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Association Between Diabetic Dyslipidemia and Macrovascular Complications in Type 2 Diabetes Mellitus: A Cross-sectional Study from an Indian Tertiary Care Center

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***Background**: Dyslipidemia is a significant modifiable risk factor for macrovascular complications in Type 2 Diabetes Mellitus (T2DM). Despite established benefits of statin therapy in cardiovascular risk reduction, its use in the Indian diabetic population remains inconsistent.*
***Objective**: To assess the prevalence and pattern of dyslipidemia in T2DM patients with macrovascular complications and to determine the association of lipid abnormalities with the history of preventive statin therapy.*
***Methods**: A cross-sectional observational study was conducted on 301 patients with T2DM (>5 years duration) at Poona Hospital and Research Centre from 2010 to 2012. Patients included had at least one macrovascular complication: coronary artery disease (CAD), cerebrovascular disease (CVD), or peripheral vascular disease (PVD). Data on demographic details, glycemic control (HbA1c), and extended lipid profiles (TC, LDL, HDL, TG, Apo A1, Apo B, non-HDL cholesterol) were collected. Statistical analysis was performed using SPSS v17.0.*
***Results**: 67.4% male, mean age 60.88 ± 10.89 years, 84.05% hypertensive, 72.76% obese. CVD (50.2%) was most common, followed by CAD (35.2%) and PVD (14.6%). Poor glycemic control in 93.4%. LDL high in 52.8%, HDL low in 41.9%, TG high in 26.9%. Only 32.9% on statins. Elevated TC, LDL, TG, and non-HDL levels were significantly associated with macrovascular complications in statin non-users.*
***Conclusion**: Diabetic dyslipidemia, particularly high non-HDL cholesterol levels, is strongly associated with macrovascular complications in T2DM. Preventive statin therapy is underutilized. Routine lipid screening, non-HDL monitoring, and broader statin use are recommended.*
***Key Word**: Type 2 Diabetes Mellitus (T2DM), Dyslipidemia, Macrovascular Complications, Statin Therapy, Non-HDL Cholesterol, Coronary Artery Disease (CAD), Cerebrovascular Disease (CVD), Peripheral Vascular Disease (PVD), Lipid Profile, Cardiovascular Risk, Glycemic Control, Preventive Therapy, Apo B, LDL Cholesterol, HDL Cholesterol*

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I. Introduction:

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic condition associated with significant vascular complications. Macrovascular complications, including coronary artery disease (CAD), cerebrovascular disease (CVD), and peripheral vascular disease (PVD), substantially increase morbidity and mortality in diabetic patients. Dyslipidemia, characterized by elevated total cholesterol (TC), low-density lipoprotein (LDL), triglycerides (TG), and low high-density lipoprotein (HDL), contributes significantly to the progression of atherosclerosis. India, being home to one of the largest diabetic populations globally, faces a dual burden of poor glycemic control and unrecognized cardiovascular risk. Statins have been shown to reduce cardiovascular events in both primary and secondary prevention settings, including among diabetics with normal LDL levels. Despite international recommendations, statin therapy is not widely adopted in Indian clinical practice. This study explores the lipid profiles and statin usage in T2DM patients presenting with macrovascular complications in a tertiary care hospital in Maharashtra.

II. Material And Methods

An observational, cross-sectional study was carried out at Poona Hospital and Research Centre, Pune, from 2010 to 2012.

Data Collection:

A total of 301 eligible patients were included. Data were collected using structured case report forms, including:
Demographics (age, sex)
Clinical history (hypertension, smoking status) Anthropometry (weight, height, BMI)
Laboratory investigations: HbA1c, TC, LDL, HDL, TG, Apo A1, Apo B, and non-HDL cholesterol History of statin therapy

Statistical Analysis:

Statistical analysis was conducted using SPSS v17.0. Descriptive statistics were used to summarize demographics and clinical variables. Associations between statin use and lipid levels were analysed using chi-square tests and one-way ANOVA. A p-value of <0.05 was considered statistically significant.

Inclusion criteria:

- Age ≥30 years
- Diagnosed with T2DM for more than 5 years
- Presence of at least one macrovascular complication (CAD, CVD, or PVD)

Exclusion criteria:

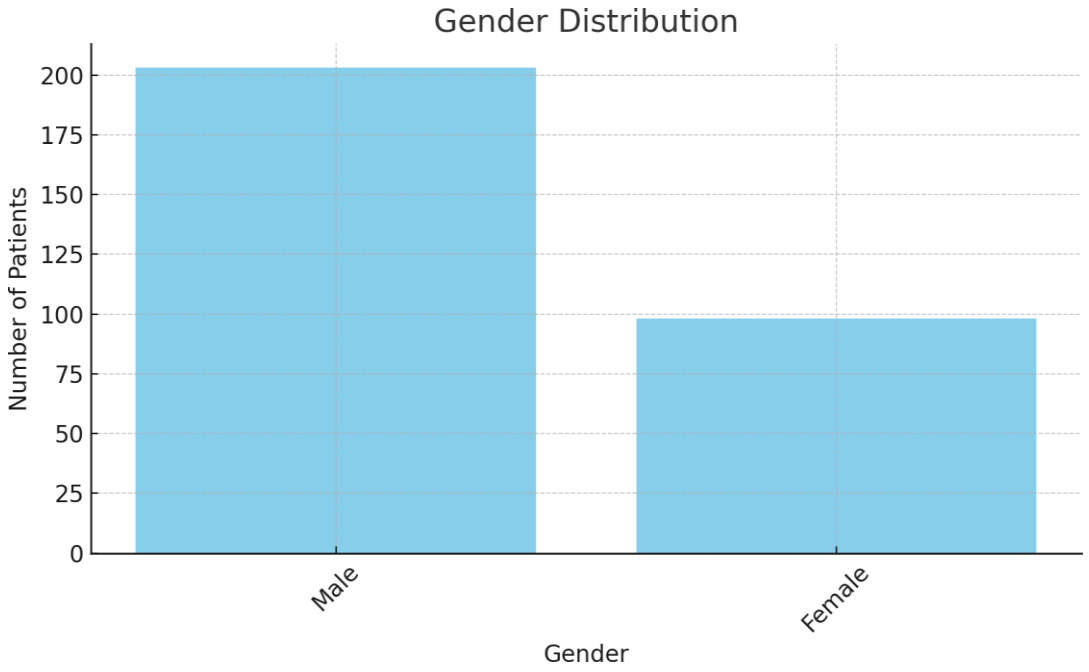
- Patients <30 years of age
- Diagnosed with T2DM for less than 5 years
- Presence of only microvascular complications (retinopathy, nephropathy, neuropathy)
- Pregnancy

III. Result:

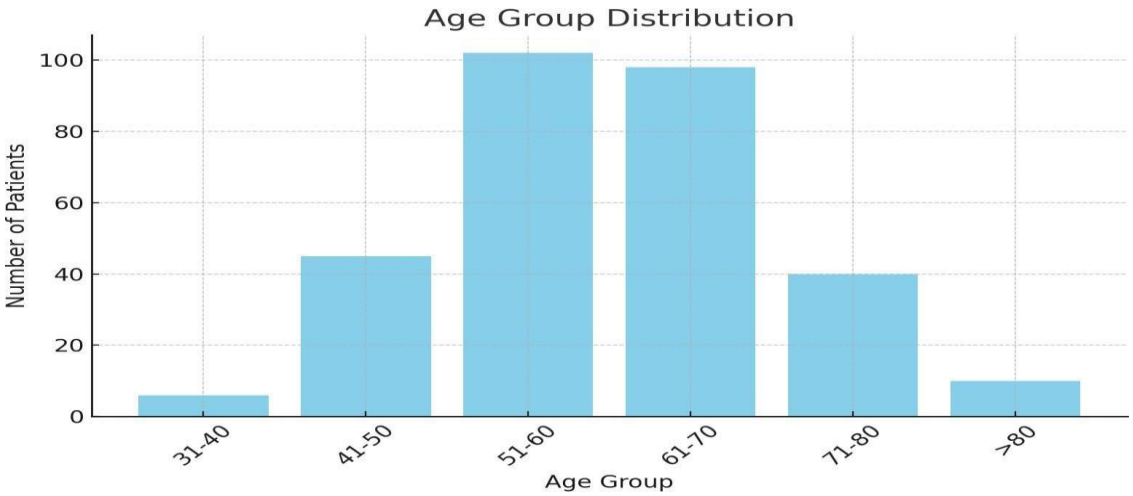
Demographic and Clinical Characteristics:

- Gender: 203 males (67.4%), 98 females (32.6%)
- Age: Majority were in the 51–70-year range
- Comorbidities: Hypertension in 84.05%; smoking history in 54.82%.

3.1 Gender Distribution



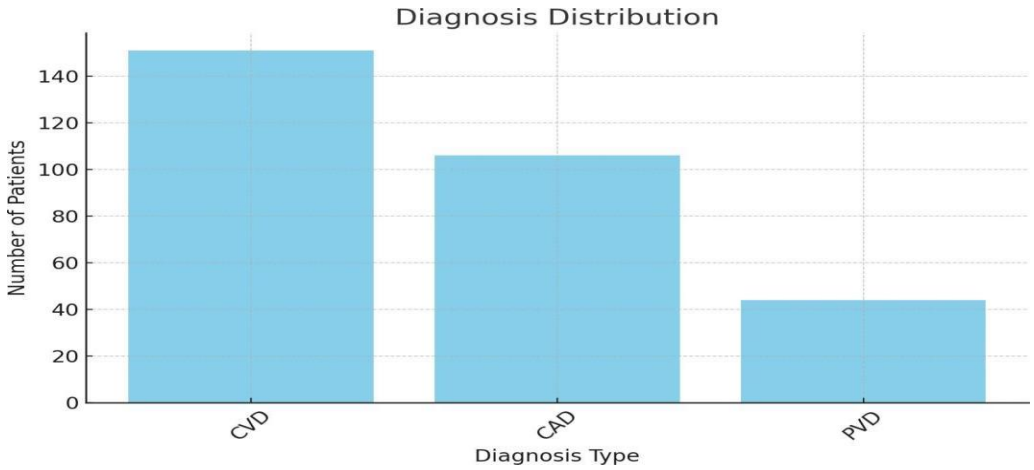
3.2 Age Group Distribution



3.3 Macrovascular Complication Types

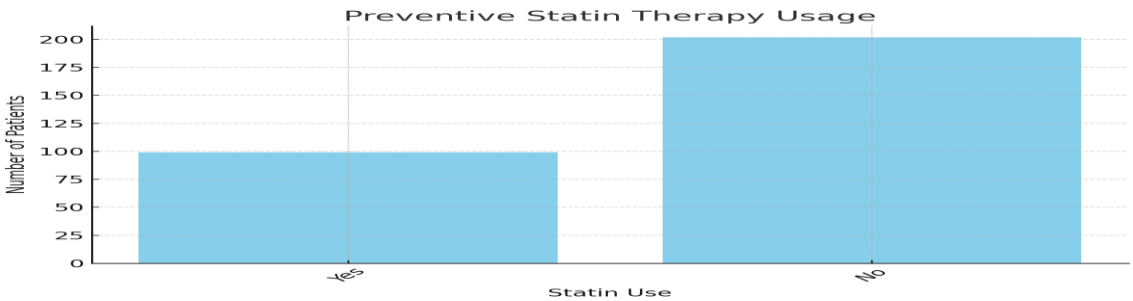
Macrovascular Complication Distribution:

- CVD: 151 patients (50.2%)
- CAD: 106 patients (35.2%)
- PVD: 44 patients (14.6%)



3.4 Statin Use

- Only 99 patients (32.9%) were on preventive statin therapy
- Among statin non-users, significantly higher levels of TC, LDL, TG, and non-HDL were observed ($p<0.05$)



3.5 Other Key Findings

- Poor glycemic control (HbA1c >7%) in 93.4%
- Dyslipidemia pattern: high LDL, low HDL, high TG
- non-HDL cholesterol significantly higher in non-statin group
- Statin users had more favorable lipid profiles

IV. Discussion

The study demonstrates that a majority of patients with T2DM and macrovascular complications exhibit classic patterns of dyslipidaemia. Elevated LDL and low HDL levels are known predictors of atherosclerotic events. In our cohort, non-HDL cholesterol emerged as the most consistent marker associated with macrovascular disease. Despite these findings, only one-third of patients were on statins, reflecting a concerning gap in preventive care. This aligns with other Indian studies that have reported suboptimal statin utilization. International trials like CARDS and HPS have established the benefit of statins in primary prevention, even in diabetics without overt dyslipidaemia.

There is an urgent need to increase awareness among physicians regarding the expanded indications for statin therapy, especially among high-risk populations like T2DM patients.

V. Conclusion

Our findings affirm that dyslipidaemia is highly prevalent in T2DM patients with macrovascular complications, and that non-HDL cholesterol may serve as a practical target for screening and intervention. Preventive statin therapy is significantly underused and should be incorporated into standard diabetes care protocols.

VI. Recommendations

- Mandatory annual lipid screening in T2DM patients
- Non-HDL cholesterol should be prioritized alongside LDL in risk assessment
- Statin therapy should be initiated early in high-risk patients regardless of LDL level
- Public health policies should target physician education and patient awareness
- Larger, multicentric, prospective studies are needed to validate these findings

VII. Limitations

- Observational study design
- No follow-up to assess progression
- Single-center data
- CVD s

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