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ORIGINAL ARTICLE

Impact of Lipid Status on Environmental Quality of Life and Mood Disorders Among Diabetic Cohorts

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Abstract

Introduction: Diabetes Mellitus (DM) and dyslipidaemia are few of the most common related illnesses significantly contributing to cardiovascular risk. Upcoming evidence shows that psychiatric morbidity and Quality of Life (QoL) can be influenced by metabolic disturbances. Our present study aims to assess the association between lipid levels, mood disorders, and QoL among patients with chronic T2DM in a tertiary care setting. **Materials and Methods:** This cross-sectional study was done among 50 individuals diagnosed with Diabetes Mellitus with a minimum duration of five years. The study was done at a tertiary care centre in Coimbatore, Tamilnadu. Institutional Human Ethics Committee approval was sought before the start of the study, and written informed consent was obtained from all the participants. Sociodemographic and clinical details were recorded; lipid levels were used to categorize participants into dyslipidaemia and normal lipid groups. The M.I.N.I. Plus 5.0 structured diagnostic interview was used to assess psychiatric co morbidities. Quality of Life was evaluated using the WHOQOL-BREF questionnaire. **Results:** Dyslipidaemia was seen in 68% of the study group. Although patterns of mood disorders varied between groups, the association between lipid status and psychiatric diagnosis was not statistically significant (P = 0.068). A significant difference was seen in the Environmental domain of QoL (P = 0.018), with lower scores reported in dyslipidaemia patients. **Conclusion:** Dyslipidaemia impacts the environmental dimension of Quality of Life to a significant extent among diabetics, underlining the need for integrated metabolic and psychosocial care.

Keywords: Diabetes Mellitus, Dyslipidaemia, Quality of Life, Mood Disorders, WHOQOL-BREF

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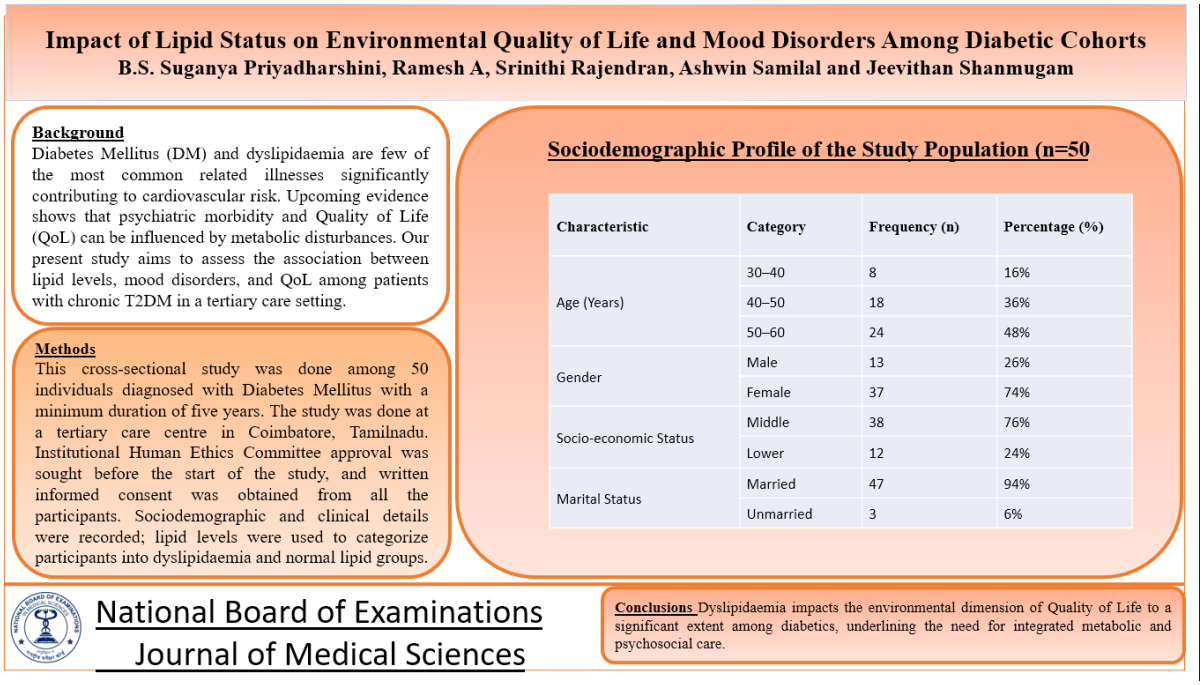
Graphical Abstract



Introduction

Diabetes Mellitus (DM) and dyslipidaemia are one of the commonest metabolic disorders that can be related. The concurrent presence of both significantly worsens the global burden of non-communicable cardiovascular diseases. India is presently in a period of an acute epidemiological transition due to growing urbanization, non active lifestyle added with change in dietary habits, leading to a startling increase in the diagnosis of type 2 diabetes. The ICMR-INDIAB study highlights the increasing incidence of prediabetes leading to diabetes across the country underscoring the importance of the enormous public health challenge [1]. Taking into consideration of this fact, the classical pattern of "diabetic dyslipidaemia"— is characterised by triglyceridemia, reduced high-density lipoprotein (HDL) and increase in LDL levels. This has emerged as a very frequent metabolic phenotype among Indians [1,2]. This atherogenic lipid profile significantly increases risk of cardiovascular events, leading to long term and chronic complications.

Along with proven cardiovascular interference, recent new evidence underscores that metabolic changes like dyslipidaemia can also influence neuropsychiatric wellness. Advances in neurobiological research highlight that metabolic and psychiatric disorders have common pathophysiologies, including low-grade inflammation, oxidative stress, insulin resistance, and dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis [3]. These pathways are associated and put forward that metabolic instability is not an isolated phenomenon but can interfere with functioning of the central nervous system, inclining patients to mood disorders. Along with that, the "cholesterol–serotonin hypothesis" brings up the idea that changes in serum cholesterol levels may affect serotonergic

neurotransmission which can modulate mood regulation and behavioral outcomes [4]. Biological interconnections like these provide a reasonable mechanistic framework relating lipid abnormalities with depressive symptoms.

Biological mechanisms along with psychosocial and environmental determinants may worsen the symptoms of patients with dyslipidaemia and diabetes. Long term and chronic illnesses require proper and regular self-management with proper compliance to medication, diet and follow up. All these can significantly impact an individual's perceived quality of life. The World Health Organization sequentiates that Quality of Life (QoL) is a multidimensional variable influenced by physical, environmental, social and psychological well-being [5]. While many studies have explored psychiatric morbidity in diabetes and the impact of metabolic control on QoL, very few researches have examined how lipid status specifically impacts both psychiatric comorbidities and the different domains of QoL within the Indian clinical setting.

Our study aims to substantiate the association between lipid status, mood disorders, and the multidimensional aspects of Quality of Life among patients with chronic diabetes Mellitus. By exploring these interrelationships in a tertiary care context, this study looks to contribute to a more holistic understanding of integrated metabolic and mental health in chronic disease management.

Materials and Methods

The study protocol was reviewed and approved by the Institutional Human Ethics Committee (IHEC) of the institute (IEC Approval Number: 14/405). The study was ethically conducted in according to the Declaration of Helsinki. All eligible participants were administered a detailed Participant Information Sheet (PIS) explaining the objectives, procedures, benefits and risks of the study. Adequate time was given for clarification of doubts, and written informed consent was obtained from all participants before inclusion. Confidentiality of personal and clinical information was strictly maintained by anonymizing data using unique identification codes, and participants were assured of their right to withdraw from the study at any stage without affecting their ongoing treatment.

This cross-sectional study was conducted in the Departments of Medicine and Endocrinology at a tertiary care teaching hospital in Coimbatore between January 2014 and June 2014. The study population comprised patients diagnosed with Diabetes Mellitus attending outpatient and inpatient services during the study period. Participants were selected using purposive sampling based on predefined eligibility criteria.

Patients aged between 30 and 60 years, of either gender, with a documented diagnosis of Diabetes Mellitus for at least five years were included in the study. Patients with juvenile-onset diabetes mellitus, intellectual disability, comorbid neurological disorders such as cerebrovascular accidents or neurodegenerative diseases, acute exacerbations of chronic illnesses, terminal conditions including malignancy, or those currently receiving psychotropic medications were excluded to minimize confounding factors in psychiatric assessment. Individuals unwilling to provide informed consent were also excluded.

After enrollment, sociodemographic details including age, gender, marital status, and socioeconomic status were recorded using a structured proforma. Clinical details related to duration of diabetes and relevant medical history were obtained from medical records and patient interviews. Metabolic assessment was carried out through evaluation of fasting lipid profiles obtained from hospital laboratory records. Based on lipid parameters, participants were categorized into two groups: those with elevated lipid levels (dyslipidaemia) and those with normal lipid profiles, as per standard laboratory reference values.

Psychiatric assessment was done using the Mini International Neuropsychiatric Interview (M.I.N.I.) Plus 5.0 which is a structured diagnostic interview tool designed to identify major Axis I psychiatric disorders according to DSM-IV criteria. Quality of Life was assessed using the World Health Organization Quality of Life–BREF (WHOQOL-BREF) questionnaire. It evaluates four domains - Physical, Psychological, Social Relationships, and Environmental Health. It was administered in the local vernacular language and standard scoring procedures were used to calculate domain-specific mean scores.

All data collected was entered and cross-verified and statistical analysis was performed. Descriptive statistics were used to sum-up sociodemographic and clinical characteristics. Categorical variables were expressed as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation. The association between lipid status and psychiatric diagnoses was analyzed using the Chi-square test. Independent sample t-tests were applied to compare mean Quality of Life domain scores between dyslipidemic and non-dyslipidemic groups. A P value of less than 0.05 was considered statistically significant.

Results

The study cohort comprised of 50 participants. A majority of the population (74%), were females, with nearly half falling within the 50–60-year age group (48%). 76% of the study population were in the middle-income group and a significant proportion of participants (94%) were married. All participants had a primary diagnosis of Diabetes Mellitus for a minimum of five years (Table 1).

Table 1. Sociodemographic Profile of the Study Population (n=50)

Characteristic	**Category**	**Frequency (n)**	**Percentage (%)**
Age (Years)	30–40	8	16%
	40–50	18	36%
	50–60	24	48%
Gender	Male	13	26%

Characteristic	**Category**	**Frequency (n)**	**Percentage (%)**
	Female	37	74%
Socio-economic Status	Middle	38	76%
	Lower	12	24%
Marital Status	Married	47	94%
	Unmarried	3	6%

Comorbid dyslipidaemia was detected in 68% of the study participants and 32% had normal lipid levels. Psychiatric assessment was done using the The Mini-International Neuropsychiatric Interview Plus (M.I.N.I. Plus 5.0) and it identified the presence of mood disorders within the study population. Out of the participants in the group with dyslipidaemia, 2.9% fulfilled the criteria for a Major Depressive Episode (MDE). Notably, patients with normal lipid levels showed a higher incidence of MDE with melancholic features (12.5%) and Dysthymia (6.3%). Though the prevalence highlighted a probable association between lipid status and psychiatric illnesses, there was no significant association (P = 0.068) (Table 2).

Table 2. Psychiatric comorbidities and dyslipidaemia of the study sample

Dyslipidaemia	None	Major depressive episode	Major depressive episode with melancholia	Dysthymia	P value
Elevated	33(97.1%)	1(2.9%)	0(0%)	0(0%)	0.068
Normal	13(81.3%)	0(0%)	2(12.5%)	1(6.3%)	

The influence of the lipid levels on patient-reported outcomes was evaluated among the four domains of the WHOQOL-BREF. Analysis of the results highlighted that physical and psychological health scores were comparable between the two groups; though, environmental quality of life varied. There were no statistically significant differences between the Physical, Psychological, or social domains ($P > 0.05$), which shows that both groups perceived similar levels of physical burden and social support within the cohort with diabetes. However, the environmental domain showed a statistically significant difference ($P = 0.018$). Patients with increased levels of lipids showed a lower mean Environmental QoL score (64.03 ± 7.2) when compared to people with normal lipid levels (69.00 ± 5.4). (Table 3).

Table 3. Comparison of Quality of Life (QoL) Scores by Lipid Status

Quality of life	Dyslipidaemia	Mean ± SD	P Value
Physical	Elevated	58.65± 7.7	0.710
	Normal	59.50± 7.3	
Psychological	Elevated	58.91±8.6	0.591
	Normal	60.31±8.6	
Social	Elevated	67.76±8.3	0.459
	Normal	69.56±7.3	
Environmental	Elevated	64.03±7.2	0.018
	Normal	69.00±5.4	

Discussion

Our study explored the multi interactions between Diabetes Mellitus, dyslipidaemia, psychiatric comorbidities, and Quality of Life, among adults in a tertiary care centre in Western Tamilnadu. Majority of the study population were women (74%), and most of them were in the age group of 50-60 year. This above pattern highlights the already proven propensity of middle aged individuals, especially women to metabolic and endocrine disturbances associated with long term diabetes mellitus. The presence of a long term illness in our study population, with the minimum duration of 5 years further underlines the added metabolic stress influencing physical, mental and psychological outcomes.

There was a high prevalence of dyslipidaemia in our study population showing the very frequent association of metabolic risk factors in people with long standing and chronic Type 2 diabetes mellitus. This is in accordance with the already proven physiological link between insulin resistance and an abnormal lipid metabolism. As suggested by the American Diabetes Association in 2024, diabetic dyslipidaemia is a classic feature of T2DM, usually characterised by increased triglycerides and reduced HDL levels. The abnormal lipid levels contribute in high levels to cardiovascular morbidity among patients with long standing diabetes [6]. Similar observations were noted by Rubin and Peyrot, who showed that diabetes and its metabolic complications negatively affected overall Quality of Life in many domains, underscoring the need for comprehensive metabolic control [7].

An interesting yet statistically non-significant trend came up in relation to psychiatric comorbidities. Very few (2.9%) patients in the dyslipidemic group fulfilled the criteria for Major Depressive Episodes (MDE) but then, the group with normal lipid levels showed a relatively higher proportion of MDE with melancholic features (12.5%) and Dysthymia (6.3%), with the association

not statistically significant (P = 0.068). The "cholesterol–serotonin hypothesis" proposes that lower serum cholesterol levels may influence serotonergic neurotransmission, predisposing individuals to few depressive subtypes. Huang (2005) showed associations between serum lipid levels and specific subtypes of major depression, especially melancholic presentations of major depression [8]. Also, Anderson et al. in their study showed that depression is significantly more present among diabetics than in the general population, supporting the bidirectional relationship between metabolic and psychiatric disorders. Though dyslipidaemia is usually considered as a negative factor to physical health, lower lipid levels may not necessarily confer psychological protection. Additionally, people with normal lipid profiles may be under stringent lifestyle modifications, which could cause increased stress and thereby cause emotional burden. However, given the small sample size, these findings should be interpreted with caution necessitating further research in larger groups [9].

The statistically significant finding of our present study was the difference observed in the Environmental domain of the WHOQOL-BREF (P = 0.018). Patients with high levels of lipids reported significant lowering of environmental Quality of Life scores, when compared to people with normal lipid levels. According to the World Health Organization (1998), the Environmental domain of health includes financial resources, physical safety, health care accessibility, and aspects of the home environment [10]. The lesser scores in this domain among patients with dyslipidaemia may show the effect of cumulative socioeconomic strain due to the burden of multiple chronic conditions. The dual effect of diabetes and dyslipidaemia often requires more medications, laboratory investigations, dietary adjustments, and frequent medical consultations, which can increase healthcare-related expenditures and perceived financial insecurity.

Similar findings were observed by Wexler et al., who showed that an increasing burden of comorbid conditions in T2DM is significantly associated with reduced Quality of Life in relation to health. This was more seen in domains associated to environmental and economic factors [11]. Vahedi showed that increased burden of comorbidities is postulated to a decrease in perceived Quality of Life, especially in the environmental dimension. [12]. Our study puts forward that physical, psychological, and social perceptions may remain relatively stable across lipid level categories but environmental stressors play an important role in deciding overall well-being. These findings underline the importance of socioeconomic determinants of health along with clinical parameters in management of chronic diseases.

Conclusion

The study results highlight the need for an integrated and holistic approach to management of diabetes. Management should include measures above lipid and sugar control and should include routine screening for psychiatric comorbidities and evaluation of environmental stressors that may compromise Quality of Life. Socioeconomic challenges should be looked into and combining mental health assessment into routine metabolic care may result in better overall patient well being and long-term outcomes.

Statements and Declarations

Conflicts of interest

The authors declare that they do not have conflict of interest.

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