

Original research article

A Community based cross-sectional study to assess the association of Pre-Diabetes, Diabetes and BMI with family history among those who are living in urban area of Bihar, India

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Abstract

Aim: to assess the association of Pre-Diabetes, Diabetes and BMI with family history among urban population.

Materials and Methods: A Community based cross-sectional study was carried out in the field practice area of department of Community Medicine, Nalanda Medical College and Hospital, Patna, Bihar, India among 200 respondents. Participants were in the age group of 20-67 years. Among them 110 males and 90 females were interviewed by using pretested semi structured questionnaire. Fasting Capillary blood glucose level was measured with the help of Glucometer (According to WHO-2006. people with plasma glucose between 110 mg/dl to 125 mg/dl are pre-diabetic and those higher than 126 mg/dl are diabetic). Family history of diabetes mellitus was obtained from each subject and classified into three groups, viz. 1= no family history of diabetes mellitus, 2= one parent affected and 3= both parents and siblings affected. WHO, 2008 criteria for classification of diabetes mellitus was used to assess the BMI of Participants. People with BMI <18 was considered underweight, between 18-24.9 normal weight, between 25-30 overweight and >30 were classified as obese.

Results: In the present study overall prevalence of pre- diabetes was 11.9% and diabetes mellitus was 7.2%. Out of which 6.6% were newly diagnosed and 0.6% were known diabetic. It is observed that 81 (40.5%) of the respondents were in the age group of 20-30 years followed by 44(22%) above 50 years of age. While 20% respondents were in age-group of 30 to 40 years and 35 (17.5%) were in 40-50 years of age group. Out of the total 200 respondents, (55%) were male and (45%) were females. Positive family history was observed more among 17.39% pre-diabetics and 20% diabetics as compared to respondents with normal blood glucose level i.e 10.8%. The association was found to be statistically significant. The statistically significant association was observed between family history and BMI. More than 57.14% respondents who had positive family history of diabetes had higher BMI.

Conclusion: Family history of diabetes mellitus was observed in 11% of total screened respondents. Out of which 7% were having 1 parent as diabetic and 4% had both parents and siblings diabetic. Due to high prevalence of pre-diabetes, it is necessary to educate them about risk factors of non - communicable disease and measures for life style modification.

Keywords: diabetes mellitus, BMI, Family History

Introduction

Diabetes mellitus (DM) is a group of metabolic disorders characterised by elevated blood glucose concentration and increased insulin resistance. Type 2 DM (T2DM) is a major cause of morbidity, mortality and high healthcare costs worldwide.¹ The global prevalence of T2DM among adults has increased rapidly during recent decades, especially in low- and middle-income countries (LMICs).^{2,3} The International Diabetes Federation (IDF) estimates that in 2017, 425 million individuals worldwide (8.8% of the world population) were living with T2DM. The IDF also predicted that in 2045 the number of adults (those aged between 20–79 years) with T2DM will be increased to 629 million and that there will be four million deaths attributable to T2DM: equivalent to 10.7% of total-cause of mortality.⁴ The prevalence of T2DM varies among countries and regions. About 79% of patients with T2DM live in LMICs, where the largest increase in the burden of T2DM is forecasted to occur.⁵ In 2017, the age-adjusted prevalence of T2DM was higher in Southeast Asia than in Europe (10.1% vs. 6.8%).⁶ Both Sweden and China have experienced an epidemiological transition from a predominance of infectious diseases to non-communicable diseases (NCDs). This transition occurred more rapidly in China than in Sweden.⁷ China has the largest number of adults with T2DM, with a prevalence of 10.9% in 2013 based on a national representative survey.^{8,9} Sweden has a T2DM prevalence of 7.0%, but this is projected to increase to 10.4% by the year 2050.¹⁰ During the transition stage, when blood glucose levels are higher than normal but lower than the threshold is used for the diagnosis of T2DM, prediabetes is considered a significant risk factor for T2DM and macrovascular diseases.¹¹ Accordingly, it is the characterisation and identification of individuals in the prediabetic state that is important for the prevention, management and treatment of T2DM.^{4,12} Most studies of T2DM have been conducted in countries with comparable socioeconomic structures. However, between China and Sweden there is a difference in the prevalence of adult T2DM: the Chinese population appears more disposed towards developing T2DM because of the nation's dramatic urbanization, that is ongoing, and its unique approach to nutrition. Despite this evidence, there is no representative, population based comparative epidemiological studies which measure the burden of prediabetes and T2DM in different socio-economic conditions. In addition, it is unclear whether the risks of prediabetes and T2DM differ between the different populations. A comparison of two populations living in different socioeconomic and political environments could help identify the burdens, as well as the behavioural and environmental factors, associated with prediabetes and T2DM. Accurate estimation of prediabetes and T2DM is necessary for raising public awareness, developing public health strategies, and allocating health resources for effective prevention and management.

Materials and Methods

A Community based cross-sectional study was carried out in the field practice area of department of community medicine, Nalanda Medical College and Hospital, Patna, Bihar, India, for 1 year. after taking the approval of the protocol review committee and institutional ethics committee.

Materials and methods

Study was conducted among 200 respondents belonging to 20-67 year age group in urban area of Bihar. Total of 110 males and 90 females were interviewed by using pretested semi structured questionnaire. Visits were made one day prior to inform each respondent to remain empty stomach overnight (at least 8hours) and get their blood sugars checked on the next day. Informed consent was taken from all respondents. Information on family history of diabetes was collected with the help of semi-structured pretested questionnaire. Next day morning blood sample was collected for the purpose of estimation of fasting capillary glucose with the

help of glucometer between 6am-8am. Fasting blood glucose level was also informed to all the respondents along with education on prevention of diabetes & place of treatment for individuals with high blood sugar. Chi-square test was applied to assess the association. $P < 0.005$ was considered to be statistically significant. Fasting Capillary blood glucose level was measured with the help of Glucometer (According to WHO-2006. people with plasma glucose between 110 mg/dl to 125 mg/dl are pre-diabetic and those higher than 126 mg/dl are diabetic). Family history of diabetes was obtained from each subject and classified into three groups, viz. 1= no family history of diabetes mellitus, 2= one parent affected and 3= both parents and siblings affected. WHO, 2008 criteria was used to assess the BMI. People who have < 18 BMI are considered underweight, 18-24.9 normal weight and 25-30 overweight and > 30 are considered obese. Known cases of diabetes with age group between 20-67 years were not included in this study.

Pregnant women and known cases of diabetes mellitus among participants were excluded from this study. Known cases of diabetes mellitus among participants were included only in screening for assessment of prevalence of diabetes mellitus. Pregnant women were excluded due to possible glucose tolerance status in this group due to pregnancy.¹³

Results

In the present study overall prevalence of pre- diabetes was 11.9% and diabetes mellitus was 7.2%. Out of which 6.6% were newly diagnosed and 0.6% were known diabetic. It is observed that 81 (40.5%) of the respondents were in the age group of 20-30 years followed by 44(22%) above 50 years age group. While 20% respondents were in age-group of 30 to 40 years and 35 (17.5%) were in 40-50 years. Out of the total 200 respondents, (55%) were male and (45%) were female. In the present study majority 148(74%) of the respondents were married. While about 40(20%) were unmarried and 6% were widow/widower.

Table 1: demographic profile of the patients

Gender	N=200	Percentage (%)
Male	110	55
Female	90	45
Age		
20-30	81	40.5
30-40	40	20
40-50	35	17.5
Above 50	44	22
Marital status		
Married	148	74
Unmarried	40	20
widow/widower	12	6

Table 2: Family history

Parameter	Number of patients	Percentage (%)
Positive family history of one parent	14	7
Both parents and siblings	8	4
Total familial risk observed	22	11

Table 3: Association between positive family history of diabetes mellitus and fasting blood glucose level

Fasting bloodglucose level		Family history of diabetes mellitus				Statistical values
		No Family history		Positive family history		
	No.	No.	%	No.	%	
Normal blood glucose level	162	147	90.74	15	10.8	$\chi^2=32.4; df=2; p< 0.001$
Pre- Diabetics	23	19	82.61	4	17.39	
Diabetics	15	12	80	3	20	

Table- 3 Shows association between positive family history and risk of diabetes mellitus among participants. Positive family history was observed more among pre-diabetics 17.39% and diabetics 20% as compared to respondents with normal blood glucose level 10.8%. The association was found to be statistically significant.

Table 4: Association of positive family history of diabetes with BMI

BMI (N-38)	Family History of diabetes				Statistical values
	No family history		Positive family history of diabetes mellitus		
	No.=31	%	No.=7	%	
<18.5	2	6.45	1	14.28	$\chi^2=7.4; df=2; p< 0.02$
18.5-24.9	20	64.5	2	28.57	
>25	9	29.03	4	57.14	

The finding (table 4) shows statistically significant association between family history and BMI. More than 57.14% respondents who had positive family history of diabetes had high BMI.

Discussion

This was a community based study in Urban area of Bihar, to assess the association of Pre-Diabetes, Diabetes and BMI with family history among urban population.

Family history is considered an important factor to detect individuals at increased risk of developing type 2 diabetes mellitus. In the present study prevalence of pre-diabetes was 11.5% and diabetes 7.5%. Out of the total 200 respondents, familial risk was observed only in 11%. Out of which 7% respondents were having positive family history of one parent being diabetic and 4% were having both parents and siblings diabetic. Positive family history was observed more among pre-diabetics 17.39% and diabetics 20% as compared to respondents with normal blood glucose level 10.8%. The association was found to be statistically significant. Significant difference was observed among diabetes, pre-diabetes with family history. This is coherent with the findings of other studies.¹⁴⁻¹⁹

The findings in table 3 shows that statistically significant association was found between positive family history and BMI. More than 57.14% respondents who had positive family history of diabetes also had high BMI. This is coherent with the study.²⁰

Conclusion

Family history of diabetes mellitus was observed in 11% of total screened participants. Out of which 7% were having either one parent diabetic and 4% of them had both parents and siblings diabetic. Due to high prevalence of pre-diabetes, it is necessary to educate them about non communicable disease program for life style modification and disease prevention.

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