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Original Research Article

Association between serum lipid profile and erectile dysfunction in adult patients with type 2 diabetes mellitus

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ABSTRACT

Background: Diabetes mellitus (DM) is a major global health concern, with men affected having a threefold higher risk of erectile dysfunction (ED) than non-diabetic men. The study aims to determine the association between serum lipid profile abnormalities and ED in adult patients with type 2 diabetes mellitus (T2DM).
Methods: This cross-sectional study at the Departments of Dermatology and Venereology and Endocrinology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh (March 2019–July 2020) included 382 married men with T2DM. Age, body mass index (BMI), diabetes duration, glycated haemoglobin (HbA1c), and lipid profile were recorded. ED was assessed using the Bengali IIEF-5 and classified as severe, moderate, mild, or no ED. Data were analyzed with statistical package for the social sciences (SPSS) v23.0 (t-test, Chi-square; $p \leq 0.05$).
Results: Among 382 men with type 2 diabetes, 158 (41.4%) had ED. Those with ED were older (48.7 versus 44.3 years), had higher BMI (26.5 versus 25.9 kg/m²), higher HbA1c (8.21 versus 7.95), and longer diabetes duration (7.14 versus 5.95 years; all $p \leq 0.05$). ED severity was severe 10.2%, moderate 13.4%, and mild 17.8%. Triglycerides were higher (225.1 versus 200.8 mg/dl, $p<0.001$) and LDL-C slightly lower (131.97 versus 136.02 mg/dl, $p=0.025$), with no differences in total cholesterol or HDL-C.
Conclusion: Elevated triglycerides and slightly lower LDL-C are associated with erectile dysfunction in men with T2DM, highlighting the role of lipid abnormalities in its development.

Keywords: Serum lipids, Erectile dysfunction, T2DM

INTRODUCTION

Diabetes mellitus (DM) represents a major public health issue worldwide, with projections indicating that nearly 629 million people may be affected by 2045, most of them living in low- and middle-income nations.[1] The disease continues to rise globally, and estimates suggest that about 592 million individuals could develop DM by 2035.[2,3] The complications related to DM pose a notable clinical burden, as the condition can lead to macroangiopathic and microangiopathic damage, along with various forms of sexual dysfunction in both men and women.[4] On a global scale, people with diabetes constitute the largest population at risk for erectile dysfunction (ED), with more than 422 million cases already reported.[5,6]

Research consistently shows that men with diabetes have almost three times the risk of developing ED compared to those without the disease and tend to experience ED 10–15 years earlier.[7,8] Among individuals with type 2 diabetes mellitus (T2DM), the prevalence of ED is estimated at around 50%, although some populations demonstrate even higher rates, such as 94.7% reported in certain populations.[9] Evidence indicates that individuals living with diabetes are more prone to developing ED, with over half of diabetic patients experiencing some degree of erectile impairment.[10,11] In diabetic men, ED tends to appear earlier, manifests with greater severity, and has a more detrimental effect on quality of life than in the general population.[12] Moreover, the presence of microvascular and macrovascular diabetic complications

further increases the likelihood of ED, and its occurrence has been shown to rise progressively with age.[13-15] Several clinical and population-based investigations have also suggested an association between ED and metabolic syndrome (MS).[16,17]

ED arises from a wide range of contributing factors, involving both biological and psychological elements. It is strongly linked with metabolic abnormalities such as hyperlipidemia, hypertension, and diabetes, in addition to mental health conditions like anxiety and depression.[18] Dyslipidemia has been recognized as a significant independent determinant of ED, and numerous studies have documented a relationship between elevated lipid levels and erectile impairment.[19,20] Research in the general population similarly demonstrates connections between dyslipidemia and ED, with growing biomedical evidence pointing toward vascular pathways through which lipid disturbances may exert their effects.[21-24] Experimental animal studies also reinforce the involvement of lipid profile abnormalities in the development of ED.[25] Specific serum indicators of dyslipidemia—including the HDL-c to total cholesterol (TC) ratio, and concentrations of HDL-c and LDL-c—have been identified as predictors of ED.[26] Because patients with DM commonly exhibit hyperlipidemia, their susceptibility to vascular disease is increased, and improvements in erectile function have been observed with statin use in men with dyslipidemia.[27] Collectively, these findings underline the potential importance of lipid metabolism in both the risk and management of ED.

Despite increasing evidence linking dyslipidemia to erectile dysfunction, much of the current understanding derives from studies conducted in non-diabetic or mixed populations, leaving uncertainty regarding how specific lipid abnormalities contribute to ED risk among individuals with T2DM. Furthermore, many available studies focus on isolated lipid parameters or examine ED as a secondary outcome, providing limited clarity on the comparative lipid profile differences between diabetic men with and without ED.

Data from South Asian populations—particularly Bangladesh—remain scarce, even though this region carries a rapidly rising burden of both T2DM and diabetes-related sexual dysfunction. As a result, the extent to which serum lipid abnormalities influence ED in adult Bangladeshi men with T2DM has not been adequately explored. The purpose of the study is to determine the association between serum lipid profile abnormalities and erectile dysfunction in adult patients with type 2 diabetes mellitus.

Objective

The objective was to determine the association between serum lipid profile abnormalities and ED in adult patients with T2DM.

METHODS

This cross-sectional, observational study was conducted at the Departments of Dermatology and Venereology and Endocrinology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from March 2019 to July 2020. A total of 382 married men with T2DM were included. Participants were selected based on specific inclusion and exclusion criteria to investigate the association between serum lipid profile abnormalities and ED in adult patients with T2DM.

Inclusion criteria

Inclusion criteria included men with T2DM who are sexually active and attending the study clinics, age between 21 and 59 years, active sexual relationship for at least the past 6 months and capable of completing a self-administered questionnaire.

Exclusion criteria

Exclusion criteria included individual with history of lower urinary tract, urethral, or penile surgery, history of pelvic fracture, history of spinal injury or surgery, uses medications affecting erectile function, having known diseases of the male genitalia, uncontrolled hypertension or dyslipidemia, uses of beta-blockers, diuretics, or similar medications affecting sexual function, having psychological disorders, including anxiety or depression, having major medical illnesses (e.g., renal, hepatic, or cardiovascular disease) and thyroid or other gonadal hormone deficiencies.

Demographic variables included age, while clinical variables comprised body mass index (BMI) and duration of diabetes. Biochemical variables included HbA1c and serum lipid profile. Erectile function, the primary outcome, was assessed using the validated Bengali version of the international index of erectile function (IIEF-5) questionnaire. ED severity was classified as severe (≤10), moderate (11–16), mild (17–25), or no ED (≥26). Data were analyzed using statistical package for the social sciences (SPSS) version 23.0. Continuous variables are presented as mean±standard deviation (SD) and categorical variables as percentages. Comparisons between participants with and without ED were performed using student's t-test or Chi-square test, and $p \leq 0.05$ was considered statistically significant. The study protocol was approved by the Institutional Review Board of BSMMU. Written informed consent was obtained from all participants, and confidentiality, voluntary participation, and the right to withdraw were ensured.

RESULTS

Table 1 presents the baseline characteristics of type 2 diabetic men (n=382) with and without ED. Participants with ED were significantly older (48.7±7.39 versus 44.3±6.25 years, p=0.015) and had higher BMI (26.5±2.70

versus 25.9±2.89 kg/m², p=0.042) compared to those without ED. Glycemic control, as indicated by HbA1c, was significantly poorer in the ED group (8.21±0.82 versus 7.95±0.91, p=0.005). Additionally, the duration of T2DM was longer among participants with ED (7.14±2.68 versus 5.95±2.54 years, p<0.001).

Table 1: Baseline characteristics of participants with and without erectile dysfunction (n=382).

Variable	With ED (n=158), mean±SD	Without ED (n=224), mean±SD	P value
Age (years)	48.7±7.39	44.3±6.25	0.015
BMI (kg/m²)	26.5±2.70	25.9±2.89	0.042
HbA1c	8.21±0.82	7.95±0.91	0.005
Duration of T2DM (years)	7.14±2.68	5.95±2.54	<0.001

Table 2 shows the prevalence of ED among the 382 adult male participants with type 2 diabetes mellitus. Overall, 41.4% of participants had ED, while 58.6% did not.

Table 3 presents the severity of ED among the 382 adult male participants with T2DM. Among those affected, 10.2% had severe ED, 13.4% had moderate ED, and 17.8% had mild ED, while 58.6% of participants did not exhibit ED.

Table 4 compares the lipid profiles of type 2 diabetic men with and without ED. Participants with ED had significantly higher triglyceride levels (225.10±64.69 versus 200.77±54.10 mg/dl, p<0.001) and slightly lower LDL-C levels (131.97±15.33 versus 136.02±18.68 mg/dl, p=0.025) compared to those without ED. No significant differences were observed in total cholesterol or HDL-C levels.

Table 2: Prevalence of erectile dysfunction among study participants (n=382).

ED status	Number of respondents	Percentage
With ED	158	41.4
Without ED	224	58.6

Table 3: Severity of erectile dysfunction among study participants (n=382).

Severity category	Number of respondents	Percentage of patients
Severe ED (≤10)	39	10.2
Moderate ED (11–16)	51	13.4
Mild ED (17-25)	68	17.8
No ED (>26)	224	58.6

Table 4: Comparison of lipid profile between participants with and without erectile dysfunction (n=382).

Lipid profile	With ED (n=158) mean±SD	Without ED (n=224) mean±SD	P value
Total cholesterol (mg/dl)	192.54±26.56	190.85±27.48	0.548
Triglycerides (mg/dl)	225.10±64.69	200.77±54.10	<0.001
LDL-C (mg/dl)	131.97±15.33	136.02±18.68	0.025
HDL-C (mg/dl)	40.41±5.33	41.07±5.98	0.270

DISCUSSION

ED is a common complication among men with T2DM, affecting both physical and psychosocial well-being. The condition significantly impairs quality of life and can serve as an early indicator of underlying vascular and metabolic disturbances. Assessment of serum lipid profile abnormalities in diabetic men provides important insights into the pathophysiology of ED, as dyslipidemia may contribute to endothelial dysfunction and vascular compromise. The findings of this study demonstrate that altered lipid parameters, particularly elevated triglycerides and changes in LDL-C, are associated with the presence of ED, highlighting the relevance of lipid metabolism in the development and severity of erectile dysfunction among patients with T2DM.

In the present study, men with ED were significantly older, had higher BMI, and longer duration of T2DM compared to those without ED, highlighting the contribution of age-related vascular changes, excess adiposity, and prolonged metabolic exposure to sexual dysfunction. These findings align with Abdlshikure et al, who identified age above 40 years, BMI ≥25 kg/m², and diabetes duration over five years as independent predictors of ED, along with other metabolic derangements, underscoring the relevance of these baseline characteristics in diabetic populations.[28] Similarly, Parmar et al reported a strong negative correlation between erectile function and age, as well as a moderate negative correlation with diabetes duration, with BMI showing weaker yet notable associations—patterns consistent with our cohort, reinforcing that increasing age, higher BMI, and longer diabetes duration are robust determinants of ED in men with T2DM.[29]

The distribution of ED severity in our study showed mild, moderate, and severe ED in 17.8%, 13.4%, and 10.2% of participants, respectively, reflecting a substantial burden

of sexual dysfunction. Comparable patterns have been reported by Giugliano et al, who found 9% mild, 11.2% mild-to-moderate, 16.9% moderate, and 22.9% severe ED among 555 diabetic men, and by Xu et al, who observed ED in 64.2% of 495 men with T2DM with severity distributed as 11.6% mild, 20.4% mild-to-moderate, 29.9% moderate, and 38.1% severe.[30,31] Although the proportion of severe ED in our study was lower, the overall pattern of graded dysfunction is consistent, reinforcing the high prevalence and spectrum of ED in diabetic populations, and highlighting the importance of routine screening and early intervention.

Pearson correlation analysis revealed significant negative relationships between IIEF-5 score and age (r=–0.131, p=0.011), diabetes duration (r=–0.359, p<0.001), and HbA1c (r=–0.242, p<0.001), indicating that older age, prolonged diabetes, and poorer glycemic control are associated with more severe ED. BMI showed a weak, non-significant negative correlation (r=–0.085, p=0.095). These findings are in line with Tamrakar et al, who reported significant negative correlations of IIEF-5 with both diabetes duration (r=–0.416) and HbA1c (r=–0.391), and Goyal et al, who found significant associations of ED with age, diabetes duration, BMI, and glycemic control in 348 men with T2DM, supporting the relevance of these variables as predictors of ED severity.[33]

Multivariate logistic regression in our study identified higher HbA1c, overweight status, and T2DM duration exceeding 10 years as significant predictors of ED, while age above 50 years was not statistically significant. These results are consistent with Parmar et al, who found age, systolic blood pressure, diabetes duration, and fasting blood sugar as independent predictors of ED in 357 diabetic men, and with Mahbub et al, who reported that ED prevalence increased with age and longer diabetes duration, with poor glycemic control and prolonged diabetes significantly associated with higher ED frequency and severity in 508 men with T2DM.[29,34]

Collectively, these findings highlight that poor glycemic control, longer diabetes duration, and higher BMI are key clinical determinants of ED among men with T2DM.

Limitations

The study had several limitations like the cross-sectional design prevents establishing causality between lipid abnormalities and ED. ED severity was self-reported, which may introduce recall and social desirability bias; no objective clinical assessments were performed.

The study was conducted at a single center, limiting generalizability to broader populations. Psychological factors, lifestyle habits, and medication use, which can influence ED, were not comprehensively evaluated. Residual confounding factors may affect the observed associations between diabetes and ED.

CONCLUSION

ED is a common complication in men with T2DM and is influenced by metabolic factors. In this study, ED was associated with older age, higher BMI, poorer glycemic control, and longer diabetes duration. Notably, participants with ED had significantly higher triglyceride levels and slightly lower LDL-C, while total cholesterol and HDL-C were similar, suggesting that specific lipid abnormalities may contribute to ED in this population.

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