

A CROSS SECTIONAL STUDY TO DETERMINE PREVALENCE OF TYPE 2 DM IN ASSOCIATION WITH IDRS & RANDOM BLOOD GLUCOSE IN WOMEN OF GWALIOR CITY

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ABSTRACT

BACKGROUND

Diabetes Mellitus (DM) Type 2 has become a well-known chronic progressive Non-Communicable Epidemic on global stages. In 2014, 422 million adults (or 8.5% of the population) had diabetes (That is 1 person in 11) which has almost quadrupled compared with 108 million (4.7%) in 1980. According to Indian Census Annual Report on MCCD -2014, deaths due to DM has shown a pattern of increase to 3.1% in 2014 from 2.5% in 1999. Also, WHO Diabetes Country Profiles 2016 predicted 97,300 diabetes deaths & 285,600 deaths to high blood glucose in India. Prevalence of diabetes was 7.5%, overweight 23.9%, obesity 6.5% and physical inactivity 15.1%. Hence, this study was conducted to assess the prevalence and associations of prediabetic state in high risk (IDRS) group.

MATERIALS AND METHODS

A cross sectional, descriptive, interview based study of 300 women aged 26-60 years age in 6 public places of Gwalior City for duration of one year. A Predesigned & Pretested proforma was used to perform Interview. Results were collected using Excel and analysed with Epicalc 2000 software. Stats used were frequency distribution, percentages & Chi square test.

RESULTS

Of 300 participants, 50% were in high risk group with IDRS \geq 60 of which Age group with highest risk (100%) is 56-60 years. 135 of 183 (73.77%) had waist $>$ 90 cm, 42 of 66 (63.63%) were doing no exercise or strenuous work while 12 out of 12 (100%) had both parents with history of diabetes in high risk group for diabetes. Prevalence of prediabetic women was highest (57.14%) in 46-50 years age group, 35.55% women with waist $>$ 90 cm, 33.33% doing no exercise or strenuous work & Maximum 44.44% had both parents as diagnosed diabetics.

CONCLUSION

Diabetes is a multifactorial disease as observed in our studies. Despite creating so much awareness its prevalence and risks are increasing. As diabetes is a preventable disease, it should be controlled by modifying life style and diet.

KEYWORDS

Type 2 DM, IDRS, Random Blood Glucose, Women, Gwalior.

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BACKGROUND

Diabetes Mellitus Type 2 has become a well-known chronic progressive Non-Communicable Epidemic on Global stages. Despite increasing awareness of its Risk factors and complications, Global Burden of Diabetes is also increasing. In 2014, 422 million adults (or 8.5% of the population) had diabetes (That is 1 person in 11) which has almost quadrupled compared with 108 million (4.7%) in 1980.¹

Diabetes is the major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. In 2012, an estimated 1.5 million deaths were directly caused by diabetes and another 2.2 million deaths were attributable to high blood glucose.

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Almost half of all deaths attributable to high blood glucose occur before the age of 70 years.¹ WHO projects that diabetes will be the 7th leading cause of death in 2030.² Diabetes prevalence has been rising more rapidly in middle- and low-income countries.³

According to Indian Census Annual Report on Medical Certification of Cause of Death -2014,⁴ deaths due to Diabetes Mellitus has shown a pattern of increase to 3.1% in 2014 from 2.5% in 1999. Total MCCD Deaths due to Diabetes Mellitus in 2014 were 33,327 out of Total MCCD Deaths of 10,66,221. In Madhya Pradesh, 902 deaths were due to Diabetes Mellitus out of Total MCCD Deaths of 33,634.⁴ Also, WHO Diabetes Country Profiles 2016 predicted 97,300 diabetes deaths & 285,600 deaths to high blood glucose in India. Prevalence of diabetes was 7.5%, overweight 23.9%, obesity 6.5% and physical inactivity 15.1%.⁵

Type 2 diabetes mellitus is becoming increasingly common primarily because of increases in the prevalence of a sedentary lifestyle and obesity. Prevention of diabetes mellitus type 2 can be achieved with both lifestyle changes and medication use; onset of type 2 diabetes can often be delayed through proper nutrition and regular exercise. A review of RCTs on the topic⁶ concluded that modest weight

loss through diet and exercise reduced the incidence of the disease among high-risk people by about 40%–60% over 3–4 years. In one of the RCTs,⁷ a lifestyle intervention that included moderate physical activity for at least 150 minutes per week was found to be more effective than metformin alone in reducing the incidence of diabetes.⁸

Hence, early identification of risk factors and diagnosis of diabetes would help in taking appropriate intervention in dietary and lifestyle modification, thus helping to prevent or at least delay the onset or control of diabetes. This means that identification of At-Risk Individuals is extremely important for diabetes prevention and control in India. Use of simple, cost-effective, easy to use & non-invasive screening tool is needed to diagnose diabetes. Several diabetic risk scores or risk engines have been devised for the last decade worldwide. The Indian Diabetes Risk Score (IDRS) developed by Mohan et al as a part of CURES Study has been found to be highly sensitive, specific & cost-effective tool in community based screening for diabetes mellitus.^{9,10} Community-based screening studies, apart from identifying these undiagnosed cases will also help in promoting awareness among the people regarding disease preventive and health promoting measures.

The Government of India has already initiated a national programme named 'National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke' (NPCDCS). The strategies proposed were implemented in 20,000 Subcentres and 700 Community Health Centres in 100 Districts across 21 States during 2010-12. During this national programme for diabetes opportunistic screening would be done on a designated day through blood glucose measurement by glucose strip method by ANM and/or health worker (M).¹¹

With this background in mind following study was designed to assess the prevalence of Diabetes Risk in women according to IDRS, to assess the prevalence & associations of Prediabetic state in high risk (IDRS) group and to suggest recommendations on the basis of findings.

MATERIALS AND METHODS

This was a community based cross sectional study conducted in Gwalior. Study population consisted of 591,871 (Urban Females)¹² women of Gwalior. With prevalence of 7.5% diabetes in females⁵ sample size was calculated from Epi-info software. Six Public places were selected randomly from where 300 women between 26-60 years of age who were unaware of their diabetic status were interviewed. Duration of this study was 1 year (1st September 2015-31st August 2016). Only women who have given informed consent and willing to participate were included in this study with ensured confidentiality while women below 26 years and above 60 years and diagnosed (DM type 2) women of any age group were excluded. All pregnant & lactating women were also excluded.

A predetermined & pretested questionnaire based on IDRS (Table 1) determining simple anthropometric and socio-demographic variables was used to interview the participants. Waist circumference was measured with a non-stretchable tape to the nearest 0.1 cm at the midpoint between the lowest rib and the iliac crest.¹³

Weight was measured to the nearest 0.1 Kg and weighing machine was used for weight measurement. Height was measured against a non-stretchable tape fixed to a vertical wall, with the participant standing on a firm/level surface and it was measured to the nearest 0.5 cm. Participants with IDRS value < 30 were categorised as low risk, those with scores 30 to 50 as medium risk and those with scores ≥ 60 as high risk for diabetes.

Particulars	Score
Age in Years	
<35	0
35-49	20
≥50	30
Abdominal Obesity	
Waist <80 cm	0
Waist 80-89 cm	10
Waist >90 cm	20
Physical Activity	
Exercise regular + strenuous work	0
Exercise regular or strenuous work	20
No exercise and sedentary work	30
Family History of Diabetes	
No family history (Reference)	0
Either parent	10
Both parents	20
Table 1. Indian Diabetes Risk Score (IDRS)	

Those who have IDRS ≥60 (High Risk group) were further examined for capillary blood glucose measurement by standardised glucose strip method (Glucometer). In this study, participants with Random Capillary Blood Glucose <129 mg/dL were Normal, 129-199 mg/dL were Pre-diabetic and >200 mg/dL were considered as Diabetic. Data collected was tabulated in Microsoft Office Excel software, analysed & interpreted. Statistical analysis was done with the help of Epi-info 7 & Epi calc 2000 software.

RESULTS

This study included 300 participants, 150 (50%) were in High risk group with IDRS≥60 of which Age group with highest risk (100%) is 56-60 years and with least risk (5.26%) is 26-30 years as shown in Table 2. 135 of 183 (73.77%) with waist>90 cm, 42 of 66 (63.63%) doing no exercise or strenuous work while 12 out of 12 (100%) had both parents with history of diabetes were in High Risk group for Diabetes.

As shown in Table 3, Prevalence of prediabetic women was noted highest i.e. 12 cases out of 21 (57.14%) in 46-50 years age group, followed by 12 cases out of 27 (44.44%) in 41-45 years Age Group ($\chi^2= 26.422$, Degree of freedom= 6, p-value= 0.009). Out of 135, 48 (35.55%) women with Waist>90 cm were Prediabetic Waist Size ($\chi^2= 9.38$, Degree of freedom= 4, p-value= 0.05). 36 (33.33) out of 108 prediabetic belong to the group doing no exercise or strenuous work. 12 (44.44%) out of 27 participants had either parent as diagnosed diabetics Family History ($\chi^2=17.34$, Degree of freedom= 4, p-value= 0.001).

IDRS Criteria	Total	IDRS<60	IDRS ≥60 (%#)
Age Group (χ ² = 160.958, Degree of freedom= 6, p-value= 0.00)			
26-30	114	108 (94.74)	6(5.26)
31-35	27	12(44.45)	15(55.55)
36-40	57	18(31.58)	39(68.42)
41-45	30	3 (10.00)	27(90.00)
46-50	27	6 (22.23)	21(77.77)
51-55	33	3 (90.10)	30(90.90)
56-60	12	0	12(100)
Waist Size (χ ² = 109.07, Degree of freedom= 2, p-value= 0.00)			
Waist <80 cm	60	57 (95)	3 (5)
Waist 80-90 cm	57	45 (78.95)	12 (21.05)
Waist >90 cm	183	48 (26.23)	135 (73.77)
Physical Activity (χ ² =25.95, Degree of freedom= 2, p-value= 0.00)			
Exercise & Strenuous work	21	21 (100)	0
Exercise / Strenuous work	213	105 (49.30)	108 (50.70)
No Exercise & Strenuous work	66	24 (36.37)	42 (63.63)
Family History (χ ² =13.33, Degree of freedom= 2, p-value= 0.001)			
No Parent	225	114 (50.67)	111 (49.33)
Either Parent	63	36 (57.14)	27 (42.86)
Both	12	0	12 (100)
TOTAL	300	150 (50.00)	150 (50.00)
# % of Total			

Table 2. Distribution of Study Participants according to IDRS Score

IDRS Criteria	IDRS ≥60 (%#)	Normal	Pre-Diabetic (%*)	Diabetic
Age Group (χ ² = 26.422, Degree of freedom= 6, p-value= 0.009)				
26-30	6	6 (100)	0 (0)	0 (0)
31-35	15	9 (60)	6 (40)	0 (0)
36-40	39	27 (69.24)	9(23.07)	3 (7.69)
41-45	27	15 (55.56)	12(44.44)	0 (0)
46-50	21	9 (42.86)	12(57.14)	0 (0)
51-55	30	24 (80)	3(10)	3 (10.00)
56-60	12	6 (50)	6(50)	0 (0)
Waist Size (χ ² = 9.38, Degree of freedom= 4, p-value= 0.05)				
Waist <80 cm	3	3 (100)	0 (0)	0 (0)
Waist 80-90 cm	12	12 (100)	0 (0)	0 (0)
Waist >90 cm	135	81 (60)	48(35.56)	6 (4.44)
Physical Activity (Statistical Test= Not Applicable)				
Exercise & Strenuous work	0	0	0	0 (0)
Exercise / Strenuous work	108	72 (66.67)	36 (33.33)	0 (0)
No Exercise & Strenuous work	42	24 (57.14)	12 (28.57)	6 (14.29)
Family History (χ ² =17.34, Degree of freedom= 4, p-value= 0.001)				
No Parent	111	75 (67.58)	33(29.72)	3 (2.70)
Either Parent	27	15	12(44.44)	0 (0)

		(55.56)		
Both	12	6 (50)	3(25.00)	3 (25)
TOTAL	150	96 (64)	48 (32%)	6 (4%)
* % of IDRS≥60				

Table 3. Association of IDRS with Pre-diabetic & Diabetic in High Risk Group

DISCUSSION

In this study, total prevalence of participants with High IDRS (>60) was found to be 150 (50%) out of 300 participants whereas Abhishek Arun et al¹⁴ reported 14.9% in Lucknow, Mohan et al¹⁵ reported 43% in Chennai & another study done in urban area of Pondicherry had 31.2% high risk subjects.^{16,17} The distribution of population in high risk category in our study was lower than that reported by Nandeshwar et al (68.8%)¹⁸ & Geetha Mani et al¹⁹ (59%). According to the above data, 64% of women found out to be normal, 32% women are in Pre-diabetic state and 4% women are diabetic among Women having IDRS score 60 and above.

According to above result, Prevalence of diabetes risk increases with increasing age. This is similar to a study conducted in Kancheepuram by Geetha Mani et al¹⁹ & Abhishek Arun et al¹⁴ but in the study by Nagalingam S. et al²⁰ risk decreased with increasing age.

In our study, women having waist size more than 90 cm have the highest risk (74%) and women having waist size less than 80 cm have the lowest risk (4%) i.e. prevalence of diabetes risk increases with increasing waist size, which is similar to Geetha Mani et al¹⁹ & Abhishek Arun et al.¹⁴

Among High IDRS group of our study, 16 women were pre-diabetic and 2 women were diabetic and all of them had waist size more than 90 cm. (35.55% women were prediabetic having waist size more than 90 cm) i.e. abdominal obesity plays a major role in causation of Diabetes Mellitus type 2. Our study shows that women who perform very limited or no physical activity have greatest risk (63.63%) i.e., prevalence of diabetes risk increases by limiting physical activity & 66.67% women who do little exercise and only 57.15% women who don't do any physical activity found out to be normal, i.e, absence of physical activity leads to Diabetes and more physical activity minimises the risk of Diabetes Mellitus type 2.

According to the above data, when both the parents are diabetic the chances are highest (100%) for diabetes. The probability decreases with no diabetic parents or when one of them is diabetic. Genetics plays an important role, but it is not the only factor. By means of modifying life style, we can delay the onset of the diabetes.

Recommendations

Despite creating so much awareness even among the educated class, they are leading a sedentary life style which leads to further disease burden. As diabetes is a preventable disease, it should be controlled by means of modifying life style like following a plant-based, low-calorie diet, eating a variety of fruits and vegetables which contain fibre, losing excess body fat as being overweight is a big risk factor for diabetes. Regular exercise of moderate intensity helps in lowering the risk of Diabetes Mellitus. Further studies, research & new combat strategies are need of the hour. Early screening through IDRS, Blood Glucose Monitoring or Regular Health Checkups are the most cost-effective measures.

CONCLUSION

Diabetes is a multifactorial disease as we have observed in our studies. On the basis of data we gathered so far we can conclude that it is going to become one of the biggest problem for our country in upcoming times. As it is a hidden disease, people generally don't focus on it until it has reached to level where it can't be cured. Hence, following the above-mentioned recommendations are the best way forward.

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