

Original Research Article

A cross sectional study on the prevalence of diabetes mellitus among adult population in a peri-urban area of West Tripura, India

Kaushik Tripura, Kaushik Nag*, Nabarun Karmakar, Anjan Datta, Partha Bhattacharjee

Department of Community Medicine, Tripura Medical College and Dr. BRAM Teaching Hospital, Hapania, Agartala, Tripura, India

Received: 31 December 2018

Accepted: 29 January 2019

*Correspondence:

Dr. Kaushik Nag,

E-mail: drkaushik86@yahoo.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Diabetes mellitus, a major lifestyle disease is undoubtedly the most challenging public health problem of 21st century with a worldwide prevalence of 387 million (8.3%). The objective of this study was to get an estimate of the prevalence of diabetes mellitus and associated factors in a sample of adult population in a peri-urban area of West Tripura.

Methods: In a cross-sectional study, prevalence of diabetes mellitus was found among adult population of a peri-urban area (Dukli) of west Tripura from April 2016 to May 2016. Multistage random sampling was followed to include 76 participants. Taking house as a sampling unit, every 5th house was chosen for this study. From every selected house, one adult participant was chosen by simple random sampling until desired sample size was attained. Collected data was compiled and analyzed with the help of statistical package for social sciences (SPSS 16.0.). Chi-square, Fischer exact test was applied to find out association.

Results: The mean age of the study participants was 42.21 ± 17.65 years, comprised of 23.7% male and 76.3% female. The prevalence of diabetes mellitus was 17.1% among study participants. Diabetes was found highest in 39-58-year age group (37.5%). Males were more affected with diabetes mellitus (22.2%) compared to females (15.5%). The study also revealed a significant association of diabetes mellitus with family history of diabetes mellitus (p value 0.00).

Conclusions: Present study showed very high prevalence of diabetes mellitus among adult population. Healthy lifestyle measures might reduce burden of diabetes mellitus which could be evaluated in future research.

Keywords: Adult, Cross-sectional study, Diabetes mellitus, Healthy lifestyle, Prevalence, Public health

INTRODUCTION

Diabetes is a serious, chronic disease that occurs either when the pancreas does not produce enough insulin (a hormone that regulates blood sugar, or glucose), or when the body cannot effectively utilize the insulin it produces. Diabetes mellitus is considered as a group of metabolic disorders characterized by a hyperglycemic state, as a result of chronic insulin resistance, which leads to

pancreatic beta-cell dysfunction and subsequently massive failure in insulin secretion. Diabetes mellitus, a major lifestyle disease is undoubtedly the most challenging public health problem of 21st century with a worldwide prevalence of 387 million (8.3%) and predicted to be 592 million by 2035 (IDF).¹

Diabetes Mellitus is the most common endocrine disorder, affecting an estimated 5% to 10 % of the adult

population in industrialized Western countries, Asia, Africa, Central America and South America and it has a large impact on society.² Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. The global prevalence (age-standardized) of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% in the adult population (WHO).³ India is the diabetes capital of the world with 41 million Indians having diabetes; every fifth diabetic in the world is an Indian.⁴ In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) with the United States (17.7 million) in second and third place respectively.⁵ It is predicted that by 2030, diabetes mellitus may rise up to 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will be in 2nd and 3rd position respectively.² The National urban diabetes survey (NUDS), a population based survey carried out in six large cities in India among 11,216 subjects aged over 20 years showed the age-standardized prevalence of diabetes was 12.1%.⁶ Diabetic patients, if undiagnosed or inadequately treated, develop multiple chronic complications leading to irreversible disabilities and death. So, knowledge of the prevalence of diabetes and pre-diabetes and of related risk factors would raise awareness of the disease and lead to new policies and strategies for prevention and management. In this context, the present study was conducted to get an estimate of the prevalence of diabetes mellitus and associated factors in a sample of adult population in a peri-urban area of west Tripura.

METHODS

It was a community based cross-sectional study, carried out in a peri-urban area (Dukli) of west Tripura from April 2016 to May 2016.

Inclusion criteria

- Adult population of more than equals to 18 years were included in this study.

Exclusion criteria

- Seriously ill,
- Mentally unstable and
- Pregnant women.

A total sample of 72 persons were calculated, using $4pq/L^2$ formula where p = prevalence (10%)², q = (1-p) (90%), L = allowable error (10%) and design effect of 2. Finally, 76 study participants were included, taking 5% as non-response rate. Multistage random sampling was followed. Taking house as a sampling unit, every 5th house was chosen for this study. The number 5 was randomly generated from random number table. From every selected house, one adult participant was chosen by simple random sampling until desired sample size was attained. If no adult person was found in that selected

house, the adjacent or next house was included in the study. After taking written consent from the study participants, authors interviewed with the help of a pre-tested and pre-designed schedule, examined and tested their random blood sugar with the help of glucometer following standard WHO guidelines.

Statistical analysis

Collected data was compiled and analyzed on Statistical Package for Social Sciences (SPSS-Inc. SPSS for Windows, version 16.0. Chicago). From there frequency distribution, percentage, proportion, mean and standard deviation values were calculated in appropriate situations. Chi-square test was used to find out any association of diabetes mellitus with socio-demographic and other study variables. P value less than 0.05 was considered as statistically significant. The study was conducted after getting permission from the Institutional Ethics Committee.

Operational definition

Diabetes mellitus

Persons having history of diabetes and/or having random blood sugar level ≥ 200 mg/dl on the day of examination.

Smoking status

- Current/Ever/ occasional. Current-Adults who have smoked 100 cigarettes in their lifetime and currently smoke cigarettes every day (daily) or some days (nondaily).⁷
- Ever -use to smoke, but presently not smoking.
- Occasional-smoke occasionally, but not addicted to smoking.

Body mass index (according to WHO).⁸ Body mass index of 18.5-24.9kg/m² was considered to be normal, 25-29.9kg/m² as overweight and more than equals to 30kg/m² as obesity.

History of physical activity

Yes: Extra activities other than regular activities related to exercise.

No: No extra activities other than regular activities related to exercise.

RESULTS

Profile of sample population

The study was conducted among 76 adults of Dukli, West Tripura. Among the participants majority of them were in the age group of 18 - 38 years (57.9%).

Table 1: Socio-demographic and behavioural characteristics of study population.

Socio demographic profile		Frequency (n=76)	%
Age group (years)	18-38	44	57.9
	39-58	16	21.1
	59-78	12	15.7
	79-98	4	5.3
Gender	Male	18	23.7
	Female	58	76.3
Cast	SC	39	51.3
	General	22	28.9
	OBC	14	18.5
	ST	1	1.3
Marital status	Married	60	78.9
	Widow	13	17.2
	Unmarried	3	3.9
Type of family	Nuclear	46	60.5
	Joint	30	39.5
Occupation	Housewife	41	53.9
	Private Job	10	13.2
	Daily worker	10	13.2
	Unemployed	7	9.2
	Govt. Job	3	3.9
	Business	3	3.9
	Student	2	2.7
Education	Illiterate	16	21.1
	Primary	23	30.3
	secondary	24	31.5
	Higher secondary	6	7.9
	Graduate and above	7	9.2
SES class (modified B.G. Prasad scale May 2016)	Upper class	2	2.7
	Upper middle class	21	27.6
	Middle class	18	23.7
	Lower middle class	22	28.9
	Lower class	13	17.1
Personal and behavioural characteristics			
Regular physical activity	Yes	43	56.6
	No	33	43.4
Diet	Vegetarian	7	9.2
	Non-vegetarian	69	90.8
Smoking history (current smoker)	Yes	48	63.2
	No	28	36.8
Alcohol intake	Yes	7	9.2
	No	69	90.8
History of diabetes mellitus among family members			
	Yes	12	15.8
	No	64	84.2

The mean age of the study participants is 42.21±17.65. The study sample comprised of 58 female (76.3%) and 18 males (23.7%). Among the participants most of them were housewife (53.9%) and belonged to nuclear family (60.5). Most of them were married (78.9%) and belonged to lower middle class (28.9%) according to modified BG prasad socio economic classification. Regarding their behavioral characteristics, most of them were non-vegetarian (90.8%) by diet, 56.6% perform regular physical activity, 63.2% were current smokers and 9.2% give history of alcohol intake. Among the study participants, 15.8% had family history of diabetes mellitus in their family (Table 1).

Magnitude of diabetes mellitus and association with other variables

In the present study, the prevalence of diabetes mellitus found to be 17.1%. Among them 12 had already diagnosed as having diabetes mellitus and majority (58.3%) diagnosed as having diabetes more 5 years.

Table 2: Prevalence of the diabetes mellitus among study participants.

Diabetes mellitus	Frequency	Percentage
Yes	13	17.1
No	63	82.9
Total	76	100

Table 3: Comparison of SBP, DBP, anthropometric variables and RBS between diabetics and non-diabetics.

Variables	Diabetics Mean ±SD	Non-diabetics Mean±SD	P value*
Systolic blood pressure (mm of Hg)	124±25	121±15	0.58
Diastolic blood pressure (mm of Hg)	83±12	75±10	0.25
Weight (kg)	50.0 ±10.67	50.42 ±10.73	0.91
Height (cm)	148.84 ±7.76	151±9.34	0.43
Waist circumference (cm)	76.61 ±14.48	78.83 ±13.95	0.60
Body mass Index (kg/m ²)	22.65 ±4.28	22.15 ±3.97	0.68
Random blood sugar (mg/dl)	207.38 ±109.38	105.87 ±24.71	0.00

* Independent T test **p value <0.05 Taken as a statistically significant. SBP= Systolic blood pressure, DBP= Diastolic blood pressure, RBS= Random blood sugar

The mean random blood sugar among diabetics (207.38±109.38) were higher than non-diabetics (105.87±24.71), which is statistically significant (p value 0.00). Diabetes was found highest in 39-58-year age group (37.5%) followed by 59 to 78 and 79 to 98 years i.e., 25%. The distribution of diabetes among different age group was found to be statistically significant. Males were more affected with diabetes mellitus (22.2%) compared to females (15.5%). The study also revealed a significant association of diabetes mellitus with family history of diabetes mellitus (p value 0.00). Non-

vegetarians (17.1%) were more affected with diabetes mellitus compared to vegetarians (14.3%). Mean body mass index of the diabetic study participant was 22.65 ±4.28 which was almost similar to non-diabetic study participants (22.15±3.97) but this difference was not statistically significant.

No significant statistical association of diabetes mellitus was found with other variables like physical activity, dietary habit, smoking status and alcohol intake of the study participants (Table 2, 3 and 4).

Table 4: Association of few socio demographic factors and behavioral characteristics with diabetes mellitus of study participants.

Socio demographic characteristics and other factors		Diabetes mellitus (n=76)		P Value
		Yes n (%)	No n (%)	
Age groups (years)	18-38	3 (6.8)	41 (93.2)	0.01*
	39-58	6 (37.5)	10 (62.5)	
	59-78	3 (25%)	9 (75)	
	79-98	1(25%)	3(75)	
Gender	Male	4 (22.2)	14 (77.8)	0.49*
	Female	9 (15.5)	49 (84.5)	
Family history of diabetes	Father	2 (50)	2 (50)	0.00*
	Mother	1 (25)	3 (75)	
	Both	1 (100)	0 (0)	
	Siblings	2 (66.7)	1 (33.3)	
History of physical activity	Yes	8 (18.6)	35 (81.4)	0.76
	No	5 (15.2)	28 (84.8)	
Dietary habit	Vegetarian	1 (14.3)	6 (85.7)	1.00*
	Non-vegetarian	12 (17.1)	57 (82.6)	
History of smoking / smokeless tobacco				
Yes		9 (18.8)	39 (81.2)	0.75*
No		4 (14.3)	24 (85.7)	
History of alcohol intake				
Yes		2 (28.6)	5 (71.4)	0.34*
No		11 (15.9)	58 (84.1)	

*Fisher's exact test **p value <0.05 taken as a statistically significant

DISCUSSION

The present study in a peri-urban area of west Tripura found prevalence of diabetes mellitus was 17.1% which also corroborate with the findings of Indian council of medical research-India diabetes (ICMR INDAIB) study.⁹ Anjana RM et al, in their study found prevalence of diabetes mellitus in urban area of Tripura was between 13.4% to 17.7%.

The prevalence of pre-diabetes varied from 6.0% (5.1-6.8) in Mizoram to 14.7% (13.6-15.9) in Tripura and the prevalence of impaired fasting glucose was generally

higher than the prevalence of impaired glucose tolerance.⁹ Ahmad J et al, in their study Kashmir found lower prevalence of diabetes mellitus (6.05%) in the age group of 20 years and above.¹⁰

Deepthi R et al, in rural Kolar, Karnataka also found lower prevalence (5.6%) of diabetes in their study.¹¹ Patil RS et al, in an urban slum of Pune found prevalence of diabetes was 4.6% with equal prevalence in both males and females.¹² D'Souza AM et al, in Mangalore and Kapoor D et al, in Kangra, Himachal Prasad lower prevalence of diabetes mellitus i.e., 7.7% and 7.8% respectively.^{13,14}

Present study showed, Diabetes was highest in 39-58-year age group (37.5%) Ahmad J et al, found prevalence of diabetes increased significantly with advancing age. Indeed there was almost three times increase in the prevalence of diabetes after the age of 60 years.¹⁰ A systematic review by D'Souza AM et al, in Mangalore showed the increasing rate of Diabetes with increasing in age i.e. in the age group 40-50 years and 60-70 years.¹³ Agarwal K in a study in Ahmedabad, Gujarat found the prevalence was highest (6.7%) in age group 21-30 and 51-60 years.¹⁵ Zaman Aktar et al, in their study in North Eastern India found diabetes was highest among 50-59 years age group (32.10%).¹⁶ Present study showed that prevalence of diabetes mellitus was more common in male (22.2%) compared to female (15.5%) but the study by D'Souza AM et al, found equal prevalence of diabetes mellitus in both male and female.¹³ This might be due to indulgence to unhealthy diet and sedentary lifestyle by the male adults. The study also revealed a significant association of diabetes mellitus with family history of diabetes mellitus. Patil RS et al, also in their study revealed abdominal obesity and family history of diabetes was found to be an associated risk factor.¹² Zaman Aktar et al, also found mean body mass index and associated family history were added risk factors in prevalence of diabetes.¹⁶

Limitation of the study was small sample size and inability to conduct other blood investigations like fasting blood sugar, post-prandial blood sugar and glycosylated hemoglobin (HbA1c) etc., due to operational infeasibility for further confirmation of diagnosis of diabetes mellitus.

CONCLUSION

Diabetes mellitus is a modern-day epidemic of our country as well as globally. Present study showed very high prevalence of diabetes mellitus among adult population. Diabetes was found highest in 39-58-year age group. Males were most affected by diabetes mellitus compared to females. The study showed a significant association of diabetes mellitus with family history of diabetes mellitus. Lifestyle modifications like increased physical activity, healthy diet, yoga, meditation, good quality of sleep can be an effective weapon to combat against this disease which needs to be further evaluated in future research.

ACKNOWLEDGEMENTS

Authors would like to thank medical students who participated actively in this study, express our gratitude Tripura Medical College and Dr. BRAM Teaching Hospital for helping us to conduct the study.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of Tripura Medical College and Dr. B.R.A.M. Teaching Hospital

REFERENCES

1. International diabetes federation. IDF diabetes atlas. In: IDF, eds. A Book. 6th ed. Brussels, Belgium: International Diabetes Federatio;2013.
2. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes-estimates for the year 2000 and projections for 2030. Diab Care. 2004; 27 (3):1047-53.
3. Global report on diabetes. Executive summary2016. World health organization 2016. Available at: www.who.int/diabetes/global-report.
4. Joshi SR, Parikh RM. India- diabetes capital of the world: now heading towards hypertension. J Assoc Physic India. 2007;55:323-4
5. Kaveeshwar SA, Cornwall J. The current state of diabetes mellitus in India. Australas Med J. 2014;7(1):45.
6. Ramachandran A, Snehalata C, Kapur A, Vijay V, Mohan V, Das AK et al. High prevalence of Diabetes and impaired glucose tolerance in India: National urban diabetes survey: Diabetologia 2001;44:1094-01.
7. Schoenborn CA1, Adams PE. Health behaviors of adults: United States, 2005-2007. Vital Health Stat 10. 2010 Mar;(245):1-132.
8. World health organization. Hypertension control: Report of a WHO expert committee. WHO Tech. Rep. S.1996; 862: 1-83. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/8669153>.
9. Anjana RM, Deepa M, Pradeepa R, Mahanta J, Narain K, Das HK, et al. Prevalence of diabetes and prediabetes in 15 states of India: results from the ICMR-INDIAB population-based cross-sectional study. Lancet Diab Endocrinol. 2017:1-12.
10. Ahmad J, Masoodi MA, Ashraf M, Rashid R, Ahmad R, Ahmad A, et al. Prevalence of diabetes mellitus and its associated risk factors in age group of 20 years and above in Kashmir, India. Al Ameen J Med Sci. 2011;4(1):38-44.
11. Deepthi R, Chandini C, Pratyusha K, Kusum N, Raajitha B, Shetty G. Screening for Diabetes and its risk factors in rural Kolar-A community-based study. IJRHDH. 2013;1(4):152-9.
12. Patil RS, Gothankar JS. Prevalence of Type-2 Diabetes Mellitus and associated risk factors in an urban slum of Pune city, India. NJMR. 2013;3(4):346-9.
13. D'Souza AM, Kundapur R, Kiran NU. A Cross sectional study to determine the prevalence of Diabetes Mellitus and its household awareness in the rural field practice areas of a medical college in Mangalore-A Pilot Study. Nitte University J Health Sci. 2015;5(3):43.
14. Kapoor D, Bhardwaj AK, Kumar D, Raina SK. Prevalence of diabetes mellitus and its risk factors among permanently settled tribal individuals in tribal and urban areas in northern state of sub-Himalayan region of India. Int J f Chronic Dis. 2014;2014.

15. Agarwal K, Vyas M, Shah B, Gupta N, Rathod D. Prevalence of diabetes mellitus in rural Ahmedabad of Gujarat-A camp based cross-sectional study. *Int J Health Sci Res.* 2014;4(6):20-4.
16. Zaman FA, Borang A. Prevalence of diabetes mellitus amongst rural hilly population of North Eastern India and its relationship with associated risk factors and related co-morbidities. *J Natural Scienc Biol Med.* 2014;5(2):383.

Cite this article as: Tripura K, Nag K, Karmakar N, Datta A, Bhattacharjee P. A cross sectional study on the prevalence of diabetes mellitus among adult population in a peri-urban area of West Tripura, India. *Int J Res Med Sci* 2019;7:843-8.