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# Comparative Study of Dyslipidemia in Diabetic Patients with Diabetic Nephropathy and Diabetic Patients without Nephropathy

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**ABSTRACT**

**Background:** Dyslipidemia is a significant risk factor for cardiovascular complications and renal damage in diabetic patients, particularly those with nephropathy. It exacerbates diabetic nephropathy (DN) progression through mechanisms such as oxidative stress and glomerulosclerosis.

**Objectives:** This study aimed to compare lipid abnormalities between diabetic patients with nephropathy and those without, assess correlations with glycemic control and urinary microalbumin, and evaluate dyslipidemia's impact on renal function.

**Methods:** A cross-sectional study was conducted at Patna Medical College & Hospital involving 60 diabetic patients aged 20–60 years, divided into two groups: diabetic patients with nephropathy (Group A, n=30) and without nephropathy (Group B, n=30). Demographics, lipid profiles, glycemic parameters, and renal function were analyzed. Dyslipidemia prevalence was assessed, and statistical significance was determined using SPSS ($p<0.05$ considered significant).

**Results:** Dyslipidemia was more prevalent in the nephropathy group (73.3% vs. 46.7%, $p=0.03$), with significantly elevated cholesterol, triglycerides, LDL-C, and reduced HDL-C levels. Mean fasting glucose, postprandial glucose, and HbA1c levels were also higher in the nephropathy group ($p<0.05$).

**Conclusion:** Dyslipidemia is significantly more severe in diabetic patients with nephropathy, linked to poor glycemic control and renal dysfunction. Targeted lipid management strategies are essential to mitigate cardiovascular and renal risks in these patients.

**KEYWORDS**: Dyslipidemia, Diabetic nephropathy, Glycemic control, Renal dysfunction.

## INTRODUCTION

Diabetes mellitus (DM) is a leading cause of premature atherosclerosis, increasing the risk of cardiovascular diseases (CVD) such as coronary heart disease (CHD) and peripheral arterial disease (PAD). Dyslipidemia, a hallmark of DM, is characterized by elevated LDL-C, triglycerides, and reduced HDL-C levels. In diabetic nephropathy (DN), these lipid abnormalities worsen kidney injury through mechanisms like cytokine formation, oxidative stress, and glomerulosclerosis. [1,2]

Managing dyslipidemia in diabetic patients, particularly those with nephropathy, is critical to reducing the progression of renal damage, cardiovascular risk, and mortality. This study focuses on comparing lipid abnormalities between diabetic patients with and without nephropathy, analyzing correlations with glycemic and renal parameters, and identifying potential predictors of DN. [3,4]

## METHODS

This hospital-based, cross-sectional study was conducted in the Emergency Medicine Department at tertiary care center over 20 months. Ethical approval was obtained, and informed consent was secured from all participants. Patients with aged between 20-60 years of either sex with a known history of type 1 & 2 DM patients chosen [based on the screening recommendation by American diabetes association (ADA)]. Diabetic patients suffering from dyslipidaemia, diabetic patients suffering from CKD with dyslipidaemia**,** patients giving informed consent for study were included in this study. However, patients with acute illnesses, pregnancy, malignancies, or HIV, HBsAg, and VDRL positivity were excluded from the study. The sample size was calculated using preliminary data i.e the results obtained from the previous study conducted by Selvin E et al. [5] In order to have power of study of 90% and taking α error as 5% in our study, thirty patients were included in each study group. Based on computer generated random number table, all patients were randomly allocated into two groups namely, **Group A** [Dyslipidemia in Diabetic patient with Diabetic

Nephropathy (n=30)], **Group B** [Dyslipidemia in Diabetic patient without Nephropathy (n=30)]. To determine the prevalence of abnormal lipid profile, microalbuminuria and associated micro vascular complications among diabetic patients. Participants underwent clinical and biochemical evaluations.

**Clinical examination:** Microalbuminuria was estimated using the immunoturbidimetric method using random spot urine sample, blood sugar levels by GOD-POD (glucose oxidase peroxidase) end point method, blood urea nitrogen by GLDH (glutamate dehydrogenase) urease method, serum creatinine by Jaffe's method and lipid profile using enzymatic end point method. Routine Urine examination was done in a random spot sample and analyzed for protein, sugar, blood, pus cells and RBC's. More than 5 leucocytes per high power field were considered as pyuria. Whereas, in **Biochemical evaluation** includes **Lipid Profile:** Total cholesterol (TC), triglycerides (TG), HDL-C, LDL-C, **Glycemic Control:** Fasting glucose, postprandial glucose, HbA1c, **Renal**

**Function:** Serum creatinine, blood urea, urinary microalbumin. The primary study was to explore the lipid abnormalities in diabetic patients with nephropathy in comparison with diabetic patients without nephropathy. The secondary outcomes were to find out any correlation between dyslipidemia in diabetic patients with nephropathy and with diabetic patients without nephropathy and to evaluate the possible association between glycated hemoglobin and urinary microalbumin as a predictor of diabetic nephropathy in diabetic mellitus patients. We used the Statistical Package for Social Sciences (SPSS version 20; IBM). The demographic data and lipid profiles were expressed as the mean±SD, $p<0.05$ was considered statistically significant.

## RESULTS

**Demographics:** The 51–60 years age group was the most common, comprising 43.3% in Group A and 46.7% in Group B. Mean ages were 51.97±8.81 years (Group A) and 51.47±7.62 years (Group B), with no significant difference (p=0.823). Male predominance was observed in both groups (70% vs. 60%, p=0.416).

**Lipid Profile:** Dyslipidemia prevalence was significantly higher in Group A (73.3%) than in Group B (46.7%, p=0.03) (Figure 1). Group A exhibited elevated TC (269.73±38.87 mg/dL vs. 234.10±51.51 mg/dL), TG (218.77±49.65 mg/dL vs. 180.69±41.99 mg/dL), and LDL-C (150.53±27.53 mg/dL vs. 123.23±26.10 mg/dL), with reduced HDL-C levels (25.92±6.93 mg/dL vs. 32.45±8.19 mg/dL, p<0.05).

**Glycemic Control:** Group A showed higher fasting glucose (201.06±22.74 mg/dL vs. 173.56±14.86 mg/dL), postprandial glucose (387.80±46.81 mg/dL vs. 284.20±25.33 mg/dL), and HbA1c (9.00±0.99% vs. 8.38±0.89%, p<0.05).

**Comorbidities:** Neuropathy prevalence was higher in Group A (p=0.04), while hypertension and retinopathy showed no significant differences.

**Renal Function and Dyslipidemia:** Mean Serum Urea, Creatinine and eGFR Level between two groups showing in Figure 2. Urinary microalbumin and eGFR were significantly worse in Group A. Lipid abnormalities correlated with renal dysfunction markers, highlighting dyslipidemia's role in DN progression.

## DISCUSSION

The Kidney Disease: Improving Global Outcomes (KDIGO) guidelines recommend the assessment of dyslipidemia in patients with newly diagnosed kidney disease, given its frequent association with nephropathy.[6] This study aimed to investigate lipid abnormalities in diabetic patients with nephropathy compared to those without nephropathy. Conducted in the Department of Emergency Medicine at tertiary care center, the cross-sectional study included 60 diabetic patients, evenly divided into two groups based on nephropathy status. The lipid profiles and related parameters of both groups were analyzed to assess the differences.

Lipid abnormalities are a significant concern in diabetic patients, contributing to an increased risk of cardiovascular disease. The characteristic dyslipidemia pattern includes elevated triglycerides (TG) and low high-density lipoprotein cholesterol (HDL-C) levels. This study revealed that dyslipidemia was more pronounced in diabetic patients with nephropathy, with a significantly higher prevalence in this group. Proteinuria, a defining feature of nephropathy, correlates with increased low-density lipoprotein cholesterol (LDL-C) levels, while advanced kidney dysfunction is often associated with reduced HDL-C levels. [7,8,9] Elevated levels of total cholesterol (TC), TG, and LDL-C were confirmed in nephropathy patients, consistent with findings from other populations. [10]

Similar patterns have been observed in South Indian studies and global research, including data from Saudi Arabia and Nigeria, showing high rates of hypercholesterolemia and hypertriglyceridemia among diabetic patients. This study aligns with the Diabetes Control and Complications Trial/Diabetes Interventions and Complications Study (DCCT/EDIC), which identified elevated TG, TC, and LDL-C levels as key contributors to the progression of nephropathy. The severe dyslipidemia in nephropathy patients may result from impaired metabolic processes, poor glycemic control, insulin resistance, and hypertension. [11,12]

Glycemic control was suboptimal in both groups, as evidenced by mean glycated hemoglobin (HbA1c) levels of 9.00% in the nephropathy group and 8.38% in the non-nephropathy group. Persistent hyperglycemia significantly impacts lipid metabolism,

potentially exacerbating dyslipidemia. Furthermore, small dense LDL particles, indicated by the TG/HDL-C ratio, were prevalent in both groups, increasing the risk of adverse cardiac events. Atherogenic dyslipidemia, characterized by high TG, low HDL-C, and the presence of small dense LDL particles, was more common in nephropathy patients, highlighting the cardiovascular risks in this population. [13,14]

The correlation between lipid profiles and kidney function suggests that dyslipidemia is closely linked to renal insufficiency. Elevated TC and LDL-C levels are associated with increased proteinuria and reduced estimated glomerular filtration rate (eGFR). Previous studies have established a connection between lipid abnormalities and renal outcomes, with HDL-C levels being independently associated with eGFR. [15]

Comorbid conditions like hypertension and neuropathy were more prevalent in nephropathy patients, emphasizing the role of multifactorial management. Effective glycemic and blood pressure control, along with targeted lipid-lowering therapies, can mitigate the progression of microvascular complications. The findings underscore the importance of early screening and comprehensive therapeutic interventions to manage dyslipidemia and its complications in diabetic patients. [16,17]

## CONCLUSION

Dyslipidemia is highly prevalent among diabetic patients, particularly those with nephropathy. It significantly contributes to cardiovascular risk and the progression of diabetic nephropathy. Managing dyslipidemia through lifestyle changes and pharmacological interventions is crucial to improving outcomes in this vulnerable population.

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