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Original Research Article

Community-Based Study on Prevalence of Risk Factors for Type 2 Diabetes Mellitus in Urban Field Practice Area of DMCH Darbhanga

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Conflict of interest: Nil

Abstract:

Background: The current study is a community-based study conducted on prevalence of risk factors for type 2 diabetes mellitus in urban field practice area of DMCH, Darbhanga. Assessments of the self-care practices among the known cases of diabetes in the study population were also carried out.

Methodology: This is a community based observational along with cross sectional study conducted on prevalence of risk factors for type 2 diabetes mellitus for a period of almost 2 year in the urban field practice area of DMCH. The study was conducted on 555 adult population residing in the area. The individuals with gestational diabetes, critically ill or bed ridden patients (inability to respond) or those who refused to participate in the field study were excluded.

Result: A total of 555 persons divided into different age group were considered for the study. In the present study 13.88% of study population were found with known family history of diabetes. Highest number of diagnosed diabetes cases were found among 42-53 years of age groups whereas lowest number of diagnosed diabetes cases were found in age group of above 65 year. Total percentage share of known diabetic cases among survey conducted on study population were 16.03%. Various risk factors like WHR, BMI, and Smoking and HTN association with diabetes were also established in this study

On analysing the risk factors for prevalence of diabetes mellitus, we can say that significant association were found as value of $p<0.05$ was found between various risk factors of diabetes such as physical activities and diabetes, between BMI and diabetes cases, between WHR and diabetes, HTN and cases of diabetes and smoking and diabetes.

Present study reveals that adherence to the self-care practice was very low as only 1 person was found to be following all the parameters of self-care practice out of 89 diabetic cases. A well-structured programs and campaign need to be organised to improve the self-care approach of Diabetic patients to promote better compliance towards Diet, exercise, adherence to drugs, and appropriate foot care.

Conclusion: Our study emphasized on the study of diagnosed cases of diabetes in the Urban Field Practice area of DMCH Darbhanga. Poor lifestyle practices, unhealthy eating habits, sedentary life style and poor adherence to medications increases the chance of diabetes in our study.

Keywords: Diabetes mellitus, Random blood sugar, self-care, Hypertension.

Introduction

Diabetes mellitus is one of the biggest epidemics of this decade and along with cardiovascular disease, respiratory disease and cancer, it is considered one of the ten leading causes of death [1,2]. According to the International Diabetes Federation Diabetes Atlas, 537 million adults worldwide between 20 - 79 years of age had diabetes in 2021, and the number is estimated to rise to 783 million by 2045 [3].

The most prevalent kind of diabetes, type 2 diabetes, formerly known as non-insulin dependent diabetes, is characterised by hyperglycemia, insulin resistance, and relative insulin shortage [4]. 90% of diabetes patients are type 2, which is the most common type. Diabetes has become a pandemic in several developing nations, including China and India [1]. According to WHO, the prevalence of diabetes mellitus is increasing most rapidly in these countries. Epidemiological change, economic expansion, inactivity, fad diets, and environmental variables are additional risk factors. A higher risk demographic group has stress, sedentary job patterns, and changing eating habits [5]. These changes have been attributed to rising levels of poor diets and sedentary lifestyles, which result in raised Body Mass Index (BMI) and fasting plasma glucose [6]. Particularly, type 2 diabetes is more prevalent in people with higher BMIs [7]. Another factor is the ageing of the population, as diabetes typically affects older people [8].

The International Diabetes Federation (IDF) estimation by 2030 India will be the 'Diabetes Capital' of the world. In India, the burden of diabetes has been increasing steadily since 1990 and leaps and at a faster pace from the year 2000. During the past decade in India as per IDF [1,9-13]. The prevalence of diabetes in India has risen from 7.1% in 2009 to 8.9% in 2019. Currently, 25.2 million adults are estimated to have IGT, which is estimated to increase to 35.7 million in the year 2045. India ranks second after China in the global diabetes epidemic with 77 million people with diabetes. Of these, 12.1 million are aged >65 years, which is estimated to increase to 27.5 million in the year 2045. It is also estimated that nearly 57% of adults with diabetes are undiagnosed in India, which is approximately 43.9 million.

There is increasing prevalence in urban and rural area. According to the World Health Organization (WHO), the prevalence of urban and rural known diabetes cases is 5.6% and 2.7%, respectively. Rapid socioeconomic change in conjunction with urbanisation and industrialisation are important causes in the global expansion in the diabetes pandemic, along with population growth, unhealthy diets and lack of physical exercise [14]. In India study done by Ranjit Unnikrishnan et al. evaluated the prevalence of diabetes mellitus in small towns and villages of India, which was found to be 5.9% and 2.7%, respectively [24].

Now since most prevalence studies in India come from large metropolitan cities and some from rural areas. Data is needed from smaller towns. Darbhanga is small town and is ideally suited for epidemiological studies. As literature review does not reveal major studies from Urban Field Practice Area of DMCH Darbhanga. To address this demand, the present study was undertaken with the objective of determining prevalence of

various risk factors of Type 2 Diabetes mellitus.

Materials and Methods

Study Design

Community based cross sectional study. Study was conducted in field practice area of Bahadurpur attached with Darbhanga Medical College, Darbhanga from January 2021 to December 2022.

2.2 Study Population

Adult population (18 years or above) residing in field practice area under UHTC, Bahadurpur are included in the study while Patient with Gestational diabetes, those who refused to participate and critically ill or bed ridden patients (inability to respond) were excluded from the study

Sampling size:

According to Ranjit Unnikrishnan et al. study on Diabetes mellitus and its complications in India, prevalence of diabetes in small town was 5.9%. At 95% confidence interval, sample size (n) = Z^2pq/D^2, where. p=prevalence (i.e. 5.9%), Z=Standard Deviation at 95% confidence interval (=1.96), q=1-p (=94.1), D=Precision or Relative error (3%).

Substituting these values in above equation, we get n= 1.96^2x5.9x94.1/3^2= 237. Therefore, sample size was estimated to be 237.

Since cluster sampling method was used, sample size needs to be adjusted with a correction factor i.e., design effect. Multiplying the sample size with design effect of 2, the adjusted sample size came out 237×2=474.

To this, a non-response rate of 10% was added. The final sample size obtained was 555.

Sampling method: Cluster sampling method was used for the current study.

Sampling technique: There were total 148 villages in Bahadurpur. Total population of Bahadurpur was 2,61,805. Considering single researcher and limited resource, cluster sampling was done. All 148 villages name were arrange in alphabetic order then every 4th village was selected (total 37 villages i.e. 25%) by systematic random sampling, each village being considered as a cluster. 15 study subjects were selected randomly from each cluster, thus to cover a total of 555 study subjects.

Study Tools:

A pre-designed pre-tested semi structured questionnaire was used for collection of data by interview method, which includes 1)Demographical information, 2)Family history of diabetes, 3) Anthropometry, 4) Habits, 5) Dietary habits, 6) Physical activity, 7) Questions on self-care practices.

Data collection:

Rapport builds up with local health workers working in the selected villages. Resource persons like Interns, AWW or MSW were oriented about the purpose of the study. On a pre decided date, researcher along with the local health workers were identified the centre of the village. One direction was randomly selected for starting the transect walk. In that direction, first house was again randomly selected. Starting from that house, each household was consecutively visited. This was done till the required number of eligible study participants were obtained from that village. Similarly all the selected villages were visited. All the eligible participants were interviewed to obtain required data. Then, anthropometric examination was carried out.

Measurements:

1. Height (cm)
2. Weight (kg)
3. Waist circumference (cm)
4. Hip circumference (cm)
5. Waist Hip Ratio

6. Random Blood Sugar (mg/dl)

Materials Used:

Weighing Machine: Libra digital weighing machine was used. Every day the machine was checked against a known weight. The weights were recorded to the nearest 500 Gms.

Measuring Tape: It is the flexible non stretch type and made of fiber. The heights were recorded to the nearest 1 cm.

Stethoscope: (Littmann)

Sphygmomanometer: Mercury column (Diamond)

Glucometre: Accu-check (WHO recommends glucometer to measure blood glucose for

epidemiological purposes.)

Study Variables: The criteria adopted for the study are detailed here:

Dependent Variable (Case Definition: WHO Criteria**)**

Blood glucose estimation: Random capillary blood glucose was determined using a glucometer (Accu-check) under aseptic precautions.

Normal: < 140 mg/dl

Pre-diabetes- 140-199 mg/dl

Diabetes: Signs and symptoms of diabetes mellitus Plus RBS ≥200 mg/dl

Independent variable

Age: Age was recorded in completed years as revealed by the subjects.

Socioeconomic Status: Self-reported per capita monthly income was recorded. Modified kuppuswamy's socio-economic status scale classification was used to assess the social class of the study subjects.

Smoking:

- **Current users:** Presently smoke
- **Non-users:** Never smoked

Physical Activity:
Sedentary Worker

Male: Teacher, Barber, Executives, Retired persons, Businessman, Landlords, Government servant;

Female: Unemployed, Teacher, Executives, Nurses

Moderate Worker:

Male: Agricultural labour, Goldsmith, Carpenter, Driver, Electrician
Female: Housewife, Maid, Basket maker
Heavy Worker:
Male: Coolie, Stonecutter, Manual laborer
Female: Manual laborer

Family history of diabetes: History of type 2 DM among first degree relatives of the subject was taken and classified as

- **Absent:** No history of DM in the family
- **Present:**

One parent: Either mother or father is having type 2 DM.
Both Parents: Both mother and father are having type 2 DM
Siblings –Either brother, sister or both.

Blood Pressure (BP): The cuff of the BP apparatus was tied round the right upper arm with the patient in a sitting posture. B.P was measured. The measurement was repeated twice more with an interval of 2-3 minutes in between.

Thus there will be three BP recordings for each participant. The first recording was discarded. The averages of the latter two recordings were then used for calculating average systolic and diastolic blood pressure. According to the joint national committee (JNC- VIII) 2014 on the detection, evaluation, and treatment of hypertension, the range of blood pressure (in mm of Hg) is as follows:

Stage	SBP (mm of Hg)	DBP (mm of Hg)
Normal	<120	and<80
Pre-hypertension	120-139	or 80-89
Stage 1 Hypertension	140 – 159	or 90 – 99
Stage 2 Hypertension	>160	>100

Weight: The weight of the subjects was recorded using weighing machine to the nearest 100 Gms without footwear and light clothing

Height: Height was measured with a tape to the nearest cms. Subjects were requested to stand upright without shoes with their back against the walls heels together and eyes directed forward. Height was then converted to meters and recorded.

Body Mass Index (Quetelet's Index):

BMI was calculated by using the formula:

$BMI = Wt (kgs) / Ht (m)^2$

Depending on the BMI, the degree of obesity was recorded as

- <18.5(Under Weight)
- 18.5-24.99 (Normal)
- 25-29.99 (Pre obese)
- 30-34.99 (Obese class I)
- 35-39.99(Obese class II)
- >40 (Obese class III)

Waist: Waist girth was measured using non stretchable tape .The participants were asked to stand erect in a relaxed position with both feet together Waist girth was measured as the smallest horizontal girth between coastal margins at the iliac crest at minimal respiration.

Hip: Hip was taken as the greatest circumference at the level of greater trochanter (the widest portion of the hip on both the sides .Measurements was made to the nearest one centimeter.

Waist-Hip Ratio (WHR): was calculated by dividing the waist circumference (cm) by the hip circumference (cm) Ratio >1 for men and >0.85 for women was taken as above normal.

Methods Of Data Analysis: A database was created in M S Excel and, analysis was performed using SPSS version 20.

Statistical Tests Used:

Chi-square test, D.F., p value Odds Ratio (with 95% confidence interval).

Ethical Issues: The protocol of the research study was submitted to the Institutional Ethics Committee (DMCH Darbhanga, Laheriasarai, Bihar) and the study was initiated after getting their approval. Participants were explained that the purpose of the study is for academic research and all data provided by the participants would be kept confidential and anonymous. After getting their approval regarding participation in this study, the informed verbal consent was taken from study participants in local language.

Result

The present study is a Community Based Study on Prevalence of Risk Factors for Type 2 Diabetes Mellitus in Urban Field Practice area of DMCH Darbhanga. Adult healthy population above 18 years are included in the study except adults with gestational diabetes or those who are critically ill or bed ridden patients unable to respond. Table 1 shows characteristic of the study population such as age distribution, gender, religion, marital status, family history of diabetes, Body mass index (BMI) and Socioeconomic conditions (SES).

Table 1: Characteristics of study population:

Age distribution (years)	Number	Percentage (%)
18-29	82	14.78
30-41	205	36.94
42-53	151	27.2
54-65	103	18.56
>65	14	2.52
Gender		
Male	291	52.43
Female	264	47.57
Religion		
Hindu	422	76.04
Muslim	120	21.62
Others	13	2.34
Marital status		
Married	529	95.31
Unmarried	26	4.69
Family History of Diabetes		
Present	77	13.88
Absent	478	86.12
BMI Range		
<18.5 (Underweight)	14	2.52
18.5-24.9 (Normal)	249	44.87
25.0-29.9 (Overweight)	124	22.34
≥30 (Obese)	168	30.27
Socio economic class		
Upper (U)	13	2.34
Upper middle (UM)	178	32.07
Lower Middle (LM)	228	41.08
Upper lower (UL)	113	20.36
Lower (L)	23	4.15

A total of 555 persons were considered into survey of this study in which 82 person belongs to 18-29 years of age group whereas 14 person belonged to senior citizens category of above 65 years of age. Maximum numbers of people were found to be from the age group of 30-41 years of age followed by 42 to 53 years of age, which was 205 and 151 in numbers respectively. In this survey 291 (52.43%) were males and 264 (47.57%) were females. 76.04% of people considered for study were Hindus and 21.62% of people as Muslim whereas 2.34% of population comprised of Christians, Sikhs, and Buddhism as others category. 529 people were identified as married whereas 26 were unmarried people. In the present study 77 (13.88%) persons were found with known family history of diabetes whereas as 478 were not found with any family history of diabetes cases.

Our study population were classified as underweight, normal, overweight and obese category according to BMI (Body Mass Index) classification as per CDC [15], which has the division criteria of BMI as follows

- BMI less than 18.5 is categorized as underweight range.
- BMI from 18.5 to less than 25 is categorized as normal weight range.

- BMI from 25.0 to less than 30 is categorized as an overweight range.
- BMI is 30.0 or higher; it lies in the category of obesity range.

249 (44.87%) people were found as normal with their BMI lying in the ranges of 18.5 to <25 followed by 168 (30.27%) people as obese with their BMI lying higher than 30.0. 14 (2.52%) people were found as underweight with their BMI was found to be less than 18.5 whereas 124 (22.34%) people were found as overweight as their BMI were in the range of 25 to <30.On the basis socio economic status, study population were divided among 5 classes namely as lower, lower middle, upper, upper lower, and upper middle. 228 (41.08%) people were found to belong from lower middle class followed by 178 (32.07%) as upper middle class. People belonging from upper lower class were 113 (20.36%), 13 (2.34%) were categorize as from upper class whereas 23 (4.15%) were from lower class. 52.43% of study population were males while 47.57% of population were females.

Distributions of cases of diabetes among the age groups are shown in the Table 2. 42-53 years of age groups were found to have the most number of diagnosed cases of diabetes which was 34 followed by 30-41 years of age group having 28 cases. 54-65 years of ages were found to be with 15 diabetic cases and 18-29 years of age groups were with only 8 diabetic cases.

Age group above 65 years of ages were found to be with least number of diabetic cases as 4 only. Total percentages of diabetic cases

among study population were 16.03%. Diabetic males and diabetic females were 19.24% and 12.5% respectively in the study population. The data was found to be significant with $p<0.05$.

Table 2: Distribution of Diabetic and Non-diabetic

Study participants	Diabetic	Non-diabetic
Age (years)		
18-29	8 (1.44%)	74(13.34%)
30-41	28 (5.04%)	177 (31.9%)
42-53	34 (6.13%)	117 (21.08%)
54-65	15 (2.7%)	88 (15.85%)
>65	4 (0.72%)	10 (1.8%)
Gender		
Male	56 (19.24%)	235 (80.7%)
Female	33 (12.5%)	231 (87.5%)
Mean WHR values		
Male	1.029	0.98
Female	0.955	0.872
Mean RBS	183.9	125.8
Mean BMI	29.51	26.09

The mean RBS in diabetic was found to be 183.9 and that in Non-diabetic was found to be 125.8. On analyzing each sample it was found that among Non-diabetic only one person has RBS of 231 which is above 200. Other all have RBS less than 200 and according to International Diabetes Federation patient with diabetes should have Random blood glucose concentration ≥ 200 mg/dl with symptoms of Diabetes. This indicates that all the unknown cases were non-diabetics. The mean BMI and mean WHR in Non-diabetics were also close to normal range. The results are shown in table 2.

Overall smoking cases in our study were 56 which constitute 10.16% of present study and the number were 47 and 9 in

males and females respectively. It can be seen that the number of smoker among males are higher and there are very few smokers among females. It has been well established fact that the smoking is among one of the cause of type 2 diabetes and the chances of developing type 2 diabetes among smokers are 30-40% more than non-smokers [16]. 21.65% of males and 17.42% of females were found with hypertension symptoms. Diabetes in combination with hypertension further rises up the complication of cardiovascular disease thus putting a portion of study population under risk. Normal WHR was found among 15.8 % male and 43.56% females. 84.2 % male and 56.44 % females were in higher WHR. BMI of 147 males and 102 females were among normal categories while 86 males and 82 females were obese. 50 males and 74 females were overweight and 8 males and 6 females were underweight. All the data were represented in table 3.

Table 3: Gender-wise distribution of occurrence of risk factors

Study subject	Male	Female
Smokers		
Smoker	47 (16.15%)	9 (3.4 %)
Non-smoker	244 (83.84%)	255 (96.59%)
Hypertension (HTN)		
HTN symptom	63 (21.65 %)	46 (17.42 %)
With no HTN symptoms	291 (78.35%)	264 (82.57%)
Waist hip ratio (WHR)		
WHR (Normal)	46 (15.8%)	115 (43.56%)
WHR (Higher)	245 (84.2%)	149 (56.44%)
Body Mass Index (BMI)		
<18.5 (Underweight)	8	6
18.5-24.9 (Normal)	147	102
25.0-29.9 (Overweight)	50	74
≥30 (Obese)	86	82

Different associations between study characteristics and diabetes, chi square values and p values are shown in Table 4. Highest number of diabetic cases was for 42-53 years of age followed by 30-41 years of age, which were 34 and 28 in number respectively. Least number of diabetic cases was for >65 years of age, which was 4 only. Overall percentage of diabetic cases was 16.03% in the total study subject. The association between age and diabetes is shown in Table 4 and the data were found to be significantly associated with p value <0.05. Out of total study population, 76.04% were Hindus and 21.62% were Muslim whereas 2.34% of population were Christians, Sikhs, and Buddhist, kept as others category. Highest numbers of diabetic cases were seen in Muslim population, which was 22.5%. Others category and Hindu population was diabetic cases with slight difference of percentage with 15.38% and 14.22% respectively. The association between religion and diabetes is shown and the data was not significant with p value >0.05. In the present study married people constitute 95.31% of study population whereas unmarried people form only 4.69% of study population. The association between marriage and diabetes is not significant p value >0.05. Family history of diabetes was found to be present with 77 people out of whom 12 were diabetic whereas 478 people were found to be with no family history of diabetes out of which 77 people were diabetic. Percentage of people with known family history of diabetes was 13.88% of total study population. The association between family history of

diabetes and diagnosed cases of diabetes is shown and the data was significant with p value<0.05. Regular physical activities of greater than 150 minutes a week were found with 305 (61%) people out of 555 people among which 31 people were found diabetic. 250 (39%) people were admitted to having physical activities lesser than 150 minutes a week among which 58 were found to be diabetic. The association between physical activities and diabetes is shown with highly significant value of p< 0.0001. Highest numbers of people were found within the Normal BMI Range which is 249 out of which 28 people were diabetic followed by 168 as obese people in which 44 were diabetic. The association between BMI and diabetes are shown and the data was found to be highly significant with p-value<0.0001. According to the World Health Organization , having a WHR of over 1.0 may increase the risk of developing conditions that relate to being overweight, including heart disease and type 2 diabetes [17]. The relation between WHR and Diabetes and the association between WHR and diabetes is shown in table 4 with highly significant p value<0.0001.

A clear association between smoking cigarette and an increased risk of diabetes has been well established in literature. Many clinical data suggest the adverse effect of smoking and nicotine on insulin sensitivity, body composition, and pancreatic β cell function. To prevent diabetes, cessation of smoking along with weight control post cessation should be encouraged as a crucial public health practice for preventing diabetes [18].

Table 4: Different associations between study characteristics, diabetic & non-diabetic, chi square values and p-values

Associations between study characteristics, diabetic & Non-diabetic			**Chi square**	**P-value**
Study characteristic	Diabetic	Non-diabetic		
Association between age and diabetes				
18-29	8	74	9.772061	0.044447
30-41	28	177		
42-53	34	117		
54-65	15	88		
>65	4	10		
Association between religion and diabetes				
Hindu	60	362	4.763833	0.092373
Muslim	27	93		
Others	2	11		
Association between Marriage and diabetes				
Married	87	442	3.13734	0.0765
Unmarried	24	2		
Association between Family history and diabetes				
Present	12	65	13.542943	0.000233
Absent	77	401		
Association between Physical activities per week and diabetes				
>150 minutes	31	274	17.3400	<0.0001
<150 minutes	58	192		
Association between BMI Range and diabetes.				
<18.5	4	10	21.58338	<0.0001
18.5-24.9	28	221		

25.0-29.9	13	111		
≥30	44	124		
Association between WHR of total population and cases of diabetes				
Normal	7	166	26.83547	<0.0001
Higher	82	300		
Association between Smoking and cases of diabetes in total study population				
Smokers	12	44	13.45168	0.0002
Non-smokers	77	422		
Association between HTN and cases of diabetes in total study population				
Hypertension	45	64	64.21867	<0.0001
No hypertension	44	402		
Association between SES and Daily vegetables intake of 80 g/day				
	Daily vegetables intake of 80 g/day			
	Yes	No		
Upper	4	9	6.792718	0.0147
Upper Middle	51	127		
Lower Middle	42	186		
Upper lower	30	83		
Lower	6	17		
Association between Physical activities and Random blood sugar (RBS)				
Physical activities	RBS<200	RBS≥200	6.19893336	0.012783
>150 minutes a week	296 (97.05%)	9 (2.95%)		
<150 minutes a week	231 (92.4%)	19 (7.6%)		

In our study, 21.28% male smokers were diabetic while 22.23 % female smokers were non-diabetes. The association between smokers of total study population including male and female and diabetes in our study was found significant data having p value<0.05. Out of total 56 smokers, 12 people were diabetes while 44 non-diabetes. Among 499 non-smokers, 77 people were diabetes. As reported in a literature, insulin resistant is most common in patients with type 2 diabetes and about half of those with essential hypertension are also insulin resistant [19]. Therefore, insulin resistance is a key link between diabetes and hypertension. Diabetes and Hypertension are both end results of the metabolic syndrome and develop one after the other in the same individual [20]. Distribution of gender wise HTN symptom and cases of diabetes is shown in table 4. In our study, 42.86% of male and 39.13% females were diabetic while 57.14 % male and 60.87% female were non-diabetic. The association between HTN and cases of diabetes in total study population is shown and the data was found to be highly significant with p value<0.0001. Vegetables intake of at least 80 grams a day in diet was found with 133 people while the same was absent or less in quantity for 422 people. Absence or very less vegetable intake make human body devoid of antioxidants, fibre, and other essential dietary nutrition, which are helpful in managing diabetes. The association between Socio economic class and daily vegetable intake is shown and the data was significant with p value <0.05. Doing physical activities play vital role not only in managing diabetes but also improve blood pressure. Moderate

physical activities (higher than 150 minutes a week) keep human body fit, thus reducing the chances of cardiovascular disease also [21]. Present study shows that those who do physical activities > 150 minutes a week can manage diabetes in better way as 97.05% of people were their random blood sugar under 200 mg/dL and only 2.95% of people were exceeded the limit. Overall 527 people in our study were their random blood sugar under limit and 5% of people exceeded the limit. The association between physical activities and RBS are found to be significant with P<0.05 is listed in Table 4. The independent and dependent variables are converted into two groups. Data were analysed to find the Odds ratio with 95% CI & Significance level. Age, Smoking, hypertension, Physical activity, Family History, BMI, WHR, were found to be statistically significant (p<0.05).

Table 5: Showing Independent variables and their associations with the outcome of disease

S. No	Independent variables		Diabetic	Non diabetic	Odds ratio with 95% CI (upper to lower limit)	Significance level	chi square value
1	Age (yrs)	<40	28	228	0.4701 (0.7765 to 0.2956)	0.0444	9.7720
		≥40	61	238			
2	Sex	Male	56	235	1.6680 (2.6606 to 1.0458)	0.1018	2.6757
		Female	33	231			
3	SES	L, LM	37	214	0.8378 (1.3262 to 0.5293)	0.0027	30.1236
		U, UL, UM	52	252			
4	Smoking	Users	12	44	1.4946 (2.9590 to 0.7549)	0.0002	13.4516
		Non- Users	77	422			
5	Hypertension	Hypertensive	45	64	6.4240 (10.5090 to 3.92687)	<0.0001	64.2186
		Normal+	44	402			
6	Physical activity	>150 minutes a week	31	274	0.374528 (0.6013 to 0.23326)	<0.0001	17.340
		<150 minutes a week	58	192			
7	Family History	Present	12	65	0.961439 (1.8645 to 0.49575)	0.0002	13.5429
		Absent	77	401			
8	BMI	<25	32	231	0.5711 (0.9133 to 0.3571)	<0.0001	21.5833
		>25	57	235			
10	WHR	Higher	82	300	6.4819 (14.349 to 2.9278)	<0.0001	26.8354
		Normal	7	166			
11	Diet	Vegetables 80 grams a day	26	107	1.3846 (2.2950 to 0.8353)	0.02356	6.7927
		Vegetables less than 80 grams a day or absent	63	359			

Self-care in diabetes: Self-care regarding diabetes is broadly defined as awareness or knowledge achieved progressively by learning, which are essentially required to lead a healthy life avoiding the complication possessed by diabetes.

In the recent times self-care among diabetes patients/families has increased exponentially as a result of awareness created by doctors, field experts, and health sector staff, volunteers by organizing camps, seminars, and door to door campaigns. Self-care enables a

diabetic person living a healthy life as good as a non-diabetic person by managing diabetes on their own.

Several parameters like healthy diet, physical activity, regular monitoring of blood sugar, proper medication, foot care, avoiding unhealthy habits etc. comes under self-care behaviour.

Diabetic self-care behaviour has been effectively found to be positively agreed with excellent glycemic control, mitigation of diabetes complication and enhancement in the quality of life. In our study the parameters used to asses self-care are Daily consumption of fruits and vegetables (80gm/day), physical activity more than 2.5 hr/week, regular blood sugar monitoring, daily adherence to medication, regular foot examination.

Table 6 shows total number of people following different self-care and table 7 shows total number of people and type of self-care followed by people:

Table 6: Total number of People following different self-care practices

Diabetes cases	Gender	Total	Number of people					Number of people following all parameters
			Daily intake of Fruits and vegetables (80 gm/day)	Physical activity more than 2.5hr/week	Regular blood sugar monitoring	Daily adherence to medication	Regular foot examination	
89	Male	56	15	23	39	43	13	0
	Female	33	11	8	22	25	5	1
Total		89	26 (29.2)%	31 (34.8%)	61 (68.5%)	68 (76.4%)	18 (20.2%)	1

This study found that the prevalence of appropriate self-care behaviours was extremely low. Only 1.12% (1 people out of 89 diabetics) follows all self-care practice. A majority of the study group had poor self-care habits. Only 24.71% follow few healthy habits

Table 7: Number of People and type of self-care followed by people:

Self-Care Parameters	Male	Female	Total	Total diabetic cases reported
Fruit and vegetables 80gm/day+ Physical activity 2.5 hr a week	6	2	8 (8.98%)	89
Blood sugar monitoring+ Medication+Regular foot examination	9	5	14 15.73%)	

Among all 89 cases of diabetes, 29.2% people has daily intake of Fruits and vegetables (80 gm/day), 34.8% people has physical activity more than 2.5hr/week, 68.5% people do regular blood sugar monitoring, 76.4% has daily adherence to medication, and 20.2% do regular foot examination.

Discussion

Diabetes mellitus is a foremost public health problem which is growing rapidly and can leads to global morbidity, disability, and mortality [22]. According to the International Diabetes Federation Diabetes Atlas, 537 million adults worldwide between 20 - 79 years of age had diabetes in 2021, and the number is estimated to rise to 783 million by 2045 [3]. The causes of the diabetes are

overweight, obesity, unhealthy diets, and physical inactivity in conjunction with genetic and epigenetic predispositions [23]. An effective and reliable assessment of diabetes status, risk factors, and comorbidities are crucial to reduce the burden of diabetes mellitus.

Our study is a community based observational study with cross sectional study conducted in field practice area of Bahadurpur attached with Darbhanga Medical College, Darbhanga. The study was carried for 2 years from January 2021 to December 2022 on the adult population (18 years or above) residing in field practice area under UHTC, Bahadurpur. All the proposed objectives of the study were conducted and the results were concluded.

Objective 1: To study the prevalence of diagnosed cases of diabetes mellitus

Most of the prevalence studies on diabetes in India come from large metropolitan cities and very few come from small urban areas. Darbhanga is small town and is ideally suited for epidemiological studies. As literature review does not reveal major studies from Urban Field Practice Area of DMCH Darbhanga. To address this demand, the present study was undertaken with the objective of determining prevalence of diagnosed cases of Type 2 Diabetes mellitus.

In our study, a total of 555 persons were considered into survey out of maximum number of 205 people were found to be from the age group of 30-41 years of age and 151 people were from 42-53 years of age. In this survey, out of total 555 people, 291 (52.43%) were males and 264 (47.57%) were females.

In the present study 13.88% persons were found with known family history of diabetes whereas as 86.12 % were not found with any family history of diabetes cases. On the basis of age distribution maximum numbers of diabetic people (6.13%) were in the age group of 42-53 years followed by 5.04% in the age group of 30-41. The least diabetic cases were observed in the senior citizen group comprising only 0.72% followed by 18-29 years age group with 1.44% cases. Diagnosed cases of diabetes were found among 16.03% of total population while 83.97 % of study population don't show diabetes and are categorized as non-diabetic. The mean RBS in diabetic was found to be 183.9 and that in non-diabetic was found to be 125.8 which mean that all the unknown cases were non-diabetic. According to International Diabetes Federation patient with diabetes should have Random blood glucose concentration ≥ 200 mg/dl with symptoms of Diabetes. Among all non-diabetic only one person has RBS of 231, others are within range. This indicates all unknown diagnosed cases of diabetes are non-diabetic. 19.24% male and 12.5% females respectively in the study population have known cases of diabetes.

Objective 2: To estimate prevalence of various known risk factors for Type II DM in the adult population of UHTC, Bahadurpur.

Different risk factors of diabetes include age, having family history of diabetes, physically inactive due to sedentary lifestyle, or a job that requires sitting for long periods of time, prediabetes, gestational diabetes and obesity. As the age advances, the risk of diabetes increases. Being overweight, having high blood pressure, and sedentary lifestyle without exercise raises the chances for developing type 2 diabetes mellitus. Waist circumference and BMI measurements are related to obesity and are risk factors of developing diabetes. According to our study 82.47% of males and 53.78% of females were higher WHR on the basis of WHR calculation, which make them very vulnerable to further health complications. The association between WHR and diabetes in our study was highly significant p value<0.0001.As reported in

literature, the chances of developing type 2 diabetes among smokers are 30-40% more than non-smokers.

In our study, 21.28% male smokers have known cases of diabetes while 22.23 % female smokers were diabetic. The association between smokers of total study population including male and female and diabetes in our study is significant with p-value<0.05. 10.48% people who are overweight having BMI range 25.0-29.9 and 26.19% people who are obese having BMI ≥30 have diabetes. In our study the association between BMI and diabetes cases data was found to be highly significant with p value<0.0001. In our study, out of 63 males having HTN symptom, 27 have diabetes while out of 46 females with HTN symptom, 18 has diabetes. The association between HTN and cases of diabetes in total study population data was found to be highly significant with p value<0.0001. People who do good physical activities i.e more than 150 min a week showed low cases of diabetes (10.17%) as compared to those having sedentary life style (23.20% of diabetes).The association between physical activities and diabetes also showed highly significant value of p< 0.0001.

Objective 3: To assess the self-care practices among the known cases of diabetes in the study population

The success of control on diabetes depends exclusively upon the self-care measures taken by the individual and the family members. The major aim of secondary treatment is to maintain normal blood glucose levels and an ideal to body weight. Measurement of glycosylated haemoglobin and glucose monitoring at home is essential to have a tight control on diabetes. Several interventions such as lifestyle interventions, blood pressure control, glycaemic control, annual eye examinations, Periodic foot care examinations, etc., have proven to be effective in managing diabetes. Important principles of self-practice which prove to be effective in managing diabetes includes: healthy eating, being active, self-monitoring, taking proper and timely medicines, periodic health check-up. These self-care practices are associated with the glycemic control which reduces the diabetes related complications.

In our study, self-care practice was extremely low. Out of total 89 diabetic cases only 1 person follows all self-care practice. 8.98% people eat Fruit and vegetables 80gm/day and also do Physical activity 2.5 hr a week. 15.73 % people follow self-care practice of blood sugar monitoring, regular medication and foot examination.

Conclusion

Our study emphasized on the study of diagnosed cases of diabetes in the Urban Field Practice area of DMCH Darbhanga. Poor lifestyle practices, unhealthy eating habits, sedentary life style and poor adherence to medications increases the chance of diabetes. There is an urgent need for knowledge and awareness to be provided in urban areas regarding diabetes care management and self-care practices. The risk identification and periodic evaluation of diabetes must be done by the health care team. The health worker is expected to make door-to-door visits to assess, monitor, and educate regarding the self-care practices and diet, exercise and foot care practices to each patient at the time of diagnosis. Our study also established the fact that risk factors, such as ageing, BMI, obesity, WHR, smoking and hypertension in Indian population has strong relationship with diabetes and concurs with the studies in the western populations.

Poor self-care practices may worsen the diabetes cases. So important knowledge regarding self-care must be imparted to the people having diabetes . The prediction of WHO, that India is likely to be the country having the largest number of diabetic

subjects by the year 2025 seems to be true. Following the fact that "Prevention is better than Cure" should be followed to avoid the situation.

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