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Original Research Article

Diabetes mellitus and its socio-demographic determinants: a population-based study from a rural block of Haryana, India

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ABSTRACT

Background: Diabetes is growing alarmingly in India which is a home to more than 65.1 million people with this disease and this number would increase to 80 million by the year 2030. The rising prevalence of type 2 diabetes mellitus poses a major threat to clinical management, economic growth and social wellbeing of patients. Studying socio epidemiology of diabetes among adults would help in decreasing the manifestation and severity of this NCD, so this study was conducted with the aim to assess the prevalence of diabetes mellitus and its associated socio-demographic factors.
Methods: The present study was conducted in rural block of district Rohtak over a period of one year among 1000 study participants aged 15-64years. Fasting blood sugar was measured to evaluate the prevalence of diabetes mellitus.
Results: Overall prevalence of diabetes mellitus was 9.2%. It was highest among 55-64years age group (26%), those engaged in service (11.6%), illiterates and upper middle SES (14.3%).
Conclusions: The prevalence of diabetes was high in the study population. A holistic approach targeting both individual and social factors is required to tackle this high prevalence.

Keywords: Diabetes, Education, Treatment

INTRODUCTION

For centuries, the microbial world has been the biggest threat to public health and infectious diseases were the main causes of death worldwide. Life expectancy was short and epidemics were too frequent. The gradual improvements in standards of living, hygiene and the vaccines, the miracle cures, helped eliminate the diseases of filth and then came the inexorable rise of non-infectious diseases in the last decade of 20th century.[1]

Four main diseases are generally considered to be dominant in NCD's (Noncommunicable diseases) mortality and morbidity: cardiovascular diseases, diabetes, cancers and chronic respiratory diseases. In 2012, NCDs killed over 38 million people in the world and 1.5 million of all deaths were attributed to diabetes. Higher-than-optimal blood glucose caused an additional 2.2 million deaths, by increasing the risks of cardiovascular and other diseases.[2] Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980 while the global prevalence (age-standardized) of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5%.[2,3]

Over the past decade, diabetes prevalence has risen faster in low and middle-income countries than in high-income countries. Diabetes accounted for 12% of health expenditures in 2010, or at least $376 billion-a figure expected to hit $490 billion by 2030.[4] In south east Asia,

estimates in 2015 indicate that 8.5% (6.8-10.8%) of the adult population has diabetes which is equivalent to 78.3 million people living with diabetes. Over half (52.1%) of these are undiagnosed.[5]

Diabetes is growing alarmingly in India which is a home to more than 65.1 million people with this disease and this number would increase to 80 million by the year 2030.[6,7] The rising prevalence of type 2 diabetes mellitus poses a major threat to clinical management, economic growth and social wellbeing of patients.[8,9]

In 2011, under the leadership of WHO over 190 countries endorsed a global mechanism to reduce the burden of diabetes called as 'global action plan for the prevention and control of NCDs 2013-2020'.[10]

As a signatory to the Sustainable Development Goals (SDGs), India has committed to extend every possible effort to reduce one-third of premature mortality from non-communicable diseases (SDG:3.4) by 2030.[3]

Studying socio epidemiology of diabetes among adults would help in decreasing the manifestation and severity of this NCD which would in turn very cost effective and would help the community to live a better life as far as possible with the aim to assess the prevalence of diabetes mellitus and its associated socio-demographic factors.

METHODS

The present study was conducted in rural block of district Rohtak, Haryana over a period of one year (September 2015 to August 2016).

Assuming the prevalence of diabetes mellitus as 9.1% and applying the formula, $n=(Z1-a/2)2xp(1-p)/d^2$, where,

- Z= value of area under the normal curve (1.96 for 2-sided test; 5% significance level),
- a= level of significance (0.05),
- p= prevalence,
- d= relative allowable error (20%),
- n= sample size.

The calculated sample size came out to be 960 but a sample of 1000 study participants was included in the study.[11] Persons in the age group 15-64years residing in the study area for more than six months were included in the study. Known cases of type 2 diabetes mellitus were also included.

Those not willing to participate, known case of type 1 diabetes mellitus, pregnant women, migrants (those who stayed in the area for less than six months) and bed ridden patients who were unable to participate in the study were excluded.

There are 20 subcentres under a community health centre of the block out of which 10 subcentres were selected by simple random sampling. Subcentre-wise list of individuals in the age group of 15-64years was obtained.

From each subcentre, 100 individuals of 15-64years age group were selected who were further subdivided equally into 15-24, 25-34, 35-44, 45-54 and 55-64years age-group. Sex wise enumeration of the study population according to the subdivided age groups was done from the subcentre registers.

Ten males and ten females were selected from each of the five age subgroups by systematic random sampling. Thus, the sample size of 1000 was included in the study with a total of 500 males and 500 females.

Study subjects were contacted for the interview by the investigator himself after obtaining their consent. Data was collected regarding lifestyle factors and sociodemographic determinants as well as health seeking behavior of study participants.

Blood glucose measurements

On a pre-informed date, fasting blood glucose was estimated in morning (after overnight fast of minimum 8hours) by using a standard digital glucometer (AccuChek glucometer was used). Fine pin prick with disposable needle on the left ring finger was done to collect the fasting blood sample necessary for calibration on AccuChek glucometer. The glucose level was recorded in the interview schedule. Study was pre-designed, pretested and semi-structured interview schedule. Data analysis was done using MS Excel 2007 and SPSSv20.0. Appropriate statistical tests were applied.

RESULTS

Among the study participants (total of 1000), overall prevalence of diabetes mellitus was found to be 9.2% and pre-diabetes was reported as 7.4%. Table 1 shows that prevalence of diabetes in the study population was 9.2% which was higher in females (10.8%) as compared to males (7.6%). Results of impaired fasting glucose showed prevalence of pre-diabetics to be 7.4% which was again higher in females (11.2%) as against 3.6% in males. The difference was statistically significant, p value being 0.000.

Table 2 shows the prevalence was highest (26.0%) among 55-64years age group followed by 13.0% in age group of 45-54, 6.0% in 35-44years age group and 1.0% in 25-34years age group. The association of diabetes with age of the study subjects was found to be statistically significant (p value <0.001). The prevalence was almost equal in-service class (11.6%) and labourers (11.5%) followed by 9.2% in unemployed and 8.9% in subjects who were engaged in cultivation. The prevalence of individuals with diabetes was highest in illiterates at 23.1%, with decreasing prevalence observed with better education.

Table 1: Prevalence of Diabetes mellitus among study participants.

Categories	Sex of the study participants		Total
	Male N (%)	Female N (%)	N (%)
Non diabetic	444 (88.8)	390 (78.0)	834 (83.4)
Pre diabetic (IFG)	18 (3.6)	56(11.2)	74 (7.4)
Diabetic	38 (7.6)	54 (10.8)	92 (9.2)
Total	500 (100)	500 (100)	1000 (100)

$\chi 2 = 25.793$, df = 2, p value<0.01

Table 2: Socio-demographic characteristics of study participants.

Socio-demographic characteristics	Non-diabetic N (%)	Pre-diabetic N (%)	Diabetic N (%)	Total N (%)	Statistics
Age group (in years)					
15-24	194(97.0)	6(3.0)	0(0.0)	200(100)	$\chi 2$=157.491, df=8, p value =<0.01
25-34	192(96.0)	6(3.0)	2(1.0)	200(100)	
35-44	180(90.0)	8(4.0)	12(6.0)	200(100)	
45-54	146(73.0)	28(14.0)	26(13.0)	200(100)	
55-64	122(61.0)	26(13.0)	52(26.0)	200(100)	
Occupation					
None	612(82.9)	58(7.9)	68(9.2)	738(100)	$\chi 2$=6.091, df=8, p value =0.637
Labourer	42(80.8)	4(7.7)	6(11.5)	52(100)	
Business	32(94.1)	2(5.9)	0(0.0)	34(100)	
Cultivation	78(86.7)	4(4.4)	8(8.9)	90(100)	
Service	70(81.4)	6(7.0)	10(11.6)	86(100)	
Educational status					
Illiterate	152(62.8)	34(14.0)	56(23.1)	242(100)	$\chi 2$=111.809, df=8, p value =<0.01
Primary	166(88.3)	12(6.4)	10(5.3)	188(100)	
Middle	154(87.5)	6(3.4)	16(9.1)	176(100)	
High school	280(90.9)	20(6.5)	8(2.6)	308(100)	
Graduate and above	82(95.3)	2(2.3)	2(2.3)	86(100)	
Socio economic status (Udai Pareek's Socio-economic Scale)					
Lower	44(75.9)	6(10.3)	8(13.8)	58(100)	$\chi 2$= 12.710, df= 6, p value=0.048
Upper lower	308(81.1)	28(7.4)	44(11.6)	380(100)	
Lower middle	436(86.2)	38(7.5)	32(6.3)	506(100)	
Upper middle	46(82.1)	2(3.6)	8(14.3)	56(100)	
Upper	0(0)	0(0)	0(0)	0(0)	

However, no such trend was observed in the impaired fasting glucose. It was found statistically significant (p value <0.01).

The prevalence of diabetes was highest among upper middle socioeconomic status (14.3%) followed by lower SES (13.8%) and upper lower SES (11.6%). Among the pre-diabetics, the highest prevalence was observed among lower SES (10.3%) and lower middle SES (7.5%). The association of diabetes with SES was found to be statistically significant (p value=0.048).

Table 3: Health seeking behaviour of Diabetic individuals.

Categories	Frequency (n= 92)	Percentage
Did you get your blood glucose level tested in past 12months	83	90.21%
Have you ever been told by the doctor about the disease	60	65.21%
Treatment history	48	52.17%
Diet history	24	26.08%
Exercise history	30	32.60%
Have you visited any doctor in past 12months	44	47.82%

Out of total diabetics (92), 90.21% (83) of them had taken blood glucose measurements in last 12months and only 48 individuals were taking treatment in the form of either drugs or injectable insulin. Only 24 individuals out of 92 diabetics were taking diet according to their diabetic status and only 30 diabetics were doing regular exercise (Table 3).

DISCUSSION

In the present study, overall prevalence of diabetes mellitus was found to be 9.2%. This was higher in comparison to IDF 2015 (8.7%) and WHO NCD Global status report 2014 (8.5%) (6,10). Kanungo S et al, 6 found the prevalence of diabetes as 6.06%.[12] Little M et al, found the overall prevalence of diabetes and pre-diabetes as 10.8% and 9.5% respectively.[13] Nearly equal prevalence of diabetes i.e. 9.1% was reported by Rathod HK et al, from a rural area of Pune.[11] Differences in diabetes prevalence may be indicative of local disparities and/or a continued increase of rural diabetes as predicted by Misra P et al.[14]

The present study reported the highest prevalence of diabetes among 55-64years age group (26%). Similarly, Bhalerao SD et al, and D'souza AM et al, reported increased prevalence of diabetes with increasing age.[15,16] This may be due to prolonged exposure to stress, obesity, genetic factor, advancement of age.

Shora TN et al, found out that diabetes mellitus was more common in the upper middle class (11.47%) which is comparable to study.[17] Majgi SM et al, had also made similar observations and found that the percentage distribution of diabetes was higher among illiterates (5.3%) as compared to graduates and above (2.2%); pre-diabetics also followed a similar pattern.[18] Deepthi R et al, reported that a higher percentage i.e. 46.8% of the diabetics were illiterate which is similar to this study.[19] This could be possibly because of the fact that lower education status leads to the lesser awareness and lesser opportunity regarding prevention/control of diseases. This study reported the prevalence of diabetes among service class and unemployed as 11.6% and 9.2%. Barik A et al, reported broadly a higher prevalence of diabetes among persons with no occupation as also observed in this study.[20] However, this association was found to be non-significant (p value=0.637).

Kanungo S et al, found that 97.76% of the study subjects were not previously diagnosed as diabetics and only 2.24% were diagnosed before.[12] In this study comparatively higher percentage of individuals with diabetes (65.21%) had been told by the doctor about the disease indicating better quality of health care services in the area. D'Souza AM et al, reported that among the diabetics, 91.7% were regularly taking medications and 8.3% were not under treatment.[16] This is higher in comparison to this study. The present study reported that 90.21% of the diabetics got their blood sugar tested during the last 12months which was higher in comparison to that reported by Muninarayana C et al (38.7%).[21] Differences in the study findings could be due to higher awareness and better education status of the study participants in Haryana. Muninarayana C et al, also found that 54.8% of the diabetics were exercising regularly, 35.5% had taken steps for weight reduction and 67.7% were into cessation of smoking/alcohol. This study reported lesser number of individuals exercising (32.6%) and on dietary modifications (26.08%).

CONCLUSION

It can be concluded that prevalence of diabetes mellitus is quite high (9.2%) in rural area of Haryana. Its consequences are stealthy, but devastating, eroding the quality of life of individuals, societies and national economies. In the study, prevalence of diabetes was found to increase with advancement of age thus, it could be inferred that elderly age group needs special attention and care. Older people must be explained the importance of self-care and a positive health care seeking behavior if ever diagnosed with diabetes. Role of social factors like education, occupation and socio-economic status with reference to diabetes mellitus have also been identified. Better educated individuals are more likely to understand not only the pathology but also risk factors and prevention of diabetes. A holistic approach targeting both individual and social factors is required to tackle the high prevalence of diabetes mellitus.

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