

An assessment of Risk of diabetes using Indian Diabetes Risk score (IDRS) among adults in a rural community of Koppal, Karnataka

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Abstract

Background: India is a home to one in every five diabetics in the world. Indian Diabetic Risk Score (IDRS) is an efficient tool to detect individuals at high risk of developing Diabetes.

Objectives:

1. To estimate the prevalence of Diabetes risk among adults using IDRS in the study setting
2. To determine various factors associated with Diabetes risk among adults.

Methods: A cross sectional community-based study was conducted in the field practice area of PHC, Irkalagada, Koppal for a duration of 3 months from September 2019 to November 2019. Cluster sampling technique was used for sample selection and a total of 629 adults were included. Data collection was done using pretested and semi structured questionnaire and anthropometric measurements were taken according to standard techniques. Risk for Diabetes was graded using Indian Diabetic Risk Score (IDRS) and statistical analysis was done using WHO Epi info software version 3.5.4.

Results: The prevalence of low, moderate and high risk for Diabetes according to IDRS, was found to be 175 (27.82%), 371 (58.98%) and 83 (13.2%) respectively in the present study. The study found significant association between prevalence of moderate to high risk for Diabetes and Age, Literacy, Diet, Religion, Type of Family, Marital status, Body mass index, Waist to hip ratio, Tobacco consumption and Physical activity of the study participants.

Conclusion: The present study revealed that the prevalence of moderate to high risk for Diabetes among adults was high in the study setting and identifies multiple risk factors for effective planning of interventions.

Key words: "Adult", "Diabetes Mellitus", "Risk", "Life Style"

Introduction

Diabetes mellitus, one of the most common non communicable disease, has emerged as a major public health problem globally owing to increased urbanization, increased life expectancy, demographic transition and adoption of unhealthy lifestyles^[1,2]. Diabetes is one of the leading causes of death worldwide and along with other NCDs, can cause potentially life-threatening complications with major economic consequences^[3,4,5]. According to International Diabetes federation, approximately 463 million adults were living with diabetes in the year 2019, of which nearly 80% are living in low and middle income countries and is expected to increase to 700

million by 2045. Further, Diabetes has caused 4.2 million deaths and was responsible for an expenditure of more than USD 760 million dollars in the year 2019^[6].

India is considered as Diabetic capital of the world with one in every five diabetics residing in India^[7,8]. As per recent estimates, there were approximately 72 million diabetics in India (2017), which is expected to double to 134 million by 2045, out of which prevalence among adults was 8.8% which is proposed to increase to 11.4%^[9]. Unfortunately, Diabetes exhibits an Iceberg phenomenon in India, with more than 50% of diabetics remaining unaware of their diabetic status^[8,9,10]. The diagnosis is usually delayed until

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the development of complications, which makes the management more difficult and expensive^[2,11]. Considering the gravity of the situation, Government of India has initiated a national programme named "National programme for prevention and control of cancer, diabetes, cardiovascular disease and stroke" which emphasizes on early detection of diabetics or at risk individuals through screening^[8,12].

Early identification of at-risk individuals and appropriate lifestyle interventions helps in preventing or postponing the onset of Diabetes mellitus^[10,13]. The Indian Diabetic Risk score (IDRS), devised by the Madras Diabetic Research Foundation (MDRF) is an efficient screening tool to detect high risk individuals^[3]. It is simple, reliable, quick, non-invasive and cost-effective tool which can be used even by community health workers to assess risk of Diabetes among individuals in the community^[2,8,11]. It also helps in detecting type 2 Diabetes^[10]. A number of studies have validated its performance in detection of high risk individuals in different study settings^[7,9,13,14,15,16,17]. With this background, the present study was conducted in a rural community of Koppal district, which is considered as one of the backward districts in the Kalyan Karnataka region according to Article 371 J of the constitution. There is no data available on the prevalence of Diabetes or its risk in this region and this study will give insights into the current status of Diabetes risk among the population. As the study also identifies various associated risk factors, population at risk can be identified at the earliest for effective planning of interventions. The objectives of the study were 1) To estimate the prevalence of risk of Diabetes among adults using Indian Diabetic Risk Score (IDRS) in the study setting and 2) To determine various factors associated with risk of Diabetes among adults.

Materials and Methods

A Community based cross-sectional study was conducted in the field practice area of PHC Irkalagada, Koppal for a duration of 3 months from September 2019 to November 2019. The study population included all the adults aged 18 years and above residing in the study setting. Minimum sample size calculated was 550 with an absolute precision of 5%, significance level of 0.05 and design effect of 2, taking 22% prevalence of high risk for Diabetes in Karnataka as per recent estimates^[10] and we included 629 adults (>18 years) in the present study.

Cluster sampling technique was used for sample selection. All 11 villages in the field practice area of PHC Irkalagada, Koppal were considered as clusters and 6 such clusters were selected by Simple random

sampling. In each of the selected cluster, house to house visit was done and 110 adults were included in the study. However, owing to disparities/ incomplete data in the questionnaires, only 629 adults could be used for final analysis.

Exclusion criteria:

1. Adults not found in the house even after giving 2 visits.
2. Adults residing in the study area for a period of less than 6 months.
3. Temporary visitors/ guests to the house.

Study tools and Data collection:

1. **Questionnaire:** A pretested and semi structured questionnaire was used for data collection after obtaining written informed consent from all the participants as per ICMR guidelines.
2. **Weighing machine:** Body weight was measured without footwear to the nearest 0.1 Kg using LED digital portable weighing scale.
3. **Portable stadiometer:** Height was measured using a standard portable stadiometer to the nearest centimetres.
4. **Measuring tape:** Waist circumference and Hip circumference were measured to the nearest centimetres.

Definition/Classification of Some important study variables:

Diabetes risk: was classified according to Indian Diabetic Risk Score (IDRS)^[18] and those found in the category of moderate and high risk for Diabetes were referred to the nearest Health centre and screened for Diabetes and offered counselling for Lifestyle modification/Treatment as applicable.

Socio economic status: classified according to Modified BG Prasad Classification^[19].

Body mass index (BMI): classified as per WHO guidelines^[20].

Waist to Hip ratio: classified as per WHO guidelines^[21].

Statistical analysis: Data analysis was performed using the Epi info software version 3.5.4 (Centres for Disease Control and Prevention"(CDC), Atlanta, Georgia, United States of America).

Ethical Clearance: Ethical clearance was obtained from the Institutional Ethics Committee, Koppal Institute of Medical Sciences, Koppal.

Results

The final statistical analysis included 629 adults in the field practice area of PHC Irkalagada, Koppal.

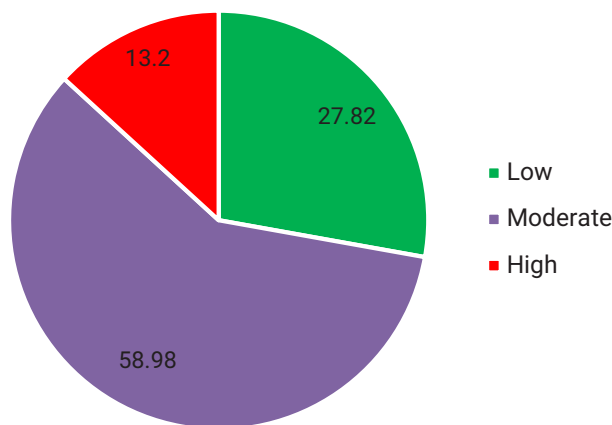


Figure No.1: Prevalence of Risk of Diabetes among study subjects using IDRS (N = 629)

Shows distribution of study subjects according to the degree of risk of Diabetes among adults and it was found that the prevalence of low, moderate and high risk for Diabetes was found to be 175 (27.82%), 371 (58.98%) and 83 (13.2%) respectively in the present study.

Table No.1: Prevalence of Risk of Diabetes among study subjects according to certain Socio demographic variables (N = 629)

Variable	Classification	Number of adults N	Risk of Diabetes n (%)		
			Low	Moderate to High	
Age (in years)	<25	11	8 (72.73)	3 (27.27)	$\chi^2 = 261.396$ P = 0.000
	26 - 35	196	132 (67.34)	64 (32.66)	
	36 - 45	152	31 (20.40)	121 (79.60)	
	46 - 55	71	3 (4.23)	68 (95.77)	
	56 - 65	111	0 (0)	111 (100)	
	66 - 75	67	1 (1.50)	66 (98.50)	
	76 - 85	14	0 (0)	14 (100)	
	> 85	7	0 (0)	7 (100)	
Gender	Male	255	72 (28.24)	183 (71.76)	$\chi^2 = 0.036$ P = 0.849
	Female	374	103 (27.55)	271 (72.45)	
Diet	Vegetarian	141	30 (21.28)	111 (78.72)	$\chi^2 = 3.877$ P = 0.049
	Mixed	488	145 (29.72)	343 (70.28)	
Religion	Hindu	593	157 (26.48)	436 (73.52)	$\chi^2 = 10.634$ P = 0.005
	Muslim	35	17 (48.57)	18 (51.43)	
	Others	1	1 (100)	0 (0)	
Literacy	Illiterate	437	85 (19.46)	352 (80.54)	$\chi^2 = 50.370$ P = 0.000
	Literate but Primary	111	54 (48.65)	57 (51.35)	
	High school & above	81	36 (44.45)	45 (55.55)	
Marital status	Married	611	165 (27.01)	446 (72.99)	$\chi^2 = 7.097$ P = 0.008
	Unmarried	18	10 (55.55)	08 (44.45)	
Family type	Nuclear	302	96 (31.79)	206 (68.21)	$\chi^2 = 4.550$ P = 0.033
	Others	327	79 (24.16)	248 (75.84)	
Socio Economic Status	1	2	0 (0)	2 (100)	$\chi^2 = 5.062$ P = 0.281
	2	15	6 (40)	9 (60)	
	3	48	16 (33.34)	32 (66.66)	
	4	161	51 (31.68)	110 (68.32)	
	5	403	102 (25.32)	301 (74.68)	

demonstrates prevalence of risk of Diabetes among study subjects according to certain socio demographic variables. The prevalence of moderate to high risk of Diabetes among adults in the present study was directly proportional to their age and the association was found to be statistically significant ($P < 0.05$). Similarly, subjects having vegetarian diet, belonging to Hindu Religion, illiterate, Married and those belonging to other than nuclear families had significantly higher prevalence of moderate to high risk for Diabetes as seen in the table.

Table No.2: Prevalence of Risk of Diabetes among study subjects according to Body Mass Index and Waist to Hip ratio (N = 629)

Variable	Classification	Number of adults N	Risk of Diabetes n (%)		
			Low	Moderate to High	
Body Mass Index	Underweight	112	40 (35.72)	72 (64.28)	$\chi^2= 19.867$ $P = 0.000$
	Normal	360	111 (30.84)	249 (69.16)	
	Pre obese	128	23 (17.97)	105 (82.03)	
	Obese	29	1 (3.45)	28 (96.55)	
Waist to Hip ratio	Normal	378	129 (34.13)	249 (65.87)	$\chi^2= 18.752$ $P = 0.000$
	High	251	46 (18.33)	205 (81.67)	

Reveals prevalence of risk of Diabetes among study subjects according to Body mass index (BMI) and Waist-to-Hip ratio (WH ratio). The prevalence of moderate to high risk of Diabetes among study subjects in the present study increased with increase in BMI and the association was found to be statistically significant ($P < 0.05$). Further, prevalence of moderate to high risk of Diabetes was found to be significantly ($P < 0.05$) high among those with high WH ratio as seen in the table.

Table No.3: Prevalence of Risk of Diabetes among study subjects according to certain Lifestyle factors (N = 629)

Lifestyle factors	Classification	Number of adults N	Risk of Diabetes n (%)		
			Low	Moderate to High	
Alcohol consumption	Present	80	21 (26.25)	59 (73.75)	$\chi^2= 0.113$ $P = 0.737$
	Absent	549	154 (28.06)	395 (71.94)	
Smoking	Present	72	9 (12.5)	63 (87.5)	$\chi^2= 9.505$ $P = 0.002$
	Absent	557	166 (29.81)	391 (70.19)	
Smokeless tobacco use	Present	226	51 (22.57)	175 (77.43)	$\chi^2= 4.852$ $P = 0.028$
	Absent	403	124 (30.77)	279 (69.23)	
Moderate exercise	Present	279	96 (34.41)	183 (65.59)	$\chi^2= 10.832$ $P = 0.001$
	Absent	350	79 (22.58)	271 (77.42)	

Shows prevalence of risk of Diabetes among study subjects according to certain Lifestyle factors. While current alcohol consumption had no association with risk of Diabetes, adults who consumed tobacco in any form had significantly ($P < 0.05$) higher prevalence of moderate to high risk for Diabetes. Further, it was also observed that the prevalence of moderate to high risk for Diabetes was significantly ($P < 0.05$) less among those who did regular moderate exercise in the present study.

Discussion

The present cross-sectional study was conducted among adults in the field practice area of PHC, Irkalagada, Koppal. The prevalence of low, moderate and high risk for Diabetes was found to be 175

(27.82%), 371 (58.98%) and 83 (13.2%) respectively in the present study. These findings were similar to the findings of many other studies - Nishant Wadhwa et. al. in Uttar Pradesh involving 500 study subjects (2018-2020)^[4]; Sudha Bala et. al. in Hyderabad, Telangana involving 150 subjects (2018)^[9]; Amrutha Angadi et. al. in Mysuru, Karnataka involving 900 subjects (2015)^[10]; Preeti Dugg et. al. in Delhi involving 185 subjects (2019)^[11]; Ranadeep et. al. in West Bengal involving 250 subjects (2011)^[12]; Prasanna kumar N et. al. in Karnataka involving 227 subjects (2019)^[14] and Bharati Taksande et.al in Central India involving 478 subjects (2011)^[15], where majority of the subjects were in moderate or high-risk group for Diabetes.

However, a few other studies done in various other settings by - Shobha Chaturvedi et. al. in Uttar Pradesh

among 615 subjects (2018)^[1]; Sheikh Mohd Salim et. al. in Jammu and Kashmir among 1530 subjects (2016)^[2]; Anand Vardhan et. al. in Mangaluru, Karnataka among 150 subjects (2011)^[3] and Priyatharshini M et. al. in Puducherry among 150 subjects (2018)^[5]- found majority of the subjects to be in the low risk group. This difference could be due to differences in study settings, study periods, sampling techniques, profile of study participants, data collection tools etc.

The prevalence of moderate to high risk of Diabetes among adults in the present study increased with increase in age of the study participants in line with findings of study by Garima Namdev et. al in Madhya Pradesh with 270 subjects (2018)^[13] and Khan MS et.al in Uttar Pradesh with 640 subjects (2014-2015)^[22]. This could be due to the fact that age is one of the four criteria in IDRS to assess risk of Diabetes. Similarly, a number of various socio demographic variables have been found to be significantly associated with prevalence of risk for diabetes like Diet, Religion, Literacy, Marital status and type of family similar to the findings of few other studies - Garima Namdev et.al in Madhya Pradesh involving 270 subjects (2018)^[13] found significant association with Religion and Literacy, Anita Shankar Acharya et. al. in Delhi involving 580 subjects (2014)^[23] with Marital status and Literacy and Reshma S Patil et. al. in Maharashtra involving 425 subjects (2015)^[24] with Literacy. On the contrary, some studies have found other socio demographic variables as predictors of risk in their studies - while Shibaji Gupta et. al. in West Bengal among 197 subjects (2019)^[8], Ranadeep et. al. in West Bengal among 250 subjects (2011)^[12] and Mongjam Meghachandra Singh et. al. in Delhi among 290 subjects (2017)^[25] found significant association with Gender alone, Preeti Dugg et. al. in Delhi among 185 subjects (2019)^[11] found significant association with both Gender and Occupation.

The study also found significant increase in the prevalence of moderate to high risk for Diabetes with increase in BMI and WH ratio, in confirmation with many other studies - Priyatharshini M et. al. in Puducherry among 150 subjects (2018)^[5]; Preeti Dugg et. al. in Delhi among 185 subjects (2019)^[11]; Ranadeep et. al. in West Bengal among 250 subjects (2011)^[12]; Garima Namdev et.al in Madhya Pradesh among 270 subjects (2018)^[13]; Anita Shankar Acharya et. al. in Delhi among 580 subjects (2014)^[23]; Mongjam Meghachandra Singh et. al. in Delhi among 290 subjects (2017)^[25] and Sanjay Kumar Gupta et. al. in Tamil Nadu among 1936 subjects (2008)^[26]. With respect to lifestyle factors, the study found significant association between increased risk for Diabetes and

tobacco consumption (both smoke and smokeless forms) among study participants. A study done by Nishant Wadhera et. al. in western Uttar Pradesh^[4] involving 500 study subjects (2018-2020) has found significant association between the risk of Diabetes and Smoking. There was less prevalence of moderate to high risk for diabetes among those adults who did moderate exercise regularly, as evident from other studies - Amrutha Angadi et. al. in Mysuru, Karnataka with 900 subjects (2015)^[10]; Reshma S Patil et. al. in Maharashtra with 425 subjects (2015)^[24]; Mongjam Meghachandra Singh et. al. in Delhi with 290 subjects (2017)^[25] and Smriti et.al in Karnataka with 205 subjects (2019)^[27].

Conclusion

The present study finds that three out of every four adults had moderate to high risk for Diabetes in the study setting. The study also found prevalence of moderate to high risk for Diabetes to be significantly associated with increasing age, illiteracy, vegetarian diet, Hindu religion, Married individuals, individuals belonging to other than nuclear families, high Body mass index, high Waist to hip ratio, habit of consumption of tobacco products and reduced physical activity of the study participants, thereby emphasizing the need for a well-co-ordinated multi sectorial approach for its prevention.

Recommendations

Long term goal of improvement in Literacy along with short term goal of promotion of Healthy lifestyle focussing on increased intake of healthy foods, regular physical activity and avoidance of tobacco and alcohol through various communication strategies, is the need of the hour. Health workers should be sensitized about IDRS for early identification of people at risk for Diabetes, for further counselling and treatment.

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