



ASSESSMENT OF PREVALENCE OF DIABETES AMONG RURAL POPULATION OF PUNE DISTRICT, INDIA

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ABSTRACT

Introduction: Diabetes is the commonest non-communicable disease in India with its onset almost a decade earlier as compared to developed countries. The proportion of people with diabetes is increasing very fast in India. Increased longevity and susceptibility of Indians to premature onset of DM have been the important reasons for this change. Objective of the study was to assess the prevalence of diabetes and associated risk factors in rural population using a simple diagnostic tool.

Method: A cross sectional survey was done in one randomly selected village of rural field practise area of a medical college in Pune district. House to house visits were paid and 255 residents of 20 and above years of age were interviewed using Indian diabetes risk score (IDRS). Those who screened positive on the score were tested for fasting blood sugar by Glucometer method.

Results: The prevalence of diabetes among the study population was 10.5%. Among the 27 newly detected cases 18 had high risk and 9 had moderate risk on IDRS. The statistically significant risk factors were age, non-vegetarian diet, socio economic status and body mass index.

Conclusion: The prevalence diabetes has started increasing in poor, illiterate and health ignorant rural population. They should be diagnosed at the earliest possible time using simple diagnostic tools like IDRS.

Key Words: Indian diabetes risk score, Prevalence, Risk factors

INTRODUCTION

The recent pandemic affecting the world is of diabetes mellitus. Diabetes mellitus (DM) is a major public health problem with increasing prevalence worldwide.¹ It is estimated that 387 million people around the world suffer from DM with a prevalence of 8.3% worldwide and over 205 million predicted to add to the count by the year 2035.² A substantial body of evidence suggests that it could reach epidemic proportions particularly in developing and newly industrialized countries.³

Diabetes is the commonest non-communicable disease in India.⁴ The proportion of people with diabetes is increasing very fast in India. In prediction, India along with China accounts for nearly a third of the estimated 300 million adult diabetics by the year 2025.⁵ Increasing longevity and susceptibility of Indians to premature onset of DM have been the important reasons for this change. The early onset of diabetes results in rapid progression leading to chronic vascular complica-

tions and ultimately end organ damage at relatively earlier time.⁶ This makes diabetes a growing cause of disability and premature death. One person dies of diabetes every 7 seconds across the globe.²

Recent surveys indicate that diabetes now affects 5-8% of rural population in India giving the impression of the epidemic to be transpiring in the rural areas.^{6,8} In spite of its high prevalence, and being a major cause of mortality, diabetes remains highly undiagnosed. Undiagnosed diabetes is associated with increased risk of all-cause mortality.⁹ Delayed diagnosis and inadequate or improper treatment results in poor disease outcome. Knowing the importance of fast spreading diabetes pandemic to rural population which forms about 70% population of India, it is very important to diagnose the diabetes at the earliest using some sensitive and cost effective tools. On this background a study was planned with the objective of estimating the prevalence of diabetes and associated risk factors among persons residing in rural area using a simple diagnostic tool.

METHOD

After institutional ethical committee approval a community-based cross-sectional survey was planned. The study area was the field practice area of rural health training centre (RHTC), Department of Community Medicine, of a medical college in Pune. One village from the field practice area was selected randomly for study purpose. House to house visits were paid and all population of 20 years and above, present on the day of survey and willing to participate were taken for the study. The purpose of the study was explained thoroughly and recruitment as study subjects was done after a voluntary written informed consent was obtained from them. Village residents of age 20 years and above was decided as the inclusion criteria for recruitment because this is the age where life style factors starts inculcating in life of a person and gets established deep rooted with practise.

The total number of subjects surveyed was 270 in which known cases of diabetes were 25. They were excluded from the surveyed sample and a total of 255 formed the final study population. The duration of survey was from October 2014 to Dec. 2014. The tool for data collection was a questionnaire. It had two parts with part one of socio demographic variables and second part made up of India diabetes Risk score (IDRS) questionnaire.⁸

The questionnaire has already been validated for Indian setting and has been used previously in studies done for diabetes risk screening.⁹ IDRS was developed by Mohan et al. and its parameters comprise of two modifiable (waist circumference, physical activity) and two non-modifiable risk factors (age, family history) for diabetes. The age of the study subjects and family history of diabetes was noted for each study subjects. Waist measurements were obtained using a standardized technique. Grade of physical activity was assessed by asking the following questions:

- How physically demanding is your work (occupation)?
- Do you exercise regularly in your leisure time?
- How would you grade your physical activity at home?

For answer reflecting physical activity score of 1 is given or else score 0 was given. For each study subjects a combined score was calculated. Scoring and grading of physical activity is done as following. If A+B+C = >3 vigorous-strenuous, 2 moderate, 1 mild, 0 sedentary.

IDRS analysis was done with the help of all four parameters. If age <35 years score is = 0, if 35-49 years score is=20, if >50 years score= 30, waist circumference <80 cm for female and <90cm for male score = 0, >80-89 cm for female and >90-99 cm male score=10, >90 cm for female and >100 cm for male score=20, physical activities vigorous exercise or strenuous work score=0, moderate exercise work-home=10, mild exercise work/home = 20, no exercise and sedentary work-home =30, family history of diabetes, no family history = 0, family history present either parent = 10, both parents =20. After adding all four parameters, if risk score (>60 very high risk, 30-50 moderate risk, <30 low risk).

All those who were falling in moderate and high risk category were tested for fasting blood sugar using an automated Glucometer. Diabetes was diagnosed if the fasting blood glucose was ≥ 126 mg/dL (≥ 7.0 mmol/L) after an overnight fast for at least 8 hours.¹² The low risk category subjects are not sent for testing because as per the risk score criteria they are showing lesser risk as compared to the rest two categories. Impaired fasting blood glucose was diagnosed if fasting blood glucose was 110-125 mg/dL (6.1-6.9 mmol/L). All those screened positive for diabetes were referred to higher centre for the standard care for diabetes. All the high and moderate risk category subjects were counselled for the risk of diabetes and the

importance of life style modification for the prevention of DM. Risk categories were expressed in percentage & Chi square test was used as a test of significance. P value of 0.05 and less was considered as statistically significant. Epi info software 7.1.2.0 was used for statistical analysis.

RESULTS

The prevalence of diabetes in the study population was 10.5%. Table no. 1 shows the risk categorization as per IDRS wherein the high risk subjects were 45(18%) and moderate risk subjects were 108(42%). These two categories were further subjected to fasting sugar testing using the Glucometer method. The low risk category had 102(40%) study subjects.

Table 1: Distribution of IDRS among Study Subjects

Score Category	Number (%)
>60 (high risk)	45 (18%)
30-50 (Moderate risk)	108 (42%)
<30 (low risk)	102 (40%)

Table No 2: Association of Socio-Demographic Variables & DM (N=255)

Risk factors	DM		Df	X ²	P Value
	Yes	No			
Age					
20 -34	02	109	2	19.3	<0.0001
35-50	10	67			
≥ 50	15	52			
Gender					
Male	09	113	1	1.93	0.164
Female	18	115			
Diet					
Veg	07	109	1	3.82	0.05
Mixed	20	119			
Socio economic status					
High & middle	05	109	1	7.23	0.007
Lower	22	119			
Body Mass Index					
< 25	08	190	1	37	<0.0001
> 25	19	38			
IDRS category					
High risk	20	45	1	17.9	<0.0001
Moderate risk	07	108			

Table no. 2 shows the significant association of diabetes with socio demographic variables like age, socio economic status, diet. The gender did not show any significant difference in the prevalence

of diabetes in this study. High body mass index has shown a clear cut association with the development of diabetes. The association of risk categories as per IDRS showed a significant risk of development of diabetes with high risk category as compared to moderate risk category.

DISCUSSION

In this study the prevalence of diabetes was found to be 10.5% among the study subjects. This clearly depicts the picture of spreading diabetes epidemic in the rural areas. Studies across India have documented prevalence from 13% to 25%.¹³⁻¹⁵ We screened the population using Indian diabetes risk score for identifying high risk subjects in the rural area. Those with high and moderate risk were tested for fasting blood sugar using Glucometer method. This method has been recommended for opportunistic screening for diabetes in the national program for control of non-communicable diseases.¹⁶

In the present study 45 (31.5%) of population had high risk score (>60) for diabetes and moderate risk was found in 108(46%) of population. Results varying in the range of 19% to 43 % of high risk category were found by other investigators in India.^{17,18} This variation in the result can be explained by different study timings and study settings which usually determine the life style and associated risk factors.

The statistical significant results were found with variables like age, diet and socio economic status. The diabetes and its association with age has been proved by many studies across the world.¹⁹ The predominant non vegetarian diet was found to be having risk of developing DM. This could be the result of plentiful of dietary fibres present in the vegetarian diet playing a protective role and absence of the same in the non vegetarian diet.

Higher body mass index has been significantly associated with the diabetes risk. The role of body mass index with the development of diabetes has been well established which was again reinforced by the present study findings.¹⁸

Among the risk categories the high risk category has been strongly associated with the development of DM in comparison with moderate risk ($x^2 < 0.0001$, p value = 17.9). The high risk category people had more prevalence of risk factors which puts them at risk of DM. This point can be utilized to focus this category for aggressive life style changes for reversing the effect of modifiable risk

factors. Simultaneously awareness about the risk factors and the ways to reverse and prevent them should be increased at all the levels of health contacts. All forms of media can do very important role especially in rural areas to raise the much needed awareness about the risk factors of DM.

We successfully met with our objective of finding the prevalence and a simple diagnostic tool for assessment of risk of DM. This will help to make diagnosis early and initiate the preventive and control measures in time to prevent the future complications.

We used IDRS for screening the risk of diabetes. Various studies in the west used different diabetes risk scores, based on simple anthropometric, demographic and behavioural factors, to detect undiagnosed diabetes.²¹ The IDRS used in this study are those recommended by American Diabetes Association.²² This simple and cost effective tool can be used for screening at risk people for DM in developing countries like India where there is a marked explosion of diabetes.

CONCLUSION

Diabetes has spreading fast in rural areas. There is enormous need of raising the awareness about DM and its complications. It increases burden on the health systems which are in crippling state in rural areas of India. To prevent the morbidity and mortality associated with diabetes there is need of some simple diagnostic tools which can identify the people at risk at the first contact with the health systems. This study has proven the usefulness of Indian diabetes risk score for screening high risk diabetic subjects in the community. The risk categories can be used to diagnose the cases of DM and to generate very valuable awareness about control of modifiable risk factors for DM. IDRS can be used effectively as population and high risk strategy for screening for diabetes in India in a most cost effective way.

LIMITATION

Limitation of the study is that we studied the effects of some socio demographic variables only. The Glucometer testing has been used on high and moderate risk categories. The standard laboratory based methods for DM diagnosis were not done due to feasibility issues.

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REFERENCES

1. Lusignan S, Sismanidis C, Carey IM, DeWilde S, Richards N, Cook DG. Trends in the prevalence and management of diagnosed type 2 diabetes 1994-2001 in England and Wales. *BMC Fam Pract* 2005;6:13
2. Diabetes: Facts and Figures. Available at <http://www.idf.org/worlddiabetesday/toolkit/gp/facts-figures.html>. Accessed May 25th, 2015.
3. King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. *Diabetes care* 1998; 21:1414-31.
4. Singh AK, Mani K, Krishnan A, Aggarwal P, Gupta SK. Prevalence, Awareness, Treatment and Control of Diabetes Among Elderly Persons in an Urban Slum of Delhi. *Indian J Community Med* 2012;37:236-9.
5. Fall CH. Non-industrialised countries and affluence. *Br Med Bull* 2001; 60:33-50.
6. Vaz NC, Ferreira AM, Kulkarni MS, Vaz FS, Pinto NR. Prevalence of diabetic complications in rural Goa, India. *Indian J Community Med* 2011;36:283-6.
7. Wild S, Roglic Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27:1047-53
8. Pradeepa R, Mohan V. The changing scenario of the diabetes epidemic: implications for India. *Indian J Med Res* 2002; 116:121- 32.
9. Wild SH, Smith FB, Lee AJ, Fowkes FG. Criteria for previously undiagnosed diabetes and risk of mortality: 15-year follow-up of the Edinburgh Artery Study cohort. *Diabet Med* 2005; 22:490-6.
10. Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A Simplified Indian Diabetes Score for screening for undiagnosed diabetic subjects. (CURES-24). *J Assoc Physicians India* 2005; 53:759-63.
11. Deepa M, Pradeepa R, Rema M, Mohan A, Deepa R, Shanthirani S, et al. The Chennai Urban Rural Epidemiology Study (CURES)-Study design and methodology (Urban component) (CURES-1). *J Assoc Physician India* 2003; 51:863-70.
12. Definition and diagnosis of diabetes mellitus and intermediate hyperglycemia. Report of a WHO/IDF consultation. 2006. Available from: http://whqlibdoc.who.int/publications/2006/9241594934_eng.pdf [Last accessed on 2009 Oct 10].
13. Srivastava RK. Multicentric study to establish epidemiological data on health problems in elderly. A Government of India and WHO Collaborative Programme Ministry of Health and Family Welfare, Government of India 2007.

14. Puri S, Kalia M, Swami HM, Singh A, Abhimanyu, Mangat C, et al. Profile of diabetes mellitus in elderly of Chandigarh, India. *The Internet Journal of Endocrinology* 2007;4.
15. Gupta HL, Yadav M, Sundarka MK, Talwar V, Saini M, Garg P. A study of prevalence of health problems in asymptomatic elderly individuals in Delhi. *J Assoc Physicians India* 2002; 50:792-5.
16. Operational Guidelines. National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke (NPCDCS). Directorate General of Health Services Ministry of Health & Family welfare Government Of India
17. Mohan V, Sandeep S, Deepa R, Shah B, Varghese C. Epidemiology of type-2 diabetes: Indian Scenario *Indian J Med Res* 2007(125): 217-230
18. Gupta SK, Singh Z, Purty AJ, Kar M, Vedapriya DR, Mahajan P et al. Diabetes Prevalence and its Risk Factors in Rural area of Tamilnadu. *Ind J Comm Med.* 2010; 35(3): 396-399.
19. Park K. Text book of preventive and social medicine. 22nd ed. Jabalpur: Banarsidas Bhanot publishers India; 2015: p 364
20. Lindstrom J, Tuomilehto J. The diabetes risk score: a practical tool to predict type 2 diabetes risk. *Diabetes Care* 2003; 26:725-31.
21. Spijkerman AM, Yuyun MF, Griffin SJ, Dekker JM, Nijpels G, Wareham NJ. The performance of a risk score as a screening test for undiagnosed hyperglycaemia in ethnic minority groups: Data from 1999 health survey for England. *Diabetes Care* 2004; 27:116-22.
22. American Diabetes Association for identifying high risk individuals. Available at [http:// www.diabetes.org/risk_test.jsp](http://www.diabetes.org/risk_test.jsp) Accessed Dec 15th, 2014