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Diabetic nephropathy in young adults (<30 years) with diabetes in Bangladesh: A cross-sectional observational study at a tertiary care center

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Abstract

Background: Microalbuminuria (MA) is the earliest clinical hallmark of diabetic nephropathy at which appropriate intervention can retard or reverse the progression of the disease. This aspect is not widely studied in young diabetic subjects of Bangladesh.

Objectives: To determine the frequency of diabetic nephropathy (DN) in young diabetic patients and to identify the risk factors associated with it.

Methods: This cross-sectional study included 88 participants [age: 26.19±3.33 years; body mass index (BMI, kg/m^2): 25.42±5.39; mean±SD] with early-onset diabetes who were <30 years of age from the Department of Endocrinology, Bangladesh Medical University (BMU). The albumin-creatinine ratio (ACR) was estimated by immunoturbidometric assay. MA and macroalbuminuria were diagnosed if ACR was 30-300 mg/g of creatinine and >300 mg/g of creatinine, respectively. The estimated glomerular filtration rate (eGFR) was estimated by the CKD-EPI equation. Anthropometric measurements, as well as creatinine, were estimated along with fasting plasma glucose (FPG), postprandial plasma glucose (PPG), glycated hemoglobin (HbA1c), and lipid profile.

Results: The frequency of diabetic nephropathy was 38.7%, with 30.7% having MA and 8% having macroalbuminuria, and only 2.2% of patients had eGFR <60ml/min/1.73 m2. There was a significantly higher frequency of MA with longer diabetes duration (p=0.010), higher FPG (p=0.045), higher HbA1c (p=0.025), and hypertriglyceridemia (p=0.009). No significant association between MA and blood pressure, BMI, or waist circumference was found. Logistic regression analysis showed that diabetes duration (p=0.008) and triglycerides (p=0.044) were independent predictors of albuminuria.

Conclusions: The results of the study suggest a high frequency of diabetic nephropathy in young subjects. Longer duration of diabetes, hyperglycemia, and hypertriglyceridemia were important risk factors for nephropathy. So, the consequences of diabetes in the younger age group should not be overlooked. *[J Assoc Clin Endocrinol Diabetol Bangladesh,* July 2026; 5 (2): e89844*]*

Keywords: Diabetic nephropathy, young adults, Diabetes mellitus

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Introduction

Diabetes is one of the major health problems affecting 589 million people, accounting for 6.7 million deaths in 2025, which is expected to increase to 853 million globally by 2050. In South Asia, Bangladesh has the second largest number of adults with diabetes, accounting for 14-15 million adults.[1] An increase in Diabetes Mellitus (DM) throughout the world has also affected the young. Over the last decade, the rise in the number of children and youth with type 2 Diabetes Mellitus (T2DM) has been labeled an 'epidemic,' and the main reason is the spurt in childhood obesity worldwide, which is linked to the global economic growth and changes in lifestyle and dietary habits.[2] In Bangladesh, A recent nationwide study reported that 4.5% of young participants had early-onset type 2 diabetes, while 18.4% had prediabetes. Among prediabetes subtypes, impaired glucose tolerance was

most common (10.0%), followed by impaired fasting glucose (6.7%), with 1.7% exhibiting both abnormalities. Notably, among those with diabetes, only 33.7% (35/104) had been previously diagnosed, whereas the majority were newly identified during the study.[3]
Asian Indians have a higher risk of diabetes due to genetic susceptibility and greater insulin resistance linked to low birth weight and a sedentary lifestyle. A population-based study showed that while T2DM rates were high across all groups, South Asian youth (20–29 years) had significantly higher rates compared to White and Chinese populations, whereas White youth more often required insulin-only therapy.[4]
Type 1 DM is the most prevalent form among adolescents and young adults. Type 1 diabetes affects approximately 9.5 million individuals worldwide, including around 1.8-1.9 million children and adolescents (<20 years).5 The burden is substantial in low- and middle-income countries, where a significant proportion of affected children reside. In Bangladesh, an estimated over 7,000 children and adolescents are living with type 1 diabetes, reflecting a growing pediatric burden.[5]
Patients with DM are at increased risk of complications if untreated. Chronic hyperglycemia causes both microvascular and macrovascular damage, resulting in ischemic heart disease, stroke, peripheral vascular disease, nephropathy, and retinopathy. Therefore, early detection and timely treatment are essential to reduce complications and improve outcomes in youth-onset DM.[6] Diabetic nephropathy is a leading cause of end-stage kidney disease requiring renal replacement therapy and affects approximately 40% of patients with type 1 and type 2 diabetes. It is defined by increased urinary albumin excretion in the absence of other renal pathology. It is classically staged into microalbuminuria (MA; urinary albumin excretion 30–300 µg/min) and macroalbuminuria (>300 µg/min).[7] A high prevalence of albuminuria (58.6%) in adults with diabetes has been reported, highlighting a growing burden of diabetic renal and cardiovascular disease in Asia with significant public health implications.[8]
Early-onset diabetes is associated with a high risk of MA and diabetic nephropathy, particularly among adolescents and young adults. Some studies show a higher prevalence compared to type 1 diabetes and strong associations with poor glycemic control, hypertension, and dyslipidemia.[9] Evidence from Japan and South Asia indicates a substantial burden of early renal involvement in youth-onset diabetes, with reported MA rates of 46.2%. Risk factors include hyperglycemia, blood pressure, lipid abnormalities, and central obesity, while progression from MA to overt nephropathy occurs in 20–40% of cases without intervention.[10]
Diabetic nephropathy is defined by persistent albuminuria and/or reduced estimated glomerular filtration rate (eGFR). It remains a major cause of end-stage renal disease globally.[11] Its early onset in youth carries significant long-term cardiovascular and renal consequences, contributing to reduced life expectancy and increasing healthcare burden. Despite this, data on nephropathy in young DM populations remain limited, particularly in South Asia, highlighting the need for further research. Accordingly, this study aimed to assess the prevalence of nephropathy and its associated risk factors among individuals under 30 years of age with early-onset diabetes in a tertiary care hospital in Bangladesh.

Methods

This cross-sectional observational study was conducted from March 2017 to September 2018 in the Department of Endocrinology, Bangladesh Medical University (BMU). Patients aged 5–29 years with newly diagnosed or previously known DM, defined according to ADA 2026 criteria, attending both inpatient and outpatient services, were approached for participation. Subjects were enrolled using purposive consecutive sampling after obtaining informed written consent.
The minimum required sample size was calculated using the formula $n = z^2pq/d^2$, assuming a prevalence of diabetic nephropathy of 28% from previous literature[12], 95% confidence level (z = 1.96), and 10% margin of error, yielding a sample size of 78. Considering a possible 10-12% attrition due to dropouts and laboratory errors, the final sample size was set at 88.
Inclusion criteria were patients with DM, irrespective of type, aged 5-29 years. Patients younger than 5 years were not included due to feasibility constraints and referral to pediatric services. Exclusion criteria included known kidney disease due to other causes, secondary diabetes (e.g., drug-induced or chronic pancreatitis), acute conditions such as fever or urinary tract infection, conditions affecting urinary albumin excretion (e.g., heart failure, connective tissue disorders), and pregnant or lactating women.
Data were collected using a semi-structured, pretested questionnaire following detailed history-taking and

physical examination. Demographic variables included age, occupation, smoking status, family history of diabetes, and duration of diabetes. Clinical evaluation included measurement of height, weight, body mass index (BMI), blood pressure, and presence of acanthosis nigricans. Height and weight were measured using standardized equipment, and BMI was calculated as weight (kg)/height (m^2) using Asian-specific cut-offs. Blood pressure was recorded after 5 minutes of rest using a calibrated aneroid sphygmomanometer.

Laboratory investigations included fasting and postprandial plasma glucose, glycated hemoglobin (HbA1c), lipid profile (total cholesterol, triglycerides, HDL-C, LDL-C), serum creatinine, and spot urine albumin–creatinine ratio (ACR). Five milliliters of fasting venous blood and a morning urine sample were collected from each participant and sent promptly to the Department of Clinical Biochemistry, BMU.

Urinary albumin was measured using a particle-enhanced turbidimetric inhibition immunoassay (PETINIA), and serum and urinary creatinine were measured by a modified kinetic Jaffe method using an automated analyzer (Dimension EXL with LM, Siemens, USA). Plasma glucose was measured by the enzymatic colorimetric method, HbA1c by ion-exchange high-performance liquid chromatography (HPLC) using an NGSP-certified system, and lipid profile by standard enzymatic methods. The eGFR was calculated using established equations.

The primary outcome variables were ACR (normoalbuminuria, MA, macroalbuminuria) and eGFR.

Diagnosis of DM

DM was diagnosed according to the American Diabetes Association (ADA) 2026 criteria, defined by any of the following: fasting plasma glucose ≥7.0 mmol/L; 2-hour plasma glucose ≥11.1 mmol/L during an oral glucose tolerance test (OGTT); HbA1c ≥6.5%; or a random plasma glucose ≥11.1 mmol/L in the presence of classic symptoms of hyperglycemia or hyperglycemic crisis. In the absence of unequivocal hyperglycemia, results were confirmed by repeat testing.[13]

Diabetic nephropathy[11]

Diabetic nephropathy was defined clinically by the presence of albuminuria and/or reduced eGFR in the absence of other primary causes of kidney disease, as per ADA 2026 guidelines. MA was considered the earliest clinical marker. Spot urine albumin–creatinine ratio (ACR) was used for screening.

Albumin–Creatinine Ratio (ACR)

ACR was calculated as urine microalbumin (mg) divided by urine creatinine (g) from a spot urine sample. Albuminuria was categorized according to ADA criteria as: normoalbuminuria (<30 mg/g), MA (30–300 mg/g), and macroalbuminuria (>300 mg/g).

eGFR[14]

eGFR was calculated from serum creatinine using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation, as recommended by KDIGO. An eGFR <60 mL/min/1.73 m^2 was considered reduced. Chronic kidney disease (CKD) stages were classified as: Stage 1 (≥90), Stage 2 (60–89), Stage 3 (30–59), Stage 4 (15–29), and Stage 5 (<15 mL/min/1.73 m^2).

Newly detected diabetes

Newly detected diabetes was defined as diabetes diagnosed within the preceding one month without prior treatment.

Data processing and statistical analysis

All data were processed using the SPSS program version 23 (IBM Corporation, Armonk, NY, USA). Results were presented as frequencies or percentages for qualitative variables and as mean ± SD for quantitative variables. Chi-square or Fisher's exact test was applied to examine the frequencies of different stages of albuminuria across categories of diabetes duration, BMI, WC, FPG, PPG, HbA1c, and lipid profile. Subgroups defined on the basis of clinical and biochemical findings were compared using the Chi-square test or the Student's t-test, as appropriate. The relationships among important variables were analyzed using Pearson's correlation test. The independent predictive importance of variables for albuminuria was assessed by multiple regression analysis. The level of significance was expressed as P values. P-value <0.05 was considered significant.

Ethical consideration

No intervention was done. Blood was collected by a minimally invasive procedure by venipuncture. So, there was minimal potential risk to the individual. Voluntary, informed written consent was obtained from each individual after a thorough explanation of the procedure and the purpose of the study. Every individual had the right to participate willingly or to refuse participation.

Every individual had the freedom to withdraw from the study at any time without compromising their medical treatment. Data collected from the individuals were treated as confidential and retained in the investigator's custody. It was disclosed only to the individual concerned and the supervisor during data processing and manuscript preparation. Ethical clearance was obtained from the Institutional Review Board (IRB) of BMU (No. BSMMU/2017/3782).

Results

A total of 88 participants were included, of whom 34 (38.6%) were male, and 54 (61.4%) were female. The mean age was 26.19±3.33 years, with a mean duration of diabetes of 1.58±2.21 years. The mean BMI was 25.42±5.39 kg/m². Mean systolic and diastolic blood pressure were 118.41±14.29 mmHg and 81.59±10.04 mmHg, respectively. Glycemic parameters showed poor control, with mean fasting plasma glucose (FPG) of 9.87±4.48 mmol/L, postprandial glucose (PPG) of 15.34±6.73 mmol/L, and HbA1c of 9.28±3.04%. The lipid profile showed mean total cholesterol 197.71±42.92 mg/dL, HDL 39.95±9.20 mg/dL, LDL 119.42±39.66 mg/dL, and triglycerides 196.19±124.30 mg/dL **(Table-I)**.

Table-I: Clinical and biochemical characteristics of the study population (n=88)

Variables	Frequency n (%)	Mean±SD
Age (years)		26.19±3.33
Duration of diabetes (years)		1.58±2.21
	66 (75)	
Family history of DM		
BMI (kg/m2)		25.42±5.39
SBP (mm/Hg)		118.41±14.29
DBP (mm/Hg)	34 (38.6)	81.59±10.04
Male	54 (61.4)	
Female		
FPG (mg/dl)		9.87±4.48
PPG (mg/dl)		15.34±6.73
HbA1c (%)		9.28±3.04
ACR (mg/g)		103.58±257.84
Creatinine (mg/dl)		0.72±0.25
eGFR (ml/min/1.73m²)		120.29±21.12
TC (mg/dl)		197.71±42.92
HDL (mg/dl)		39.95±9.20
LDL (mg/dl)		119.42±39.66
TG (mg/dl)		196.19±124.30

Data were expressed as frequency, percentage, and mean±SD.

BMI: body mass index, SBP: systolic blood pressure, DBP: diastolic blood pressure; FPG = fasting plasma glucose, PPG = postprandial blood sugar, HbA1c = glycated hemoglobin, ACR = albumin to creatinine ratio, eGFR = estimated glomerular filtration rate, TC = total cholesterol, HDL = high density lipoprotein cholesterol, LDL = low density lipoprotein cholesterol, TG = triglyceride

Assessment of nephropathy revealed a mean urinary ACR of 103.58±257.84 mg/g, a serum creatinine of 0.72±0.25 mg/dL, and an eGFR of 120.29±21.12 mL/min/1.73 m². Regarding albuminuria, 54 (61.3%) participants had normoalbuminuria, 27 (30.7%) had MA, and 7 (8.0%) had macroalbuminuria, indicating that 38.7% had some degree of albuminuria (Figure-1). Reduced eGFR (<60 mL/min/1.73 m²) was observed in only 2 (2.2%) participants, both of whom also had albuminuria **(Table-II)**.

Table-II: Frequency of diabetic nephropathy according to ACR and eGFR in study population (n=88)

Diabetic Nephropathy	†ACR >30mg/g	‡eGFR <60 ml/k-g/1.73m²	ACR >30mg/g or eGFR <60 ml/kg/1.73m2
	n (%)	n (%)	n (%)
n	88	88	88
Present	34 (38.7)	2 (2.2)	34 (38.7)
Absent	54 (61.3)	86 (87.7)	54 (61.3)

Data were expressed as frequencies and percentages within parentheses, with percentages over column totals. ACR: albumin to creatinine ratio, eGFR: estimated glomerular filtration rate.
†Cut off for diabetic nephropathy according to ACR,
‡Cut off for diabetic nephropathy according to eGFR

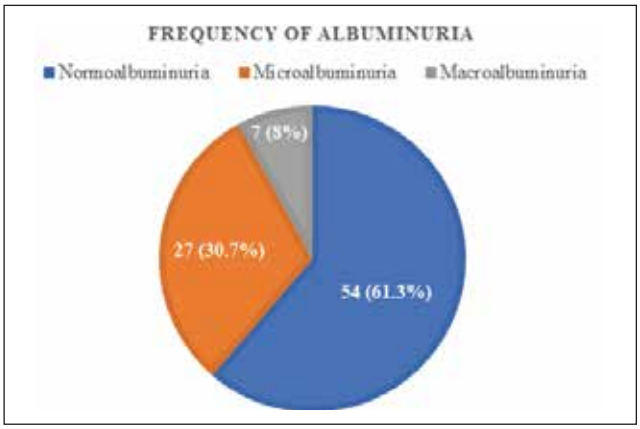

Figure-1: Frequency of different stages of albuminuria among the study population according to ACR (n=88)

Data were expressed as frequency and percentage; ACR = albumin to creatinine ratio; Cut-offs for albuminuria stages according to ADA; Normoalbuminuria: ACR<30 mg/g; Microalbuminuria: ACR 30-300 mg/g; Macroalbuminuria: >300mg/g

Albuminuria was significantly associated with longer duration of diabetes (≥5 years vs. <5 years: 80.0% vs. 33.3%; p=0.010), higher fasting plasma glucose (>7.2 mmol/L vs. ≤7.2 mmol/L: 46.6% vs. 23.3%; p=0.045), elevated HbA1c (≥8% vs. <8%: 47.0% vs. 27.0%; p=0.025), and higher triglyceride levels (≥150 mg/dL vs. <150 mg/dL: 49.1% vs. 21.2%; p=0.009). No significant associations were found with diabetes status, postprandial glucose, blood pressure, HDL, or LDL (p>0.05), although diastolic blood pressure showed a borderline trend (p=0.057) **(Table-III)**. Correlation analysis demonstrated that duration of diabetes had a significant positive correlation with albuminuria (r=0.450, p=0.008), while no other variables showed significant correlations **(Table-IV)**.

On multivariable logistic regression analysis, duration of diabetes (B=1.55, SE=0.16, p=0.008) and triglyceride levels (B=1.00, SE=0.03, p=0.044) may be independent predictors of albuminuria. Other variables, including BMI, blood pressure, glycemic indices, and other lipid parameters, were not significant predictors after adjustment **(Table-V)**.

Table-III: Association of albuminuria with clinical and biochemical variables (n = 88)

Variables	n	Normo-albuminuria n (%)	Micro-albuminuria n (%)	Macro-albuminuria n (%)	p-value
Diabetes status					
Newly detected	30	22 (73.3)	8 (26.7)	0	0.079
Known diabetes	58	32 (55.2)	19 (32.8)	7 (12.1)	
Diabetes duration					
<5 years	78	52 (66.7)	21 (26.9)	5 (6.4)	0.010
≥5 years	10	2 (20.0)	6 (60.0)	2 (20.0)	
FPG (mmol/L)					
≤7.2	30	23 (76.7)	7 (23.3)	0	0.045
>7.2	58	31 (53.4)	20 (34.5)	7 (12.1)	
PPG (mmol/L)					
<10	18	14 (77.8)	4 (22.2)	0	0.242
≥10	70	40 (57.1)	23 (32.9)	7 (10.0)	
HbA1c (%)					
<8	37	27 (73.0)	10 (27.0)	0	0.025
≥8	51	27 (52.9)	17 (33.3)	7 (13.7)	
Systolic BP (mmHg)					
≤120	67	44 (65.7)	18 (26.9)	5 (7.5)	0.261
>120	21	10 (47.6)	9 (42.9)	2 (9.5)	
Diastolic BP (mmHg)					
≤80	63	43 (68.3)	17 (27.0)	3 (4.8)	0.057
>80	25	11 (44.0)	10 (40.0)	4 (16.0)	
HDL (mg/dl)					
≥40	39	26 (66.7)	9 (23.1)	4 (10.3)	0.374
<40	49	28 (57.1)	18 (36.7)	3 (6.1)	
LDL (mg/dl)					
<100	25	14 (56.0)	10 (40.0)	1 (4.0)	0.428
≥100	63	40 (63.5)	17 (27.0)	6 (9.5)	
TG (mg/dl)					
<150	33	26 (78.8)	4 (12.1)	3 (9.1)	0.009
≥150	55	28 (50.9)	23 (41.8)	4 (7.3)	

Data were expressed as frequencies and percentages; p-values were calculated using Fisher's exact test. Within parentheses, percentages over column total

FPG: fasting plasma glucose. Cut-offs for FPG from ADA; PPG: postprandial plasma glucose. cut-offs for PPG from ADA; HbA1c: glycated hemoglobin. cut-offs for HbA1c; HDL: high density lipoprotein, LDL: low density lipoprotein, TG: triglyceride; *cutoffs of HDL, LDL, and TG according to treatment targets; SBP = Systolic blood pressure, DBP = Diastolic blood pressure

Table-IV: Correlation of ACR with variables within the normoalbuminuria and albuminuria groups

Determinants of "r"	Normoalbuminuria		Albuminuria	
	r	p	r	p
Age (years)	-0.149	0.282	0.103	0.561
Duration of DM (years)	0.262	0.055	0.450	0.008
BMI (Kg/m²)	0.143	0.301	0.096	0.588
SBP (mm/Hg)	0.203	0.142	-0.143	0.419
DBP (mm/Hg)	0.216	0.116	-0.061	0.732
FPG (mmol/L)	-0.041	0.770	0.200	0.256
PPG (mmol/L)	-0.109	0.435	-0.014	0.939
HbA1c (%)	-0.011	0.938	0.146	0.409
TC (mg/dl)	0.284	0.037	-0.130	0.465
LDL (mg/dl)	0.231	0.092	0.110	0.535
HDL (mg/dl)	0.120	0.386	-0.108	0.543
TG (mg/dl)	0.179	0.196	-0.197	0.264

BMI: body mass index, WC: waist circumference, SBP: systolic blood pressure, DBP: diastolic blood pressure, FPG = fasting plasma glucose, PPG = postprandial plasma glucose, HbA1c = glycated hemoglobin, TC = total cholesterol, HDL = high density lipoprotein cholesterol, LDL = low density lipoprotein cholesterol, TG = triglyceride, eGFR = estimated glomerular filtration rate

Table-V: Multiple logistic regression for albuminuria

Variable	B	SE	p
Duration of diabetes	1.55	0.16	0.008
BMI	1.07	0.12	0.556
SBP	0.98	0.02	0.650
TG	1.00	0.03	0.044
HbA1c	1.03	0.05	0.811

Analyzed by binary logistic regression; BMI= body mass index, WC= waist circumference, SBP= systolic blood pressure, DBP= diastolic blood pressure, TG = triglyceride, FPG = fasting plasma glucose, PPG = postprandial plasma glucose, HbA1c = glycated hemoglobin

Discussion

Diabetic nephropathy is the leading cause of kidney disease in patients starting renal replacement therapy, affecting ~40% of diabetic patients, and increases the risk of cardiovascular mortality. Its prevalence in the population below 30 years of age with DM is not less.[15] This cross-sectional study evaluated 88 young diabetic patients (16-29 years) to determine the frequency of diabetic nephropathy and categorize albuminuria. It also examined risk factors, including longer diabetes duration, higher BMI, uncontrolled blood pressure, and dyslipidemia. Although diabetes type was not formally classified, most participants appeared to have type 2 diabetes based on high family history (75%), presence of acanthosis nigricans (39.8%), elevated mean BMI (25.42 kg/m²), and typical South Asian phenotypic features.

In the present study, the frequency of diabetic nephropathy in terms of albuminuria was 38.7%, including 30.7% of MA and 8% of macroalbuminuria, with a mean duration of diabetes of 1.58 years, and associated risk factors for albuminuria were longer duration of diabetes, raised FPG, higher HbA1c, and hypertriglyceridemia. Another study conducted in Bangladesh observed a similar prevalence of MA (25%), including 3.5% of macroalbuminuria in children and adolescents with diabetes after persistent observation with spot urine ACR.[16] The search for Diabetes in Youth (<20 years of age) found that the prevalence of elevated ACR was 9.2% in T1DM and 22.2% in T2DM.[17] According to the American Diabetes Association, albuminuria should be confirmed by ≥2 abnormal ACR results out of 3 samples over 3–6 months; thus, the higher prevalence of MA in this study may reflect a lack of longitudinal confirmation. The elevated rates may also be explained by strong familial predisposition.[18] In this cohort, 75% had a positive family history of diabetes. Overall, youth-onset type 2 diabetes appears to carry a substantial risk for nephropathy, with variability across studies likely due to differences in design, population characteristics, laboratory methods, glycemic control, and diabetes duration.

It is a fact that the development and progression of nephropathy is positively correlated with the duration of diabetes. As reviewed by other studies, they stated that MA and overt nephropathy were found in 18-72% and 5-27% of adolescents with T2DM, respectively, which typically occurs after 5-10 years of diabetes.[19] This present study observed that 26.9% had MA and none had macroalbuminuria in those with <5 years of duration of disease, but a significant percentage of MA (60%) and macroalbuminuria (20%) was seen in those with > 5 years duration of disease. This is in agreement with previously reported MA rates of 22-42% in children with youth-onset T2DM of <5 years' duration.[17] Macroalbuminuria rates have been reported as high as 17–27% within 5–10 years of diabetes duration; however, the lack of confirmation of persistent albuminuria in many studies may have led to overestimation. In contrast, studies using serial ACR measurements in youth with type 2 diabetes have demonstrated lower rates, with MA in 26.9% and persistent macroalbuminuria in only 4.7%. Contemporary evidence from systematic reviews and high-impact cohort analyses indicates that although albuminuria is relatively common in youth-onset type 2

diabetes, the prevalence of persistent macroalbuminuria remains low, typically around 3–5%, when confirmed with repeat measurements. This highlights the importance of confirming persistence and suggests that earlier reports may have substantially overestimated the true burden of advanced diabetic kidney disease.[20] Present study observed a significantly higher frequency of MA and macroalbuminuria with poor glycemic status of the subjects, similar to the previous report in the young diabetic population.[16] A statistically significant association was observed between MA and elevated fasting plasma glucose (FPG) and HbA1c, which is consistent with findings from recent studies. Contemporary evidence indicates that poor glycemic control, particularly higher HbA1c levels, is strongly associated with the development and progression of albuminuria in type 2 diabetes. For instance, higher HbA1c levels have been shown to correlate with increasing severity of albuminuria and renal impairment. However, similar to our findings, some studies have reported no significant association between postprandial glucose and albuminuria. These observations suggest that chronic glycemic exposure, reflected by HbA1c, may be a more important determinant of diabetic nephropathy than short-term glycemic fluctuations.[21] These findings are in agreement with the fact that hyperglycemia is an important risk factor for the development of DN and hence, glycemic control remains the key target of therapy. In contrast to earlier studies in youth, this study found no significant association between BMI and MA, consistent with some adult T2DM studies.17 A possible explanation is that poorly controlled diabetes may lead to weight loss, meaning patients with lower BMI could still be at higher risk of complications, including MA. Uncontrolled blood pressure is a known risk factor for MA, but this study found no significant association, possibly because most participants had controlled BP, unlike prior studies.[22] Triglycerides showed a significant correlation with albuminuria, consistent with findings by Wang Yet al., while LDL and HDL were not associated, which can be explained by different population groups, ethnicity, and genetics.[23] Regression analysis identified diabetes duration and triglycerides as key predictors of albuminuria.

This study has several strengths, including its real-world clinical setting and focus on young diabetic patients with early albuminuria, a relatively underexplored group. The use of standardized biochemical measurements, including urine ACR, enhances the reliability of the findings and provides useful preliminary evidence on metabolic risk factors associated with early renal involvement in a resource-limited setting. However, the study is limited by its cross-sectional design, small single-center sample size, reliance on a single ACR measurement, and lack of clear classification of diabetes type. In addition, the effects of medications influencing albuminuria were not accounted for, and the absence of imaging or biopsy limited the exclusion of non-diabetic kidney disease. The lack of longitudinal follow-up further restricts the assessment of disease progression over time. However, the present study found quite a significant frequency of MA in the young diabetic population who had relatively higher FPG, TG, and HbA1c with a higher duration of diabetes. Therefore, the consequences of diabetes in the younger age group should not be overlooked. Screening for MA and controlling associated risk factors is necessary in this age group.

Conclusions

It is concluded that diabetic nephropathy is frequent in young patients with DM. Longer duration of diabetes, poor glycemic status, and hypertriglyceridemia are risk factors of albuminuria in young patients with DM. Duration of diabetes and triglycerides may represent independent predictors for albuminuria in young patients with DM.

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Conflict of interest

The authors have no conflicts of interest to disclose.

Disclosure of generative AI ad AI assisted technologies

Nothing to disclose.

Ethical approval

The protocol was approved by the Institutional Review Board (IRB) of BMU (No. BSMMU/2017/3782, Dated: 19.04.2017).

Data availability

Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Author contributions

Conceptualization: SS, MAH
Data collection: SS
Statistical analysis: KKS, SS, MAH
Writing- Original Draft Preparation: KKS, SS

Writing- Review & Editing: KKS, SS, MAH
Supervision: MAH
Project Administration: MAH

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References

1. Magliano DJ, Boyko EJ, Atlas D. 3. The global picture of diabetes. In Diabetes Atlas [Internet]. 11th edition 2025. International Diabetes Federation. Available at https://www.ncbi.nlm.nih.gov/books/NBK618744/

2. Mayer-Davis EJ, Lawrence JM, Dabelea D, Divers J, Isom S, Dolan L, et al. Incidence trends of type 1 and type 2 diabetes among youths, 2002–2012. N Engl J Med. 2017;376(15):1419-29. DOI: https://doi.org/10.1056/nejmoa1610187

3. Hasan M, Morshed MS, Tofail T, Sultana N, Banu H, Rahman MA, et al. Early-Onset Type 2 Diabetes in Bangladesh: National Estimates and Risk Correlates. AACE Endocrinol Diabetes. 2026;13(2):222-32. DOI: https://doi.org/10.1016/j.aed.2025.12.005

4. Ke C, Sohal P, Qian H, Quan H, Khan NA. Diabetes in the young: a population-based study of South Asian, Chinese and White people. Diabet Med. 2015;32(4):487-96. DOI: https://doi.org/10.1111/dme.12657

5. Duncan BB, Magliano DJ, Boyko EJ. IDF Diabetes Atlas 11th edition 2025: global prevalence and projections for 2050. Nephrol Dial Transplant. 2025;41(1):7-9. DOI: https://doi.org/10.1093/ndt/gfaf177

6. Netayawijit P, Chansanam W, Sorn-In K. Interpretable machine learning framework for diabetes prediction: Integrating SMOTE balancing with SHAP explainability for clinical decision support. Healthcare 2025;13(20):2588. DOI: https://doi.org/10.3390/healthcare13202588

7. Grams ME, Melamed ML. Chronic Kidney Disease. Ann Intern Med. 2025;178(9):129-144. DOI: https://doi.org/10.7326/annals-25-02684

8. Stevens PE, Ahmed SB, Carrero JJ, Foster B, Francis A, Hall RK, et al. KDIGO 2024 clinical practice guideline for the evaluation and management of chronic kidney disease. Kidney Int. 2024;105(4):S117-314. DOI: https://doi.org/10.1016/j.kint.2023.10.018

9. Shah AS, Barrientos-Pérez M, Chang N, Fu JF, Hannon TS, Kelsey M, et al. ISPAD clinical practice consensus guidelines 2024: type 2 diabetes in children and adolescents. Horm Res Paediatr. 2024;97(6):555-83. DOI: https://doi.org/10.1159/000543033

10. Saito H, Tanabe H, Hirai H, Higa M, Tanaka K, Yamaguchi S, et al. Young-onset type 2 diabetes mellitus enhances proteinuria, but not glomerular filtration rate decline: A Japanese cohort study. J Diabetes Investig. 2024;15(10):1444-1456. DOI: https://doi.org/10.1111/jdi.14272

11. American Diabetes Association Professional Practice Committee for Diabetes. 11. Chronic kidney disease and risk management: Standards of care in diabetes-2026. Diabetes Care. 2026;49(Supplement_1): S246-S260. DOI: https://doi.org/10.2337/dc26-s011

12. Eppens MC, Craig ME, Cusumano J, Hing S, Chan AK, Howard NJ, et al. Prevalence of diabetes complications in adolescents with type 2 compared with type 1 diabetes. Diabetes care. 2006;29(6):1300-6. DOI: https://doi.org/10.2337/dc05-2470

13. American Diabetes Association Professional Practice Committee for Diabetes. 2. Diagnosis and classification of diabetes: Standards of care in diabetes-2026. Diabetes Care. 2026;49(Supplement_1):S27-S49. DOI: https://doi.org/10.2337/dc26-s002

14. Cavalier E, Zima T, Datta P, Makris K, Schaeffner E, Langlois M, et al. Recommendations for European laboratories based on the KDIGO 2024 clinical practice guideline for the evaluation and management of chronic kidney disease. Clin Chem Lab Med. 2025;63(3):525-34. DOI: https://doi.org/10.1515/cclm-2024-1082

15. Zhang L, Jiang L, Xu R, Zhang X, Zhang B, Yue R. Epidemiological research on diabetic nephropathy at global, regional, and national levels from 1990 to 2021: an analysis derived from the global burden of disease 2021 study. Front Endocrinol. 2025;16:1647064. DOI: https://doi.org/10.3389/fendo.2025.1647064

16. Zabeen B, Nahar J, Islam N, Azad K, Donaghue K. Risk factors associated with microalbuminuria in children and adolescents with diabetes in Bangladesh. Indian J Endocrinol Metab. 2018;22(1):85-8. DOI: https://doi.org/10.4103/ijem.ijem_269_17

17. Maahs DM, Snively BM, Bell RA, Dolan L, Hirsch I, Imperatore G, et al. Higher prevalence of elevated albumin excretion in youth with type 2 than type 1 diabetes: the SEARCH for Diabetes in Youth study. Diabetes care. 2007;30(10):2593-8. DOI: https://doi.org/10.2337/dc07-0450

18. Herrlin I, Sigfrids FJ, Sandholm N, Thorn LM, Groop PH, Harjutsalo V. Familial clustering of diabetic kidney disease and retinopathy in offspring of parents with type 1 diabetes: a population-based study. EClinicalMedicine. 2025;83. DOI: https://doi.org/10.1016/j.eclinm.2025.103232

19. Ek AE, Samuelsson U, Janson A, Carlsson A, Elimam A, Marcus C. Microalbuminuria and retinopathy in adolescents and young adults with type 1 and type 2 diabetes. Pediatr Diabetes. 2020;21(7):1310-1321. DOI: https://doi.org/10.1111/pedi.13074

20. Cioana M, Deng J, Hou M, Nadarajah A, Qiu Y, Chen SS, et al. Prevalence of hypertension and albuminuria in pediatric type 2 diabetes: a systematic review and meta-analysis. JAMA Netw Open. 2021;4(4):e216069. DOI: https://doi.org/10.1001/jamanetworkopen.2021.6069

21. Yoo JH, Kim JY, Kim JH. Association Between Continuous Glucose Monitoring-Derived Glycemia Risk Index and Albuminuria in Type 2 Diabetes. Diabetes Technol Ther. 2023;25(10):726-735. DOI: https://doi.org/10.1089/dia.2023.0165

22. Zhou L, Yu J, Cai X, Zhu Y, Li M, Han X, et al. Risk factors for progression to albuminuria in individuals with newly diagnosed type 2 diabetes: a 5-year cohort study. BMC Endocrine Disorders. 2025;25(1):203. DOI: https://doi.org/10.1186/s12902-025-02014-y

23. Wang Y, Li S. Lipid metabolism disorders and albuminuria risk: insights from National Health and Nutrition Examination Survey 2001-2018 and Mendelian randomization analyses. Ren Fail. 2024;46(2):2420841. DOI: https://doi.org/10.1080/ 0886022x.2024.2420841