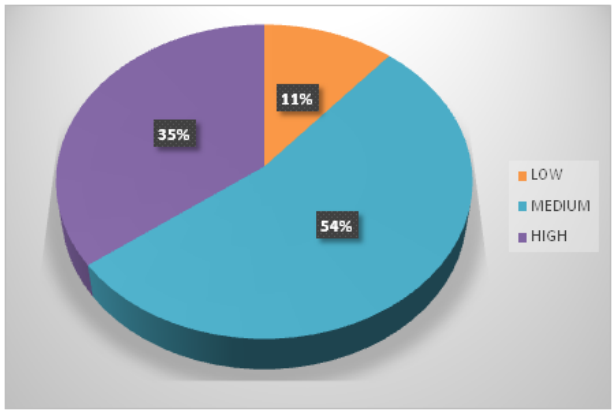

Figure 4: IDRS score distribution among study population

CONCLUSION

The Indian Diabetic Risk score is highly sensitive test for early diagnosis of prediabetes, and its screening is done in the prediabetic stage then we can prevent it into conversion in diabetes mellitus and laid diabetic complications in Indian community.

The current study estimates that, males were at high risk compare to females, participants with under PUC, unemployed, whose age 35-50, whose family history with either parent diabetic, those physical activity under no exercise, >25 overweight BMI,

Table 5: Frequency distribution

Variables	Frequency (n-125)[%]		
	Low risk	Moderate risk	High risk
Age			
• <35	14[100%]	36[53.7%]	0
• 35-50	0	27[40.2%]	38[86.3%]
• >50	0	4[5.9%]	6[13.6%]
Physical Activity			
• Mild/moderate	10[71.4%] 4[28.5%]	30[44.7%]	7[15.9%]
• Vigorous		8[11.9%]	0 37[84%]
• No exercise	0	29[43.2%]	
Waist Circumference			
• <80 [female],<90[male]	3[21.4%] 11[78.5%]	7[10.4%]	3[6.8%]
• 80-89 [Female], 90-99[male]		44[65.6%]	24[54.5%]
• >90[female], >100[male]	0	16[23.8%]	17[38.6%]
Family History			
• Two non diabetic parents	12[85.7%] 2[14.2%]	41[61.1%]	21[47.7%]
• Either parent diabetic		23[34.3%]	19[43.1%]
• Both parents diabetic	0	3[4.4%]	4[9%]
Level of Education			
• Under puc	8[57.2%] 6[42.8%]	30[44.7%]	24[45.6%]
• Above puc		37[55.3%]	20[45.4%]
Employment Status			
• Employed	3[21.4%] 6[35.7%]	19[28.3%]	15[34%]
• Unemployed	5[42.8%]	28[41.7%]	17[38.6%]
• Self employed		20[29.8%]	12[27.2%]
BMI			
• Under weight	0	4[5.9%]	0
• Normal weight	12[85.7%] 2[14.2%]	45[67.1%]	21[47.7%]
• Above weight		18[26.8%]	23[52.2%]
Rice Intake/Day			
• Once	0	9[13.4%]	5[11.3%]
• Twice	9[64.2%] 5[35.7%]	48[71.6%]	35[79.5%]
• Thrice		10[14.9%]	4[9%]

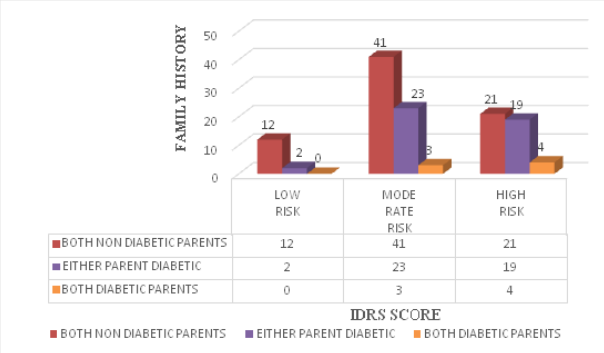

Figure 5: Family history Vs IDRS

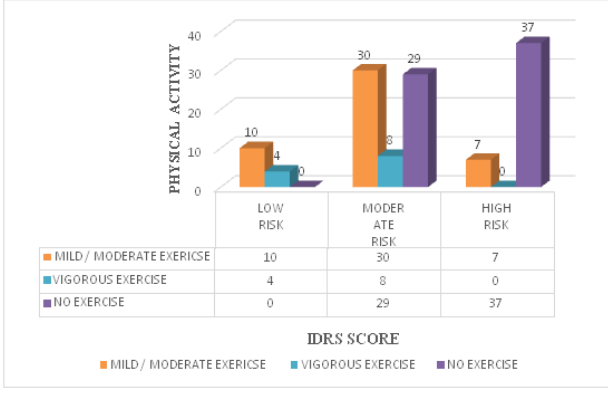

Figure 6: Physical activity Vs IDRS

twice under rice intake/day, random blood sugar >160 mg/dl and waist to hip ratio >0.9 were found to be at high risk.

In our cross-sectional study, we reached to a conclusion that, IDRS is a simple tool used in a small pop-

Table 6: Other socio demographic factors distribution

Variables	Frequency (n-125)[%]
Marital Status	
• Married	96[76.8%]
• Unmarried	29[23.2%]
Personal History	
• Alcoholic	7[5.6%]
• Smoker	21[16.8%]
• Both	15[12%]
• Nil	82[65.6%]
PCOD	
• Yes	5[9.9%]
• No	50[90.1%]
Waist To Hip Ratio	
• <0.8	3[2.4%]
• 0.8-0.9	28[22.4%]
• >0.9	94[75.2%]
HTN	
• Yes	23[18.4%]
• No	102[81.6%]
Other Risk Factors	
• Alcohol addiction	7[5.6%]
• Asthma	16[12.8%]
• Thyroid	11[8.8%]
• Thyroid and asthma	9[7.2%]
• Nil	82[65.6%]

Table 7: IDRS Risk assessment Male vs Female

Sl. No	Risk level	Male [%]	Female[%]	Total [%]
1.	Low risk [score <30]	5[35.7%]	9[64.3%]	14[11.2%]
2.	Moderate risk [score 30-50]	39[58.2%]	28[41.8%]	67[53.6%]
3.	High risk [Score >50]	26[59%]	18[41%]	44[35.2%]

ulation based study to detect population with high risk of diabetes. Half of half participants were found to at high- risk 44[35%] for diabetes.

So we conclude that the risk of diabetes can be reduced by the change in modifiable factors in high risk population and also by decreasing the waist to hip ratio. The finding of our present study may help in convincing health care professionals and population at high risk of developing diabetes to take stem action- towards healthy life style and achieving the goals of "health for all"

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

REFERENCES

[1] Ancypaula C, Dennyb, LincyGeorge C, Krishnakumar D, Panayappane L. An Assessment

of Knowledge and Evaluation of Risk on Developing Type-II Diabetes Mellitus- a Prospective Study. Int J Hospital Pharmacy. 2017;2(2):76–68.

[2] Brahmbhatt TKR, Chakraborty, Chandana G, Shwethashree NM, Madappady S, Sowndarya TA, et al. Risk of type 2 diabetes using simplified Indian Diabetes Risk Score-Community-based cross-sectional study. Int J Med Sci Public Health. 2016;5(12):102–106.

[3] Sathya S. Diagnosis and classification of diabetes mellitus American diabetes association. Diabetes care. 2004;4(3):113–129.

[4] LanordStanley JM. Evaluation of Indian diabetic risk score for screening undiagnosed diabetes subjects in the community. Indian Journal of Science and Technology. 2012;5(6):1–2. Available from: 10.17485/ijst/2012/v5i6.4.

[5] Nagalingam S, Kavitha S, Balaji. A Screening for diabetes using Indian Diabetes Risk Score. IJAM. 2016;13(2):95–96.

[6] Mushtaqurrahmana RK, Anne-Helenharding, Wareham NJ, Simon J, Griffin. High Risk of developing type 2 diabetes : prospective cohort study. OUP. 2018;4(11):23–24.

[7] Subramani R, Devi U, Shankar U, Stephen, Karthik, Seshadhri. 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):223–248.

[8] Taksande B, Ambade M, Joshi R. External validation of Indian diabetes risk score in a rural community of central India. Journal of Diabetes Mellitus. 2012;02(01):109–113. Available from: 10.4236/jdm.2012.21017.

[9] Tan JPL, Koh E. Situating learning analytics pedagogically: towards an ecological lens. Informa UK Limited; 2017. Available from: 10.1080/23735082.2017.1305661.

[10] Gupta SK, Singh Z, Purty AJ, Vishwanathan M. Diabetes prevalence and its risk factors in urban Pondicherry. International Journal of Diabetes in Developing Countries. 2009;29(4):166–166. Available from: 10.4103/0973-3930.57348.

[11] 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):1056–1056. Available from: 10.18203/2394-6040.ijcmph20171323.

[12] Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A simplified Indian Diabetes Risk Score for screening for undiagnosed diabetic subjects. JAPI. 2005;53(4):45–46.

[13] Saleem AFSM, Raina M, Khan SS, Sumayajan S. Indian Diabetic Risk Sore -A tool for predicting risk of undiagnosed type 2 diabetes mellitus. Int J Cur Res Rev. 2017;9(3):39–42.

[14] Adhikari P, Pathak R, Kotian S. Validation of the MDRF- Indian Diabetes Risk Score (IDRS) in another South Indian population through the baloor diabetes study (BDS). JAPI. 2010;58(2):26–27.

[15] Katulanda P, Stratton HNR, De S, Matthews SDN. R Development and validation of a diabetesrisk score for screening undiagnosed diabetes in Srilanka. BMC Endocrine Disorders. 2016;16(42):1–6.

[16] Divyang N, Patel, Maulik C, Shah GN, Ahir DV, Amin, et al. A study on validity of Indian diabetes risk score (MDRF) for screening of diabetes mellitus among the high risk group of diabetes mellitus of bhavngar City. IJMS. 2012;2(5):109–120.

[17] Sharma KM, Ranjani H, Nguyen H, Shetty S, Datta M, Narayan KMV, et al. Indian Diabetes Risk Score Helps to Distinguish Type 2 from Non-Type 2 Diabetes Mellitus (GDRC-3). Journal of Diabetes Science and Technology. 2011;5(2):419–425. Available from: 10.1177/193229681100500232.

[18] Shashank R, Joshi. Indian diabeties risk score. wwwjapiorg. 2005;53(7):755–57.

[19] Patil RS, Gothankar JS. Assessment of risk of type 2 diabetes using the Indian Diabetes Risk Score in an urban slum of Pune, Maharashtra, India: a cross-sectional study. WHO South-East Asia Journal of Public Health. 2016;5(1):53–53. Available from: 10.4103/2224-3151.206555.

[20] Sumana M, Kudachi H, Sundar M. Prediction of risk of development of type 2 diabetes mellitus using Indian diabetic risk score in rural areas of Hassan. International Journal Of Community Medicine And Public Health. 2018;5(3):948–948. Available from: 10.18203/2394-6040.ijcmph20180443.

[21] Birrul SK. Ahmed RajaGoshul and Demo Yamane Tesfaye Prevalence of Undiagnosed Diabetes Mellitus and itsRisk Factors in Selected Institutions . vol. 23. Bishoftu Town, East, Ethiopia, J Diab Meta; 2013. p. 2155–56.

[22] Nam-KyooLim, Sung-HeePark, Sun-JaChoi,

Kwang-SooLee, Hyun-YoungPark. A Risk Score for Predicting the Incidence of Type 2 Diabetes in a Middle-Aged Korean Cohort. Circulation Journal. 2012;76(8):1904–1910. Available from: 10.1253/circj.cj-11-1236.

[23] Anjali D, Turale, Vrushalkhandekar VG, Patrikar. Indian diabetes risk score for screening of undiagnosed pre- diabetic individuals of sakkardara region of nagpur city. IAMJ. 2017;5(10):203–207.

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