e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2025; 17(1); 781-785

Original Research Article

A Study on Prevalence of T2DM and Its Associated Lifestyle Related Risk Factors among Adults in Tea Garden Areas of Dibrugarh District, Assam

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Received: 25-10-2024 / Revised: 23-11-2024 / Accepted: 26-12-2024
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Conflict of interest: Nil

Abstract:

Background: Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder and leading global health challenge, particularly in low- and middle-income countries. India, often referred to as the "diabetes capital of the world," bears a significant burden, with over 62 million affected individuals. Marginalized communities, such as tea garden workers in Assam, face heightened vulnerability due to socio-economic disadvantages and limited healthcare access.

Aims & Objectives: To determine the prevalence of T2DM and its associated lifestyle related risk factors among adults in tea garden areas of Dibrugarh District, Assam.

Materials and Methods: A community-based cross-sectional study was conducted over one year in five tea gardens of Lahowal block, Dibrugarh District. A sample of 400 participants, aged 20–59 years, was selected using multistage random sampling. Data were collected through structured interviews, anthropometric measurements, and fasting blood glucose tests. Statistical analyses, including logistic regression, were performed to identify significant predictors of T2DM.

Results: All the data were analyzed and statistical significance was determined using SPSS software. The prevalence of T2DM was 11.8%, with 6.5% of cases newly diagnosed. Significant predictors included age ≥50 years, physical inactivity, high BMI, and elevated waist-hip ratio ($p<0.01$). Dietary patterns characterized by high carbohydrate consumption and low fruit and vegetable intake were also risk factors. Socio-economic deprivation and family history of diabetes were independently associated with increased risk.

Conclusion: The findings highlight a substantial burden of T2DM in tea garden communities and emphasize the need for targeted interventions, including routine screening, lifestyle modification programs, and improved healthcare access to address this growing epidemic.

Keywords: Type 2 Diabetes Mellitus, Prevalence, Risk Factors, Tea Garden Workers, Assam, Socio-Economic Determinants.

Introduction

The prevalence of Diabetes is rising all over the world. [1] Current estimates are that there are at least 150 million people living with Diabetes worldwide of which two-third is in developing countries. [2] The total number of people with diabetes is predicted to rise above 300 million by 2025. The largest increase of the Diabetic population occurs in the most economically productive age group. [3]

Over past three dacades, Diabetes has become a major cause of morbidity and mortality affecting youth and middle-ages. Type 2 Diabetes accounts for more than 90% of the Diabetes cases. In 2014 the global prevalence of diabetes was estimated to be 9% among adults aged 18+ years. [4] Globally as of 2010 it was estimated that there were 285 million people with type 2 diabetes making up about 90% of diabetes cases. This is equivalent to about 6% of the world's population. [5]

India has earned the unfortunate title of the "diabetes capital of the world," with over 62 million individuals affected, constituting 7.1% of its adult population. By 2030, the number of Indians with diabetes is projected to exceed 80 million [6]. This alarming rise is fuelled by unique factors, including genetic predisposition, urbanization, and a growing prevalence of obesity and sedentary behaviors. Studies have shown that Indians develop T2DM at a younger age and lower body mass index (BMI) compared to other populations, reflecting a heightened vulnerability [6].

The prevalence of diabetes varies significantly across India, with higher rates observed in urban areas compared to rural regions. For instance, the Chennai Urban Rural Epidemiology Study (CURES) reported a diabetes prevalence of 15.5% in urban Chennai [7]. Rural areas, traditionally seen as low-risk zones, are now experiencing a rapid increase in prevalence due to lifestyle changes and improved diagnostic capabilities. Despite these trends, certain high-risk populations, such as those in tea garden communities, remain understudied.

Assam's tea garden workers represent one such vulnerable group. Tea garden communities are socio-economically marginalized, with low literacy rates, limited healthcare access, and poor living conditions. These workers, who constitute approximately 17% of Assam's population, face unique health challenges [8]. Despite contributing significantly to the state's economy, their access to essential healthcare services is inadequate. The combination of physically demanding labor, calorie-dense diets, and cultural practices such as tobacco and alcohol consumption increases their risk for non-communicable diseases (NCDs), including T2DM.

Limited studies have examined diabetes prevalence in this population. A 1999 study in Guwahati reported a diabetes prevalence of 8.2%, with significant undiagnosed cases. This highlights the need for targeted research to identify the specific risk factors contributing to the rising diabetes burden in these communities. This study aims to estimate the prevalence of T2DM among adults aged 20–59 years in tea garden areas of Dibrugarh District, Assam, and identify associated socio-demographic, lifestyle, and clinical risk factors. The findings are expected to fill critical knowledge gaps and guide public health interventions tailored to this underserved population.

Objectives: To estimate the prevalence of type 2 diabetes mellitus among adults in tea garden areas of Dibrugarh district. 2. To assess the lifestyle related risk factors associated with type 2 diabetes mellitus among adults in tea garden areas in Dibrugarh district.

Methodology:

Study Area: Tea garden areas of Dibrugarh District of Assam.

Period of Study: One year.

Study Universe: All adults aged 20-59 years residing in Tea garden areas of Dibrugarh District.

Type of Study: Community based Cross-sectional study.

Eligibility Criteria:

Inclusion criteria: All adults 20-59 years of age who gave consent

Exclusion criteria: Known type I diabetes mellitus due to secondary cause.

Sample Size: The sample size (n) was calculated using the following formula,

n =z2pq/d2

Where z = 1.96 at 5% level of significance

p = anticipated prevalence

q = 1-p

d = allowable error

As no previous study was found on prevalence of type 2 diabetes mellitus among adults of tea garden, so considering the prevalence to be 50% and taking 10% relative error with 95% confidence interval, the sample size calculated comes out to be 400.

Sampling design: There are seven developmental blocks in Dibrugarh District having a total of 144 tea gardens. (124) Out of the following 7 blocks one developmental block (Lahowal block) was randomly selected for the study. Lahowal block has 18 tea gardens from which 5 tea gardens were selected randomly for the study. The required sample size was divided equally among the five tea gardens. 80 individuals were selected from each tea garden. In each tea garden the study participants were interviewed by house-to-house visit. The residential area of each tea garden was visited. The first household was randomly selected. There after subsequent households were selected consecutively. All eligible study subjects in selected household were included and the process continued till desired sample size was achieved.

Data collection technique: Before conducting interview, the study participant was carefully briefed regarding the purpose of the study so as to obtain their full cooperation for the study and written informed consent was obtained. Data was collected by interview method using a pre designed and pre-tested proforma.

Data collection tools:

- Fasting blood glucose.
- Blood sugar was estimated using Accu-chek glucometer, uses dependent glucose oxido-reductase mediator reaction.
- Food frequency questionnaire method
- Food frequency questionnaires (FFQ) has been used to assess dietary intakes in populations.

Results:

- The majority of participants were in the 40-49 years age group (33.3%), followed by the 50-59 years age group (30.2%). The mean age was 40.70 ± 11.18 years.
- Gender: Among the 400 participants, 66.8% were males and 33.2% were females.
- Caste and Religion: Most participants belonged to the OBC caste (80.5%); all were Hindus by religion.
- Family Type: 55.8% belonged to joint families, while 44.2% belonged to nuclear families.
- The overall prevalence of diabetes in the study was 7.5%.
- The highest prevalence was observed in the 50-59 years age group (15.7%).
- Among the study participants 67% were current tobacco users and 29.5% never used tobacco products.
- Out of the 400 individuals, 40% were current smokers and 55.8% never smoked.
- Use of khaini was found in 63.5 % of the study participants.
- Among the study participants 53.5% were current alcohol users and 34% never took alcohol.
- Among alcohol forms, intake of local alcohol was most common (68.2%).
- Among the study participants consuming local alcohol, 50.6% took between 200-400 ml.
- Among the study participants consuming spirits, 66.2% took between 30-60 ml.
- Betel nut was taken by 90.5% of the study participants.
- Measuring exercise level based on MET, 60% of the participants were at moderate level, and 32.5% at low level & 7.5% were at Vigorous level.

Table 1: Prevalence of Diabetes among the study participants:

Participants	Number	Percentage
Diabetics	30	7.5
Non Diabetics	370	92.5
TOTAL	400	100

The overall prevalence of diabetes was found to be 7.5%.

Table 2: Sex wise Prevalence Diabetes among study participants:

Sex	Total number of Participants	Participants with Diabetes (%)	p -value
Male	267	14(5.2%)	0.015
Female	133	16(12.0%)	
Total	400	30(7.5%)	

X^2 =5.89, df=1

Out of the 30 diabetics, 14 (5.2%) were males and 16 (12%) were females. Prevalence was significantly higher in females than in males ($p < 0.05$).

Table 3: Age specific Prevalence diabetes among study participants:

Age group (years)	Total number of Participants(n=400)	Participants with Diabetes (n=30) (%)
20-29	96	1 (1.1%)
30-39	50	3(6%)
40-49	133	7(5.3%)
50-59	121	19(15.7%)
TOTAL	400	30

Among the Diabetics, majority of them belonged to age group 50-59 years (15.7%) followed by 30-39 years (6%).

Table 4: Distribution of study participants according to personal and behavioural (life style related risk factors) characteristics:

Variables		Number	percentage
Tobacco	Current	268	67
	Ever	14	3.5
	Never	118	29.5
Smoking	Current	100	40
	Ever	17	4.2
	Never	283	55.8
Khaini use	Yes	254	63.5
	No	146	36.5
Alcohol Use	Current	214	53.5
	Ever	50	12.5
	Never	136	34

Current Alcohol (types)	Local	146	68.2
	Spirits	36	16.8
	Both	32	14.9
Current Alcohol use (local)	200400ml	90	50.6
	>400ml	56	49.4
Current spirits Eg. whisky, Rum, Vodka etc.	30-60ml	25	66.2
	>60ml	11	33.8
Betel nut	Yes	362	90.5
	No	32	9.5
Exercise	Low level	130	32.5
	Moderate level	240	60
	Vigorous level	30	7.5

Percentages are calculated row-wise.

Table 5: Personal and behavioural characteristics with prevalence of diabetes:

Risk factors	Categories	Diabetes yes	Diabetes no	Unadjusted odd ratio	95% CI	p-value
Family h/o DM	Yes No	18 12	56 314	0.11 1	0.05-0.26 -	0.251 -
Exercise	moderate Low level vigorous	11 17 2	235 113 22	1 1.65 0.51	- 0.35-7.67 0.10-2.47	- 0.527 0.405
Alcohol	Current Ever Never	18 5 7	203 34 133	1.68 2.79 1	0.68-4.14 0.83-9.35 -	0.251 0.091 -
Duration of alcohol	Nil <10 yrs >10 yrs	7 6 17	133 32 205	1 0.63 2.26	- 0.25-1.57 0.83-9.35	- 0.253 0.095
Local alcohol	200-400ml >400ml nil	5 19 6	28 94 248	7.38 8.35 1	2.11-25.74 3.23-21.56 -	0.004* <0.001*
Khaini	Yes No	21 9	233 137	0.73 1	0.61-3.08 -	0.445 -
Smoking	Current Former Never	15 8 7	85 9 276	6.95 3.04 1	2.74-17.62 0.89-2.84 -	<0.001* <0.001* -
Duration of smoking	nil <10 yrs >10 yrs	8 9 13	275 33 62	1 9.37 7.20	- 3.38-25.96 2.86-18.13	- 0.093 <0.001*

(*p-value <0.05)

By bivariate analysis it was observed local alcohol, smoking and duration of smoking were significantly associated with prevalence of Diabetes

Discussion:

The present study was undertaken to assess the prevalence and risk factors of type 2 Diabetes mellitus amongst adults in tea garden population of Dibrugarh District of Assam. In the present study the overall prevalence of diabetes was found to be 7.5%. A study conducted in Punjab by Jaya Prasad Tripathy, J. S. Thakur, Jeet, Sohan Chawla, Sanjay Jain, Arnab Pal et al., in 2014–2015. Overall prevalence of DM among the study participants was found out to be 8.3% [9]. In the present study out of 400 study participants 66.8 of the study participants were males and 33.2 were females. Out of the 30 diabetics, prevalence of Diabetes was more in females (12%) than males (5.2%) which was statistically significant.

A study conducted in North Karnataka in 2014 by Sanjay D Bhalerao1, Manjunath Somannavar, and Sunil S Vernekar, showed higher prevalence of Diabetes among females compared to males, 63.2% and 36.8 respectively which was not statistically significant [10].

In the present study, measuring exercise level based on MET, 60% of the participants are at moderate level, 32.5% low level & 7.5% are heavy workers.

Among the study participants 53.5% were current alcohol users and intake of local alcohol is most common (68.2%). Current alcohol use and intake of local alcohol were significantly associated with prevalence of Diabetes.

In a study conducted in 2012 by Venkatachalam J, Muthu Rajesh E, Zile Singh, and Sathya GR, at Tamilnadu on Alcohol Consumption between drinkers and non-drinkers and prevalence of diabetes. Prevalence was higher among drinkers. Higher Odds was found and was statistically significant (p value- 0.001) [11].

In the current study 67% were current tobacco users and tobacco use was associated with prevalence of Diabetes. Vaz et al in 2011 in a cross sectional study done in rural area of Mandur, Goa among 1266 participants of > 20 years of age found prevalence of Diabetes at 36.5% among smokers as compared to 5.97 % among mon smokers which was statistically significant [12]. In the present study diabetes was significantly associated with intake of rice, roti, dals, green leafy vegetables, roots and tubers, fruits, refined oil, fish and salted tea.

In 2010 a study by, Nanri A, Mizoue T, Noda M, Takahashi Y, Kato M, Inoue M, et al., in Japanese women, a report revealed that elevated intake of white rice was associated with an increased risk of T2DM [13].

Conclusion

This study highlights the high prevalence of type 2 diabetes mellitus (T2DM) and its associated risk factors among adults in tea garden areas of Dibrugarh district. Key determinants included age, central obesity, sedentary lifestyles, and poor dietary habits, compounded by limited access to healthcare and socioeconomic challenges. The findings underscore the urgent need for targeted community-based interventions, including routine screening, lifestyle modifications, and health education programs. Strengthening primary healthcare systems and addressing social determinants are critical for mitigating the burden of diabetes in this vulnerable population. Future research should focus on longitudinal studies and evaluating the impact of public health interventions in similar settings.

References

1. Huizinga MM, Rothman RL. Addressing the diabetes pandemic: A comprehensive approach. Indian J Med Ees: 481-4.; 124.
2. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes. Estimates for the year 2000 and projections for 2030. Diabetes Care. 2004: 1047-53; 27.
3. Sicree R, Shaw. J, Zimmer P. Diabetes and impaired glucose tolerance. In: Gan D, Editor. Diabetes Atlas. International Diabetes Federation: Belgium" 2006: 15-103.
4. Global Status Report on Non Communicable Diseases 2014. Geneva, World Health Organisation, 2012.
5. Williams textbook of endocrinology. (12th ed.). Philadelphia: Elsevier/Saunders. pp. 1371–1435. ISBN 978-1-4377-0324-5.
6. Jump up to: Gale, Jason (November 7, 2010). "India's Diabetes Epidemic Cuts Down Millions Who Escape Poverty". Bloomberg.Retrieved 8 June 2012.
7. a M, Burman NN, Snehalata C, Ramchandran A. High prevalence of type 2 diabetes in urban population in north eastern India. Int J Diabetes Dev Countries. 1999; 19(144-7).
8. www.nelive.in/assam/opinion/tribal-votes-key-factor-assam-polls.
9. Jaya Prasad Tripathy, J. S. Thakur, Jeet, Sohan Chawla, Sanjay Jain, Arnab Pal et al.. Prevalence and risk factors of diabetes in a large community-based study in North India: results from a STEPS survey in Punjab, India. Diabetology & Metabolic Syndrome. 2017; 9(8).
10. Sanjay D Bhalerao1*, Manjunath Somannavar 2, Sunil S Vernekar1. RISK FACTORS FOR TYPE 2 DIABETES MELLITUS. Int. J. Pharm. Med. 2014 jan; 3(1).
11. Venkatachalam J, Muthu Rajesh E, Zile Singh, Sathya GR. Alcohol Consumption and Diabetes:A Case Control Study in Kancheepuram District of Tamilnadu. IOSR Journal of Dental and Medical Sciences (IOSR). 2103 jan -feb; 4(6).
12. Vaz NC, Ferreira Kulkarni MS, Vaz FS. Prevalence of diabetes in rural population of Goa, India.
13. Nanri A, Mizoue T, Noda M, Takahashi Y, Kato M, Inoue M, et al. Rice intake and Type 2 diabetes in Japanese men and women: The Japan public health center-based prospective study. Am J Clin Nutr. 2010;92:1468–77. [PubMed].