



PREVALENCE OF DIABETES, CHRONIC LIVER DISEASE, CHRONIC KIDNEY DISEASE AND DYSLIPIDEMIA IN PATIENTS ATTENDING A TERTIARY CARE CENTRE

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Abstract

Background: Metabolic comorbidities such as diabetes, dyslipidemia, obesity, and chronic organ disease are increasingly prevalent among hospitalized adults and contribute significantly to morbidity and mortality. This study aims to evaluate the prevalence of diabetes, dyslipidemia, chronic kidney disease (CKD), and chronic liver disease (CLD) and their patterns of multimorbidity in a tertiary care hospital-based cohort.

Methods: A cross-sectional observational study was conducted over 12 months at a tertiary care centre in central India, enrolling 60 consecutive adult patients (≥ 18 years) with one or more metabolic or chronic conditions. Demographic, clinical, anthropometric, and laboratory data were recorded, and multimorbidity was defined as two or more of the four conditions.

Results: The mean age group was predominantly 41–60 years, with 70% of patients overweight/obese. Dyslipidemia was the commonest condition (63.3%), followed by diabetes (45%), CKD (23.3%), and CLD (15%). Elevated LDL-C and low HDL-C were the predominant lipid abnormalities among those with dyslipidemia. A striking 66.7% of patients had two or more concurrent conditions, and diabetic patients had significantly higher rates of dyslipidemia (81.5%) and CKD (37%) compared with non-diabetic patients ($p < 0.05$).

Conclusion: Hospitalized adults in this tertiary care setting exhibit a high burden of metabolic multimorbidity, with diabetes strongly associated with dyslipidemia and CKD, underscoring the need for protocol-driven, integrated management of cardiometabolic risk factors in inpatient care.

Keywords: Metabolic comorbidities, Multimorbidity, Dyslipidemia

Introduction-

Metabolic comorbidities such as diabetes, dyslipidemia, obesity, and chronic organ disease are increasingly recognized as interconnected drivers of morbidity and mortality among hospitalized adults.[1] Over the past few decades, the global prevalence of obesity has nearly tripled, creating a parallel rise in type 2 diabetes mellitus (T2DM), dyslipidemia, and related metabolic disorders, which collectively contribute to a substantial burden on healthcare systems.[2,3] These conditions often coexist within the same individual, forming a “metabolic syndrome” phenotype that amplifies

the risk of cardiovascular disease, chronic kidney disease (CKD), and other organ-specific complications.[4,5]

In India, national-level data indicate that metabolic syndrome affects approximately one-third of the adult population, with higher prevalence among older adults, urban residents, and those with sedentary lifestyles.[3] Within this framework, obesity acts as a central pathophysiological hub, promoting insulin resistance, dyslipidemia, and hypertension, which in turn accelerate the development of T2DM and CKD.[5] Studies from hospitalized cohorts, including those with COVID-19, have shown that diabetes and other metabolic comorbidities are more prevalent among inpatients than in the general community, underscoring the selective vulnerability of individuals with metabolic derangements to acute illness requiring hospitalization.[6-8]

The mechanistic links between these comorbidities are increasingly well described. Obesity-related visceral adiposity generates chronic low-grade inflammation and oxidative stress, which impair insulin signaling and promote dyslipidemia, thereby predisposing to both macrovascular and microvascular organ damage. [4,5] In the kidney, obesity-related metabolic dysfunction is associated with obesity-related glomerulopathy and faster progression of CKD, even in the absence of classical diabetes or hypertension. Similarly, in the cardiovascular system, uncontrolled diabetes, dyslipidemia, and obesity independently and synergistically increase the risk of heart failure, coronary artery disease, and stroke, especially when present in hospitalized patients who may experience additional physiological stress.[7,9]

Despite advances in pharmacologic and lifestyle interventions, many patients remain either undiagnosed or sub-optimally treated, permitting the progression of metabolic comorbidities into overt chronic organ disease.[6] Moreover, the clustering of diabetes, dyslipidemia, obesity, and chronic organ disease complicates clinical management during hospitalization, influences drug dosing, and is associated with poorer outcomes, including higher rates of complications and mortality.[7,8] For these reasons, understanding the prevalence, interrelationships, and clinical impact of metabolic comorbidities among hospitalized adults is essential for refining risk stratification, tailoring preventive strategies, and improving long-term prognosis in this high-risk population.

Materials and Methods

Study Design and Setting

This was a hospital-based, cross-sectional observational study conducted at a tertiary care centre in central India. The study was carried out over a period of 12 months. The institution serves as a major referral centre for patients from the region, catering to a wide spectrum of metabolic and chronic non-communicable diseases.

Study Population

A total of 60 patients attending the outpatient and inpatient departments of Medicine were enrolled in the study during the study period. Patients aged 18 years and above who were either newly diagnosed or previously known cases of diabetes mellitus, chronic liver disease (CLD), chronic kidney disease (CKD), and/or dyslipidemia were included in the study.

Inclusion Criteria

- Patients aged 18 years and above
- Patients diagnosed with one or more of the following conditions: diabetes mellitus, CKD, CLD, or dyslipidemia
- Patients willing to provide informed written consent

Exclusion Criteria

- Patients below 18 years of age
- Pregnant women

- Patients with acute infections or critically ill patients in whom laboratory evaluation was not feasible
- Patients who refused to participate in the study

Sampling Method

Consecutive sampling was employed. All patients fulfilling the inclusion criteria and attending the designated departments during the study period were enrolled until the required sample size was achieved.

Data Collection

A pre-structured, pretested proforma was used to collect data including detailed sociodemographic information (age, sex, residence), anthropometric measurements (height, weight, BMI), clinical history, presenting complaints, duration of illness, and current medications. BMI was calculated using the standard formula: weight (kg) divided by the square of height (m²), and patients were categorised as normal (BMI 18.5–24.9 kg/m²) or overweight/obese (BMI ≥ 25 kg/m²) as per WHO criteria.

Diagnostic Criteria

The following standard diagnostic criteria were applied:

- **Diabetes Mellitus:** Diagnosed as per the American Diabetes Association (ADA) criteria — fasting plasma glucose ≥ 126 mg/dL, 2-hour post-prandial glucose ≥ 200 mg/dL, HbA1c ≥ 6.5%, or a random plasma glucose ≥ 200 mg/dL with classic symptoms, or previously diagnosed and on antidiabetic treatment.
- **Chronic Kidney Disease:** Defined as the presence of kidney damage or a glomerular filtration rate (eGFR) < 60 mL/min/1.73 m² for three or more months, as per KDIGO 2012 guidelines.
- **Chronic Liver Disease:** Diagnosed on the basis of clinical features, liver function tests, ultrasonographic findings, and/or liver biopsy where indicated, with evidence of liver damage persisting for more than six months.
- **Dyslipidemia:** Defined as one or more of the following: total cholesterol > 200 mg/dL, LDL-C > 130 mg/dL, HDL-C < 40 mg/dL in males and < 50 mg/dL in females, or triglycerides > 150 mg/dL, as per the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) guidelines.

Laboratory Investigations

All enrolled patients underwent a standard battery of investigations including complete blood count (CBC), fasting and post-prandial blood glucose, glycated haemoglobin (HbA1c), kidney function tests (serum urea, serum creatinine, eGFR), liver function tests (serum bilirubin, ALT, AST, ALP, serum albumin), and a fasting lipid profile (total cholesterol, LDL-C, HDL-C, triglycerides, VLDL). Investigations were carried out in the accredited biochemistry laboratory of the institution using automated analysers under standard quality control protocols.

Assessment of Multimorbidity

Multimorbidity was defined as the co-occurrence of two or more of the four studied chronic conditions in the same patient. Patients were categorised into four groups: no condition, single condition, two conditions, and three or more conditions simultaneously.

Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Ethics Committee (IEC) of the institution. Written informed consent was obtained from all participants prior to enrollment. Patient confidentiality and anonymity were maintained throughout the study.

Statistical Analysis

Data were entered and managed using Microsoft Excel and analysed using appropriate statistical software. Categorical variables were expressed as frequencies and percentages. Association between diabetes and other comorbid conditions was assessed using the Chi-square test. A p-value of < 0.05 was considered statistically significant.

Results- The study included 60 patients, the majority of whom were aged 41–60 years (55%) with a significant prevalence of overweight or obesity (70%), as detailed in **Table 1**. Analysis of disease prevalence revealed that dyslipidemia was the most common condition, affecting 63.3% of the cohort, followed by diabetes mellitus (45%), chronic kidney disease (23.3%), and chronic liver disease (15%), as shown in **Table 2**. Among those with dyslipidemia, elevated LDL-C (63.2%) and low HDL-C (55.3%) were the most frequent lipid abnormalities (**Table 3**). Notably, 66.7% of the total study population presented with two or more concurrent conditions, highlighting a high burden of multimorbidity in the tertiary care setting (**Table 4**). Furthermore, a strong clinical association was observed between diabetes and other metabolic complications; diabetic patients showed a significantly higher prevalence of dyslipidemia (81.5%) and chronic kidney disease (37%) compared to non-diabetic patients (**Table 5**).

Table 1: Demographic Profile of the Study Population

Variable	Frequency (n=60)	Percentage (%)
Age Group		
18–40 years	12	20%
41–60 years	33	55%
> 60 years	15	25%
Gender		
Male	34	56.7%
Female	26	43.3%
BMI Category		
Normal (18.5–24.9)	18	30%
Overweight/Obese (≥ 25)	42	70%

Table 2: Prevalence of Individual Chronic Conditions

Clinical Condition	Number of Patients	Prevalence (%)
Dyslipidemia	38	63.3%
Diabetes Mellitus	27	45.0%
Chronic Kidney Disease (CKD)	14	23.3%
Chronic Liver Disease (CLD)	9	15.0%

Table 3: Distribution of Dyslipidemia Components

Lipid Parameter (Abnormal)	Frequency (n=38)	Percentage (%)
High LDL-C (>130 mg/dL)	24	63.2%
Low HDL-C (<40 mg/dL)	21	55.3%
High Triglycerides (>150 mg/dL)	19	50.0%
High Total Cholesterol (>200 mg/dL)	15	39.5%

Table 4: Overlap of Comorbidities (Multimorbidity)

Number of Conditions	Frequency (n=60)	Percentage (%)
Single Condition	14	23.3%
Two Conditions	22	36.7%
Three or More Conditions	18	30.0%

None of the Four	6	10.0%
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Table 5: Association Between Diabetes and Other Conditions

Condition	Diabetic Patients (n=27)	Non-Diabetic (n=33)	p-value*
Dyslipidemia	22 (81.5%)	16 (48.5%)	< 0.05
Chronic Kidney Disease	10 (37.0%)	4 (12.1%)	< 0.05
Chronic Liver Disease	5 (18.5%)	4 (12.1%)	> 0.05

Discussion

The present study investigated the prevalence of dyslipidemia, diabetes mellitus, chronic kidney disease (CKD), and chronic liver disease (CLD) among 60 patients attending a tertiary care centre, while also assessing multimorbidity patterns and the clinical associations between diabetes and other metabolic conditions.

In our study, dyslipidemia was the most prevalent condition, affecting 63.3% of the cohort. This finding is consistent with Joshi SR et al.,[9] who in the ICMR–INDIAB study, a large multistate population-based survey, reported that 79% of individuals had at least one abnormal lipid parameter, with low HDL-C being the most frequent abnormality (72.3%). Among patients with dyslipidemia in our study, elevated LDL-C (63.2%) and low HDL-C (55.3%) were the most common lipid abnormalities. These findings are corroborated by Mithal A et al.[10], who reported that high LDL-C was the most common reason for initiating lipid-lowering therapy among 5,400 Indian diabetic patients across 178 centres, with an overall LDL-C goal achievement rate of only 48.7%. Singh G et al.[11] in their epidemiological review also observed that low HDL-C, borderline high LDL-C, and hypertriglyceridemia are the most common patterns of dyslipidemia in India, with a rising trend over two decades in urban populations.

The prevalence of diabetes mellitus in our study was 45%, which is higher than community-based estimates but consistent with figures reported in tertiary care settings that preferentially attract patients with established metabolic disease. Anjana RM et al.[12] in the ICMR–INDIAB study reported a prevalence of diagnosed diabetes of 7.3% in the general Indian population, though urban rates were considerably higher. The elevated proportion observed in our cohort reflects the referral bias inherent to tertiary care centres, where patients with complex or multiple comorbidities predominate. Mohan V et al[13]. similarly noted that the burden of type 2 diabetes in India is rising rapidly, especially among urban adults aged 40–60 years — an age group that constituted 55% of our study population.

Our study found that 81.5% of diabetic patients had dyslipidemia, significantly higher than the 48.5% prevalence in non-diabetic patients ($p < 0.05$). This strong association aligns closely with the findings of Mithal A et al.[10] (SOLID study), where dyslipidemia affected 10–73% of T2DM patients across India, with the majority failing to meet standard lipid targets. Kumar P et al.[14] in their hospital-based study in a tertiary care setting also documented that low HDL-C and elevated LDL-C were the predominant lipid abnormalities among diabetic patients, closely mirroring the lipid pattern observed in our study.

The prevalence of CKD in our study was 23.3% overall, rising significantly to 37% among diabetic patients ($p < 0.05$) compared to 12.1% in non-diabetic patients. This finding is consistent with the literature; Newtonraj A et al.[15] reported a CKD prevalence of 11% in diabetes-only patients and 14–15% in hypertensive and combined DM-HT groups in a rural South Indian population. Jha V et al.[16] highlighted that diabetes and hypertension together account for nearly 40–60% of CKD cases in India, underscoring the strong causal linkage between diabetes and progressive renal disease. Bikbov B et al.[17] (Global Burden of Disease Study 2017) further established that diabetes-related CKD accounts for a disproportionate share of the global CKD burden, particularly in South Asian countries.

CLD was observed in 15% of the total cohort (18.5% among diabetic patients versus 12.1% among non-diabetic patients), although this difference did not reach statistical significance ($p > 0.05$).

Duseja A et al.[18] reported that NAFLD, the most common form of CLD in India, has a prevalence ranging from 6.7% to 55.1% in adult Indian populations, with metabolic risk factors such as obesity and diabetes playing a central pathogenic role. Asrani SK et al. (2019)[19] noted that India contributed 18.3% of global liver disease–related deaths in 2015, and the burden of CLD continues to rise, especially due to NAFLD and alcohol-related liver disease. The relatively lower prevalence of CLD in our study may reflect study design limitations including sample size and varying diagnostic thresholds.

A striking finding of our study was that 66.7% of the total study population presented with two or more concurrent conditions. This high burden of multimorbidity in a tertiary care setting is consistent with national evidence; Arokiasamy P et al.[20] demonstrated in a cross-sectional study that multimorbidity is highly prevalent in Indian adults and is significantly associated with increasing age, obesity, and urban residence — all characteristics that were prominent in our study population. The co-occurrence of diabetes with dyslipidemia and CKD, in particular, points to a convergent cardiometabolic syndrome that warrants integrated, protocol-driven management in tertiary care settings.

Conclusion

This study demonstrates a high burden of metabolic comorbidities, particularly dyslipidemia and diabetes, among hospitalized adults in a tertiary care setting, with a large proportion exhibiting multimorbidity involving two or more chronic conditions. The strong clinical association between diabetes, dyslipidemia, and chronic kidney disease underscores the need for integrated cardiometabolic risk assessment and management in hospitalized patients. Furthermore, the high prevalence of overweight/obesity and the clustering of metabolic conditions highlight the importance of early lifestyle and pharmacologic interventions to prevent progression to overt organ disease and poor outcomes

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