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Original Research Article

SOCIO-DEMOGRAPHIC CHARACTERISTICS, RISK FACTOR PROFILE AND CO-MORBIDITIES AMONG ADULTS WITH TYPE 2 DIABETES MELLITUS IN AN URBAN SLUM OF MUMBAI: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is a growing public-health problem, and its management is shaped by social circumstances, lifestyle exposures and coexisting disease. Local profiles can guide primary-care planning in underserved urban communities.

Aim: To describe socio-demographic characteristics, selected risk factors and comorbidities among adults with T2DM residing in an urban slum.

Materials and Methods: A descriptive cross-sectional study included 200 adults aged ≥30 years with T2DM who resided in an urban-slum field-practice area in Maharashtra and attended an Urban Health Training Centre. Data were collected from May to October 2023 using a case-record form and outpatient records. Categorical data were summarized as n (%), with Wilson 95% CIs for selected proportions. Exploratory sex comparisons used chi-square or Fisher's exact tests.

Results: The mean age was 57.12±10.8 years; 121 (60.5%) participants were aged 50-70 years, and 127 (63.5%) were men. Class IV socioeconomic status was reported in 114 (57.0%). Raised waist-hip ratio was present in 163 (81.5%), BMI >25 kg/m² in 136 (68.0%), and low physical activity in 111 (55.5%). Hypertension was the most common recorded comorbidity (122/200, 61.0%; 95% CI 54.1-67.5), followed by chronic kidney disease (8.5%) and ischaemic heart disease (8.0%). Hypertension was more frequently documented among women than men (75.3% vs 52.8%; p<0.01).

Conclusion: The clinic-attending sample had a substantial burden of central adiposity, low physical activity and hypertension. Routine assessment of cardio-metabolic risk factors and comorbidities may support local diabetes care. Findings are descriptive and should not be generalized beyond similar clinic populations without representative sampling.

Key words: Type 2 diabetes mellitus; Comorbidity; Risk factors; Urban slum.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycaemia arising from insulin resistance, impaired insulin secretion, or both. Its long asymptomatic phase and progressive course make early identification and continuing primary care important. Diabetes is associated with cardiovascular disease, kidney disease, neuropathy, visual impairment and premature mortality, and its burden is shaped by biological, behavioural and social conditions.[1] The International Diabetes Federation estimated that 537 million adults were living with diabetes worldwide in 2021, with a continuing rise expected over the following decades.[2] In India, the epidemic is substantial and heterogeneous across states and between urban and rural settings. The ICMR-

INDIAB national survey reported an overall diabetes prevalence of 11.4%, with a higher estimate in urban than rural participants.[3] Urban slum communities may face the combined effects of changing diets, reduced opportunities for physical activity, tobacco and alcohol exposure, limited health literacy and barriers to continuous health care. Studies in Indian slums have documented diabetes and prediabetes alongside common exposures such as central adiposity, sedentary behaviour and family history.

Population-level data such as NFHS-5 also provide context on urban glycaemia, though its measure is not equivalent to a confirmed diagnosis of T2DM.[4] Among people already diagnosed with T2DM, these factors remain relevant to risk reduction and to the organization of accessible, person-centred care. South Asian populations may develop metabolic risk at comparatively lower body-mass index thresholds, making assessment of abdominal adiposity useful in addition to general obesity. Comorbidity further increases the clinical and service burden of diabetes. Hypertension frequently coexists with T2DM and amplifies cardiovascular and renal risk; chronic kidney disease and ischaemic heart disease are also important conditions to identify during routine follow-up.[5] However, estimates vary with population selection, diagnostic definitions, availability of laboratory testing and whether participants are sampled from a community or a health facility. A focused profile of adults with T2DM living in an urban slum can therefore help describe the social context, potentially modifiable risk-factor burden and recorded comorbidities in the local care setting. This study described these characteristics among adults with T2DM attending an Urban Health Training Centre in Maharashtra.

Aim

To describe the socio-demographic characteristics, risk-factor profile and comorbidities among adults with type 2 diabetes mellitus residing in an urban slum.

Objectives

1. To describe the socio-demographic profile of adults with type 2 diabetes mellitus in the study population.
2. To determine the distribution of selected behavioural and anthropometric risk factors among the participants.
3. To describe the comorbidities recorded among adults with type 2 diabetes mellitus.

MATERIALS AND METHODS

Source of data -

Data were obtained from 200 adults with type 2 diabetes mellitus residing in an urban slum in the field-practice area of an Urban Health Training Centre (UHTC) in Maharashtra and attending its outpatient department. Socio-demographic and clinical information was collected using a case-record form; relevant investigation values were abstracted from outpatient records.

Study design

A descriptive, cross-sectional study was conducted.

Study area

The study was conducted at the UHTC outpatient department serving an urban-slum population in the field practice area of HBT Medical College and Dr. R. N. Cooper Hospital, Mumbai.

Study duration

The study was conducted from May 2023 to October 2023.

Study population

The study population comprised adults aged 30 years or older of either sex, residing in the UHTC urban-slum field-practice area for at least one year and diagnosed with T2DM, including newly diagnosed cases, who attended the UHTC and consented to participate.

Sample size

The planned sample size was 200. Using the single-proportion formula, $n = Z^2(1-\alpha/2) \times p(1-p) / d^2$, with $Z = 1.96$ for 95% confidence, $p = 0.153$, and absolute precision $d = 0.05$: $n = (1.96)^2 \times 0.153 \times 0.847 / (0.05)^2 = 199.6$, rounded to 200. OpenEpi software was used and a 5% confidence limit was specified; the calculation above expresses the stated assumptions as a conventional 5-percentage-point absolute precision.

Inclusion Criteria

Adults aged 30 years or older, of either sex; resident in the UHTC urban-slum field-practice area for at least one year; newly or previously diagnosed with T2DM according to the study's stated diagnostic criteria; and willing to participate after informed consent.

Exclusion Criteria

People with gestational diabetes or another form of diabetes; serious uncontrolled comorbidity such as coronary heart disease or chronic kidney disease; critical illness with deranged vital signs; or mental retardation, psychotic disorder or cognitive decline were excluded.

Procedure and methodology

Eligible adults attending the UHTC outpatient department were approached, the study purpose was explained, and written informed consent was obtained. Socio-demographic variables and medical history were recorded. Height, weight, waist circumference, hip circumference and blood pressure were measured using routine clinical instruments. The study also recorded tobacco use, alcohol consumption, physical activity, dietary pattern, family history of diabetes and documented comorbidities.

Data collection

Data were collected during outpatient visits using a structured case-record form after consent. The form captured age, sex, education, socioeconomic class (classified using the Modified Kuppuswamy scale updated for 2024), marital status, religion, family type, lifestyle exposures, anthropometric

measurements, family history and medical history. Clinical examination report and comorbidity information were abstracted from the clinical record. Personal identifiers were not included in the tables.

Ethical approval

Ethical approval for the study was obtained from the Institutional Ethics Committee of HBT Medical College & Dr. R N. Cooper Hospital, Mumbai (Approval No. HBTMC/IEC/18-23/O/DT/094/24032023/2023 dated 24.03.2023) and written informed consent was obtained from participants.

Statistical analysis

Data had been entered in Microsoft Excel 2019 and analysed using IBM SPSS version 21.0. Categorical variables were summarized as frequencies and percentages; continuous variables were summarized as mean and standard deviation when available. In this study, 95% confidence intervals (CIs) for proportions were calculated using the Wilson method. Sex-wise categorical distributions were compared using Pearson's chi-square test; Fisher's exact test was used for sparse 2×2 comparisons. Risk differences are reported as percentage-point differences with Wald 95% CIs. Tests were two-sided, and $p<0.05$ was considered statistically significant. Since the data was collected with convenience sampling from one UHTC, inferential results are exploratory and do not support population-level causal inference.

RESULTS

Table 1: Socio-demographic profile by Sex (N=200)

Socio-demographic Characteristics	Male (n=127)	Female (n=73)	Overall No. (%) (95% CI)	Sex comparison
Age : 30-50 years	30 (23.6%)	29 (39.7%)	59 (29.5%) (23.6-36.2)	$\chi^2(2)=15.57$; p=<0.001
Age : 50-70 years	77 (60.6%)	44 (60.3%)	121 (60.5%) (53.6-67.0)	$\chi^2(2)=15.57$; p=<0.001
Age : >70 years	20 (15.7%)	0 (0.0%)	20 (10.0%) (6.6-14.9)	$\chi^2(2)=15.57$; p=<0.001
Education: Illiterate	19 (15.0%)	22 (30.1%)	41 (20.5%) (15.5-26.6)	$\chi^2(5)=12.25$; p=0.032
Education: Primary	20 (15.7%)	15 (20.5%)	35 (17.5%) (12.9-23.4)	$\chi^2(5)=12.25$; p=0.032
Education: Middle	30 (23.6%)	19 (26.0%)	49 (24.5%) (19.1-30.9)	$\chi^2(5)=12.25$; p=0.032
Education: Secondary	27 (21.3%)	7 (9.6%)	34 (17.0%) (12.4-22.8)	$\chi^2(5)=12.25$; p=0.032
Education: Intermediate	13 (10.2%)	4 (5.5%)	17 (8.5%) (5.4-13.2)	$\chi^2(5)=12.25$; p=0.032
Education: Graduate and above	18 (14.2%)	6 (8.2%)	24 (12.0%) (8.2-17.2)	$\chi^2(5)=12.25$; p=0.032
Socio-economic class: Class I	0 (0.0%)	0 (0.0%)	0 (0.0%) (0.0-1.9)	Not tested (no participants)
Socio-economic class: Class II	6 (4.7%)	3 (4.1%)	9 (4.5%) (2.4-8.3)	$\chi^2(3)=27.49$; p=<0.001
Socio-economic class: Class III	33 (26.0%)	5 (6.8%)	38 (19.0%) (14.2-25.0)	$\chi^2(3)=27.49$; p=<0.001
Socio-economic class: Class IV	76 (59.8%)	38 (52.1%)	114 (57.0%) (50.1-63.7)	$\chi^2(3)=27.49$; p=<0.001
Socio-economic class: Class V	12 (9.4%)	27 (37.0%)	39 (19.5%) (14.6-25.5)	$\chi^2(3)=27.49$; p=<0.001
Marital status: Married	114 (89.8%)	63 (86.3%)	177 (88.5%) (83.3-92.2)	Married vs other; p=0.460
Marital status: Unmarried	7 (5.5%)	2 (2.7%)	9 (4.5%) (2.4-8.3)	Married vs other; p=0.460
Marital status: Divorced	3 (2.4%)	1 (1.4%)	4 (2.0%) (0.8-5.0)	Married vs other; p=0.460
Marital status: Widowed	3 (2.4%)	7 (9.6%)	10 (5.0%) (2.7-9.0)	Married vs other; p=0.460
Religion: Hindu	114 (89.8%)	60 (82.2%)	174 (87.0%) (81.6-91.0)	Hindu vs non-Hindu; p=0.125
Religion: Muslim	11 (8.7%)	12 (16.4%)	23 (11.5%) (7.8-16.7)	Hindu vs non-Hindu; p=0.125
Religion: Other	2 (1.6%)	1 (1.4%)	3 (1.5%) (0.5-4.3)	Hindu vs non-Hindu; p=0.125
Family type: Nuclear	59 (46.5%)	29 (39.7%)	88 (44.0%) (37.3-50.9)	Nuclear vs other; p=0.356
Family type: Joint	48 (37.8%)	32 (43.8%)	80 (40.0%) (33.5-46.9)	Nuclear vs other; p=0.356
Family type: Three-generation	14 (11.0%)	10 (13.7%)	24 (12.0%) (8.2-17.2)	Nuclear vs other; p=0.356
Family type: Household	6 (4.7%)	2 (2.7%)	8 (4.0%) (2.0-7.7)	Nuclear vs other; p=0.356

It was seen from **Table 1** that the participants had a mean age of 57.12±10.8 years; 121 (60.5%) were aged 50-70 years. There were 127 (63.5%) men and 73 (36.5%) women. Class IV socioeconomic status was most frequent (114/200, 57.0%), and 41 (20.5%) participants were illiterate. Age-group, education and socioeconomic-class comparisons used Pearson's chi-square test; the remaining comparisons were prespecified binary contrasts (married vs other, Hindu vs non-Hindu, and nuclear vs other family type). Domain-level p values apply to the full distribution or stated contrast, not to each individual row. These exploratory comparisons do not imply that sex caused the observed differences.

Table 2: Selected risk factors by sex

Risk factor	Male	Female	Overall	Male-female difference, (95% CI)	Chi-square test; p-value
Low physical activity	71 (55.9%)	40 (54.8%)	111 (55.5%)	1.1 (-13.2 to 15.4)	$\chi^2(1)=0.02$; p=0.879
Tobacco use	32 (25.2%)	9 (12.3%)	41 (20.5%)	12.9 (2.2 to 23.5)	$\chi^2(1)=4.71$; p=0.030
Alcohol consumption	29 (22.8%)	2 (2.7%)	31 (15.5%)	20.1 (11.9 to 28.3)	$\chi^2(1)=14.29$; p=<0.001
Raised BMI (>25 kg/m²)	90 (70.9%)	46 (63.0%)	136 (68.0%)	7.9 (-5.8 to 21.5)	$\chi^2(1)=1.31$; p=0.252
Raised waist-hip ratio	95 (74.8%)	68 (93.2%)	163 (81.5%)	-18.3 (-27.9 to -8.8)	$\chi^2(1)=10.35$; p=0.001
Family history of diabetes	40 (31.5%)	24 (32.9%)	64 (32.0%)	-1.4 (-14.8 to 12.1)	$\chi^2(1)=0.04$; p=0.840
Mixed diet	96 (75.6%)	46 (63.0%)	142 (71.0%)	12.6 (-0.8 to 25.9)	$\chi^2(1)=3.56$; p=0.059

It was observed from **Table 2** that most common recorded exposures were raised waist-hip ratio (163/200, 81.5%), BMI >25 kg/m² (136/200, 68.0%) and low physical activity (111/200, 55.5%). Tobacco use was recorded in 41 (20.5%), alcohol consumption in 31 (15.5%) and family history in 64 (32.0%). Mixed diet was reported by 142 (71.0%). In sex-wise comparisons, the largest differences were in alcohol consumption and raised waist-hip ratio; sparse counts were handled with Fisher's exact test where applicable. These factors were documented among participants who already had diabetes and should be interpreted as profile characteristics, not as causes estimated by this design.

Table 3: Recorded comorbidities among participants (N=200)

Comorbidity	No.	Prevalence (%)	95% CI (%)
Hypertension	122	61.0	54.1-67.5
Chronic kidney disease	17	8.5	5.4-13.2
Ischaemic heart disease	16	8.0	5.0-12.6
Arthritis	10	5.0	2.7-9.0
Cerebrovascular disease	07	3.5	1.7-7.0

As seen from **Table 3** that hypertension was the most frequent recorded comorbidity (122/200, 61.0%; 95% CI 54.1-67.5), followed by chronic kidney disease (17/200, 8.5%; 95% CI 5.4-13.2) and ischaemic heart disease (16/200, 8.0%; 95% CI 5.0-12.6). Arthritis was documented in 10(5.0%) and cerebrovascular disease in 7(3.5%). The CIs describe sampling uncertainty around the observed proportions; they do not correct for convenience sampling or incomplete clinical ascertainment.

Table 4: Sex-wise distribution of recorded comorbidities

Comorbidity	Male (n=127)	Female (n=73)	Male-female difference, (95% CI)	Chi-square test; p-value
Hypertension	67 (52.8%)	55 (75.3%)	-22.6 (-35.7 to -9.4)	$\chi^2(1)=9.94$; p=0.002
Chronic kidney disease	8 (6.3%)	9 (12.3%)	-6.0 (-14.7 to 2.6)	$\chi^2(1)=2.17$; p=0.141
Ischaemic heart disease	7 (5.5%)	9 (12.3%)	-6.8 (-15.3 to 1.7)	$\chi^2(1)=2.93$; p=0.087
Arthritis	7 (5.5%)	3 (4.1%)	1.4 (-4.6 to 7.4)	Fisher exact; p=0.749
Cerebrovascular disease	4 (3.1%)	3 (4.1%)	-1.0 (-6.4 to 4.5)	Fisher exact; p=0.707

It was seen from **Table 4** that hypertension was recorded in 52.8% of men and 75.3% of women (difference −22.6 percentage points, 95% CI −35.7 to −9.4; Pearson χ^2 p=0.002). The sex differences for chronic kidney disease, ischaemic heart disease, arthritis and cerebrovascular disease were imprecise and were not statistically significant at the 0.05 level. Given the small numbers for these diagnoses and the exclusion of some participants with serious uncontrolled comorbidity, these comparisons should be treated as descriptive.

DISCUSSION

This cross-sectional profile of 200 adults with T2DM attending one UHTC in an urban-slum setting showed that most participants were aged 50-70 years, a majority were men, and lower socioeconomic classes were common. The sample was selected from clinic attendees with known or newly diagnosed diabetes and therefore describes the participants rather than the diabetes prevalence of the whole slum. The 2023 ICMR-INDIAB survey demonstrated substantial geographic and urban-rural variation in diabetes and other metabolic conditions across India.[4] Dasappa et al,[5] likewise reported diabetes and prediabetes in Bangalore slums and found associations with age, adiposity and lifestyle exposures. Patil and Gothankar,[6] identified substantial diabetes risk in a Pune urban-slum population, with lower socioeconomic position, limited activity and central adiposity contributing to risk-score patterns. These studies support attention to local context, while differences in sampling and outcome definitions prevent direct prevalence comparisons.

The risk-factor profile was marked by raised waist-hip ratio and BMI, low physical activity, mixed diet, tobacco and alcohol exposure, and family history. Aravinda,[7] described behavioural and familial risk factors among Bengaluru patients with T2DM, while Barik et al,[8] documented the contribution of physiological and behavioural factors in rural India. Adhikary et al,[9] and Ilamathi et al,[10] also examined activity and diet-related factors in Indian populations. The high frequency of raised waist-hip ratio in the present clinic sample is consistent with the importance of abdominal adiposity in South Asian risk assessment; Mendhe et al,[11] similarly highlighted obesity and related factors in Central India. Since this study included people who already had diabetes and did not have a non-diabetic comparison group, the measured exposures cannot be interpreted as independent etiologic risk estimates.

Hypertension was the leading recorded comorbidity, affecting 61% of participants, and was more frequently documented among women than men. The direction of this finding is clinically plausible in light of the high burden of hypertension reported in national and Indian diabetes research,[4,12] but local comparisons are affected by case mix and ascertainment. Raikar et al,[13] reported a comorbidity profile among people with T2DM in Mumbai slums. Pati and Schellevis,[14] described multi-morbidity

among patients attending urban primary-care centres in Bhubaneswar, and Jha and Kusum,[15] reported comorbidity patterns in a tertiary-care population. Across these studies, differences in setting and definitions likely contribute to variation in estimates. The observed CKD and ischaemic heart disease proportions were 8.5% and 8.0%, respectively. Rajput et al,[16] reported CKD burden in the START-India study, and Kumar et al,[17] reported complications among newly diagnosed patients in western Uttar Pradesh. The study's exclusion criteria and reliance on existing outpatient records may have reduced the detection of comorbidities.

The sociodemographic differences across sex, particularly in age, education and socioeconomic class, emphasize the need to consider equity and access in routine diabetes services. Chawla et al.,[18] and Kishore et al,[19] documented the relevance of health education and treatment-seeking practices in Indian diabetes care. The present study did not measure care access as an outcome, but its clinic-based sample and the profile of lower socioeconomic status indicate that community-linked follow-up and risk-factor counselling may be useful areas for local service planning. The NFHS-5 survey provides related population-level context on raised random glucose or use of glucose-lowering medication in urban adults, although that measure is not equivalent to confirmed T2DM.[12] Vigneswari et al,[20] also described high central obesity and sedentary behaviour among urban-poor adults in Chennai.

Limitations

- The cross-sectional design does not establish temporal relationships or causality between the recorded characteristics and diabetes outcomes.
- Participants were recruited by non-probability convenience sampling from one UHTC outpatient department; the findings may not represent all adults with diabetes or all residents of the urban slum.
- The sample included only 200 participants, and several comorbidities had small counts, producing imprecise sex-specific estimates.
- Comorbidities and investigation values were abstracted from clinical records and history; variable availability and diagnostic definitions may have led to under-ascertainment or misclassification.
- The methods excluded people with serious uncontrolled comorbidities, which may have lowered the observed burden of some conditions.
- No non-diabetic comparison group was included, so the study cannot estimate risk ratios for developing T2DM or attribute diabetes to the measured lifestyle characteristics.

CONCLUSION

Among 200 adults with type 2 diabetes mellitus attending an Urban Health Training Centre in an urban-slum field-practice area of Maharashtra, most were aged 50-70 years and belonged to lower socioeconomic classes. Raised waist-hip ratio, BMI above 25 kg/m² and low physical activity were common recorded characteristics. Hypertension was the most frequent comorbidity, followed by chronic kidney disease and ischaemic heart disease. These findings support routine assessment of anthropometric risk factors and comorbidities in local diabetes care, while interpretation is limited to this clinic-attending sample.

REFERENCES

1. World Health Organization. Diabetes [Internet]. Geneva: World Health Organization; 2021 [cited 2026 Oct 13]. Available from: https://www.who.int/news-room/fact-sheets/detail/diabetes
2. Magliano DJ, Boyko EJ, editors. IDF Diabetes Atlas. 10th ed. Brussels: International Diabetes Federation; 2021.
3. Pradeepa R, Mohan V. Epidemiology of type 2 diabetes in India. Indian J Ophthalmol. 2021;69(11):2932-8.
4. Anjana RM, Unnikrishnan R, Deepa M, Pradeepa R, Tandon N, Das AK, et al. Metabolic non-communicable disease health report of India: the ICMR-INDIAB national cross-sectional study (ICMR-INDIAB-17). Lancet Diabetes Endocrinol. 2023;11(7):474-89.
5. Dasappa H, Fathima FN, Prabhakar R, Sarita K. Prevalence of diabetes and pre-diabetes and assessments of their risk factors in urban slums of Bangalore. J Family Med Prim Care. 2015;4(3):399-404.
6. Patil RS, Gothankar JS. Assessment of risk of type 2 diabetes using the Indian Diabetes Risk Score in an urban slum of Pune, Maharashtra, India: a cross-sectional study. WHO South-East Asia J Public Health. 2016;5(1):53-61.
7. Aravinda J. Risk factors in patients with type 2 diabetes in Bengaluru: a retrospective study. World J Diabetes. 2019;10(4):241-8.
8. Barik A, Mazumdar S, Chowdhury A, Rai RK. Physiological and behavioral risk factors of type 2 diabetes mellitus in rural India. BMJ Open Diabetes Res Care. 2016;4(1):e000255.
9. Adhikary M, Chellaiyan VG, Chowdhury R, Daral S, Taneja N, Das TK. Association of risk factors of type 2 diabetes mellitus and fasting blood glucose levels among residents of rural area of Delhi: a cross-sectional study. Int J Community Med Public Health. 2017;4(4):1005-10.
10. Ilamathi KR, Aditi R, Ramkumar M, Umeshkumar PM, Bargavi R. Association between type of diet, extent of sweet consumption and status of physical activity with presence of type II diabetes mellitus. Int J Nutr Pharmacol Neurol Dis. 2023;13(1):40-6.
11. Mendhe HG, Borkar SK, Shaikh MK, Choudhari SG. Assessment of obesity and associated risk factors of diabesity in an urban population in Central India. Cureus. 2023;15(5):e38595.
12. International Institute for Population Sciences, ICF. National Family Health Survey (NFHS-5), 2019-21: India. Volume I. Mumbai: IIPS; 2021.
13. Raikar KJ, Velhal G, Shukla A. Profile of type 2 diabetic patients in urban slums of Mumbai. Glob J Med Res. 2018;17(F3):25-30.
14. Pati S, Schellevis FG. Prevalence and pattern of co-morbidity among type 2 diabetics attending urban primary healthcare centers at Bhubaneswar (India). PLoS One. 2017;12(8):e0181661.
15. Jha PN, Kusum V. Observational study to evaluate prevalence of comorbidities in Indian type 2 diabetes patients and its association with glycemic control at a tertiary care teaching hospital at Patna. J Diabetes Metab. 2020;11:1-6.
16. Rajput R, Kumar KM, Seshadri K, Agarwal P, Talwalkar P, Kotak B, et al. Prevalence of chronic kidney disease in type 2 diabetes mellitus patients: the START-India study. J Diabetes Metab. 2017;8(2):1-7.
17. Kumar M, Rawat R, Verma VK, Zafar KS, Kumar G. Chronic complications in newly diagnosed patients with type

2 diabetes mellitus in rural area of western Uttar Pradesh, India. Int J Res Med Sci. 2016;4(6):2292-6.
18. Chawla SPS, Kaur S, Bharti A, Garg R, Kaur M, Soin D, et al. Impact of health education on knowledge, attitude, practices and glycemic control in type 2 diabetes mellitus. J Family Med Prim Care. 2019;8(1):261-8.
19. Kishore J, Kohli C, Gupta N, Kumar N, Sharma PK. Awareness, practices and treatment seeking behavior of type 2 diabetes mellitus patients in Delhi. Ann Med Health Sci Res. 2015;5(4):266-73.
20. Vigneswari A, Manikandan R, Satyavani K, Archana S, Rajeswari R, Viswanathan V. Prevalence of risk factors of diabetes among urban poor South Indian population. J Assoc Physicians India. 2015;63(10):32-4.