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Prevalence and Associated Factors of Erectile Dysfunction among Filipino Men with Type 2 Diabetes Mellitus in a Tertiary Hospital in San Juan City, Metro Manila, Philippines

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Abstract

Background. Erectile dysfunction (ED) is a common complication among men with Type 2 Diabetes Mellitus (T2DM), but updated data from the Philippines remain limited. This study determined the prevalence of ED and evaluated associated clinical and socioeconomic factors among Filipino men with T2DM.

Methodology. We conducted a cross-sectional study among 384 adult Filipino men with T2DM recruited from private clinics, an outpatient service clinic, and an affiliated community clinic of Cardinal Santos Medical Center. ED was assessed using the International Index of Erectile Function-5 (IIEF-5). Comparative analyses between participants with and without ED were performed, followed by multivariable logistic regression analysis. Results are presented as adjusted odds ratios (AORs) with 95% confidence intervals (CIs).

Results. The prevalence of erectile dysfunction (ED) among Filipino men with T2DM in this study was 88.02% (338/384; 95% CI: 84.4–91.1). Common comorbidities in the study population included hypertension (67.45%), dyslipidemia (44.53%), and coronary artery disease (26.56%). Regarding glycemic control, only 30.31% of participants had an HbA1c level <7%. Participants with ED were significantly older than those without ED (median age: 60 [IQR 17] vs 48 years [IQR 15], p <0.001) and were more likely to have a longer duration of diabetes. On multivariable analysis, dyslipidemia remained independently associated with higher odds of ED (AOR = 2.57, 95% CI: 1.20–5.53; p = 0.015), whereas higher socioeconomic status was associated with lower odds of ED (AOR = 0.31, 95% CI: 0.13–0.75; p = 0.010).

Conclusion. ED was highly prevalent among Filipino men with T2DM included in this study. Dyslipidemia and socioeconomic status were independently associated with ED and may help identify patients who could benefit from more thorough screening. Further studies involving larger cohorts and improved sampling methods are needed to validate these findings and better understand the factors underlying the high prevalence of ED observed in this population.

Key words: erectile dysfunction, diabetes mellitus, Filipino, prevalence

INTRODUCTION

In the general Asian population, the overall reported prevalence of erectile dysfunction (ED) ranges from 2% to 81.8%.[1] In the Philippines, the prevalence is approximately 33% to 65%.[1] Compared to the general population, the prevalence of ED among patients with type 2 diabetes mellitus (T2DM) ranges from 35 to 90%, and men with diabetes mellitus have an approximately three-fold increased risk of developing ED.[2-4] In addition, ED presents 10–15 years earlier in men diagnosed with diabetes, and more severe cases were associated with a poorer quality of life.[5]

Erectile dysfunction (ED) is a common problem in men worldwide. ED is defined as the persistent inability to attain and maintain an erection to allow satisfactory sexual performance resulting from vascular endothelial damage from various cardiovascular risk factors, including hypertension, diabetes mellitus, hyperlipidemia, and smoking.[6] This damage results in vascular obstruction, plaque rupture, thrombosis, arteriosclerosis, and erectile

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dysfunction (ED).[4] Additionally, increased body mass index (BMI) is associated with a higher risk of ED, with obesity linked to a 1.3-fold greater risk compared to normal weight, as well as a positive correlation between obesity and the risk of moderate/severe ED. It is a crucial global disease affecting physical health, mental health, and overall quality of life. A study has shown that the presence of ED significantly impacts the quality of life in men.[7,8] Unfortunately, its presence is not routinely elicited during patient encounters due to various cultural factors.[9] Most of the available literature and epidemiologic studies on ED in diabetes mellitus and associated chronic conditions such as hypertension and cardiovascular disorders and other associated factors such as obesity, dyslipidemia, metabolic syndrome, cigarette smoking, stress, anxiety, and depression are based on Western populations.[3] The relationship between socioeconomic factors and erectile dysfunction (ED) remains unclear, with studies reporting inconsistent findings.[10,11]

Previous studies on the prevalence of erectile dysfunction (ED) in the Philippines date back two decades, with the studies of Zulueta et al., and Piores et al.[12,13] A more recent study conducted in 2019 specifically focused on the patients' demographics.[14] While these studies provide valuable insights, the epidemiology may have changed due to rapid changes in diabetes management, lifestyle patterns, and socioeconomic conditions. Despite the extensive global research on erectile dysfunction (ED), there remains a lack of recent data from the Philippines and the Southeast Asian region addressing these shifts. To fill this gap, the current study aims to provide updated data on ED prevalence among Filipino men with T2DM, considering evolving clinical and demographic factors. Additionally, this study utilizes the IIEF-5 questionnaire, a shorter, more user-friendly tool, to ensure efficient and accurate assessments of ED.

The International Index of Erectile Function (IIEF-5) was developed to diagnose the presence and severity of ED.[15] The five items in this questionnaire focused on erectile function and intercourse satisfaction and is considered an excellent diagnostic test. A cutoff score of 21 (range of scores, 5-25) discriminated best (sensitivity = 0.98, specificity = 0. 88). ED was classified into five severity levels, ranging from none (22-25) to severe (5-7). IIEF-5 possesses favorable properties for detecting the presence and severity of ED.[15] Hence, in this study, we aim to determine the prevalence of ED among Filipino men with diabetes mellitus and to identify associated medical and socioeconomic risk factors.

OBJECTIVES

General objective

This study determined the prevalence of erectile dysfunction and its associated risk factors among Filipino men with Type 2 Diabetes Mellitus in Cardinal Santos Medical Center, San Juan, Philippines.

Specific objectives

This study compared the demographics including family history, lifestyle, educational, professional, marital status and socioeconomic factors of patients with versus without ED among Filipino men diagnosed with type 2 DM. This study also determined the association of glycemic control, duration of diabetes, BMI, presence of cardiovascular risk factors, dyslipidemia, hypertension, and coronary artery disease of patients with versus without ED among Filipino men diagnosed with type 2 DM.

METHODOLOGY

Study design

This was a cross-sectional study conducted from March 1, 2024 to February 28, 2025 at selected private clinics, an outpatient service clinic, and an affiliated community health clinic of Cardinal Santos Medical Center in San Juan City, Philippines. Adult male patients with T2DM were recruited through convenience sampling. All participants provided informed consent before enrolment. The study was approved by the Cardinal Santos Medical Center Research Center and Research Ethics Review Committee (CRC TM 2023-42; 2023-060).

Study population

Adult male patients with type 2 diabetes mellitus (DM) were recruited using convenience sampling. Participants in this study had to meet the following inclusion criteria: (1) Male patients with type 2 diabetes (according to the American Diabetes Association criteria for type 2 diabetes), (2) Aged 18 years or older, and (3) Sexually active. The exclusion criteria were: (1) Patients unwilling to give consent, (2) history of anatomical abnormalities of the genitourinary system, (3) history of gonadectomy or pelvic surgery, (4) type 1 diabetes, (5) patients with chronic kidney disease on hemodialysis, (6) history of organ transplantation, (7) History of alcoholism or substance abuse within the past 12 months, (8) primary diagnosis of hyposexuality, (9) inability to complete a self-administered questionnaire due to eye or extremity disabilities, and (10) inability to understand English or Filipino. The participant selection and data collection process is summarized in Figure 1.

Sample size estimate and procedure

This study considered a 53% prevalence of ED in Philippines, and the minimum sample size requirement was computed using R version 4.0.3.[1] A sample size of 383 participants is needed to estimate of prevalence of erectile dysfunction among patients with type 2 diabetes mellitus, with 5% half-width precision and 95% level of significance in a population with expected prevalence of 53%.[1] A sample size of 222 is needed to achieve 80% power with 5% level of significance in a logistic regression analysis to detect a desired odds ratio of at least 1.68 (small effect

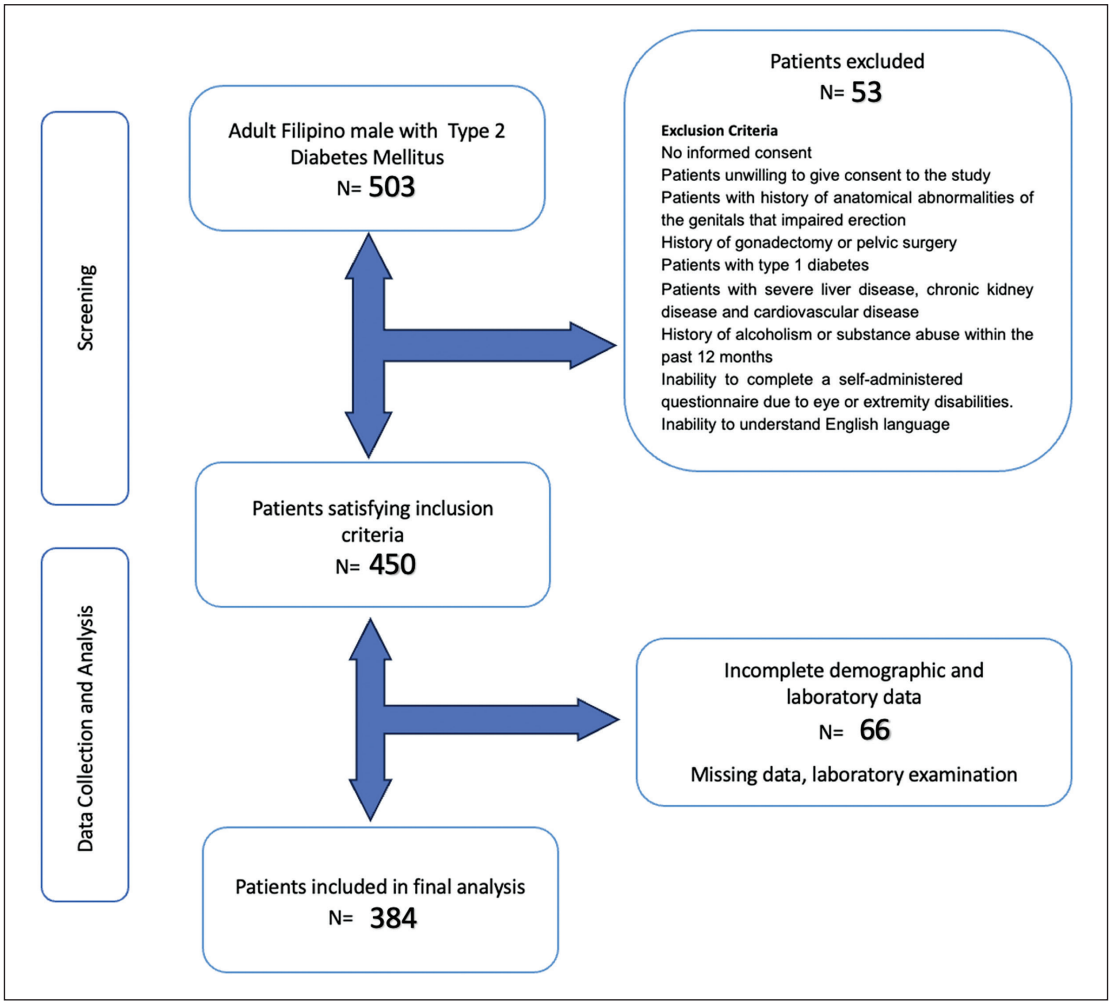

Figure 1. Participant selection and data collection flowchart. Of 503 patients screened, 450 met the inclusion criteria. After further exclusions due to incomplete data, 384 were included in the final analysis.

size) in a population expected to have 53% prevalence of erectile dysfunction, and an R-squared of about 40% for the different co-variates.[5]

Data analysis

The demographic and clinical profile of male patients with type 2 diabetes mellitus consulting Cardinal Santos Medical Center and community clinic were summarized by descriptive statistics. Numerical variables were described as median and interquartile range. Categorical variables were described as frequency and percentage. The prevalence of erectile dysfunction among patients with type 2 diabetes mellitus were determined and reported as point estimate and 95% confidence interval. The association of duration of diabetes, glycemic control, diabetes treatment, BMI, smoking, alcohol use, physical activities, hypertension, dyslipidemia, and social status with erectile dysfunction was determined by multivariable logistic regression analysis. Variable selection was performed by backward elimination with LR test <0.05 as criteria for variable retention.

The magnitude of the association was reported as the odds ratio with a 95% confidence interval, using multiple logistic regression to control for potential confounders. Data analysis was performed using Stata 17. Participants with incomplete questionnaires or missing key analytic variables were excluded prior to analysis and were not statistically imputed. The final analytic dataset included only complete cases; therefore, no missing values were present in the analyzed sample. Normality of distribution of numerical variables were assessed by Shapiro-Wilk test of normality. All tests of hypothesis were evaluated with significance level set at $\alpha = 0.05$.

RESULTS

Study population and prevalence of ED

A total of 384 participants were included in the study. The mean age of the study population was 58.65 + 12.71 years and the mean BMI was 28.12 ± 5.90 kg/m². Most participants had a family history of diabetes mellitus (76.04%), while 53.39% had a history of smoking and 27.86% reported alcohol consumption. Hypertension (67.45%), dyslipidemia (44.53%), and coronary artery disease (26.56%) were the most common comorbidities. Diabetes duration of more than 10 years was the most frequent category (39.84%),

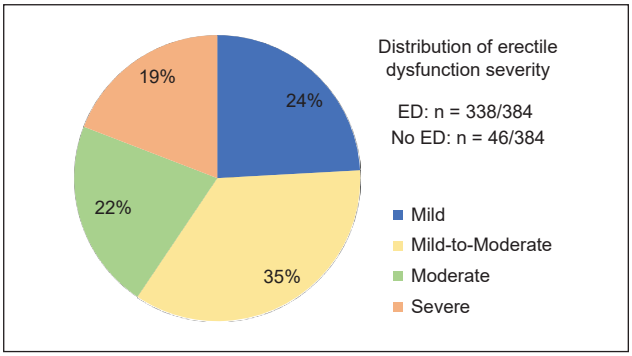

Figure 2. Distribution of erectile dysfunction severity. The proportions of mild, mild-to-moderate, moderate, and severe cases were 23.96% (n = 81), 34.91% (n = 118), 22.19% (n = 75), and 18.93% (n = 64), respectively.

while 30.31% of participants had an HbA1c level <7%. The demographic and clinical characteristics of the study cohort are summarized in Tables 1 and 2.

Among the 384 participants, 338 had erectile dysfunction, corresponding to a prevalence of 88.02% (95% CI: 84.4–91.1). Based on the IIEF-5, ED severity was classified as mild in 23.96%, mild-to-moderate in 34.91%, moderate in 22.19%, and severe in 18.93% of affected participants (Figure 2). Comparisons between participants with and without ED are presented in Tables 3 and 4.

Comparative analysis of patients with and without erectile dysfunction

Demographic and lifestyle factors

Participants with ED were significantly older than those without ED (median age: 60 (IQR 17) vs 48 years (IQR 15), p <0.001). Longer diabetes duration (>10 years) was more common in the ED group (42.60% vs 19.57%, p = 0.007) (Figure 3).

Occupation, educational attainment, and socioeconomic status were also significantly associated with ED (Table 3). Compared with participants without ED, those with ED were less likely to have white-collar occupations, attain higher levels of education, and belong to the high socioeconomic status group. Other demographic and lifestyle factors, including marital status, smoking, alcohol intake, exercise were not significantly associated with ED.

Table 1. Demographic and lifestyle characteristics of the study population (n = 384)

	Full cohort, n = 384 Mean (SD); min to max, or frequency (%)
Age (years)	58.65 (12.71); 27 to 78
Family history of DM	292 (76.04%)
Smoking (pack-years)	
Never-smoker	179 (46.61%)
Light smoker (1-10)	111 (28.91%)
Moderate smoker (11-20)	49 (12.76%)
Heavy smoker (>20)	45 (11.72%)
Drinking alcohol	107 (27.86%)
Exercise	
Regularly	127 (33.07%)
Sometimes	139 (36.20%)
Never	118 (30.73%)
Occupation	
White-collar	218 (56.77%)
Blue-collar	62 (16.15%)
Retired	104 (27.08%)
Education level	
Elementary graduate or less	4 (1.04%)
High School graduate or less	57 (14.84%)
College graduate or less	282 (73.44%)
Postgraduate	41 (10.68%)
Marital status	
Single	60 (15.62%)
Married	298 (77.60%)
Separated	4 (1.04%)
Widow	22 (5.73%)
Monthly household income	
Low socioeconomic status	100 (26.04%)
Middle socioeconomic status	73 (19.01%)
High socioeconomic status	211 (54.95%)

Values are presented as mean (standard deviation) with range or as frequency (%). DM, diabetes mellitus.

Table 2. Clinical and laboratory characteristics of the study population (n = 384)

	Full cohort, n = 384 Mean (SD); min to max, or frequency (%)
BMI (kg/m²)	28.12 (5.90); 12.41 to 59.51
Duration of DM (years)	
<1	58 (15.10%)
1-5	111 (28.91%)
6-10	62 (16.15%)
>10	153 (39.84%)
Comorbidities	
Hypertension	259 (67.45%)
Coronary artery disease	102 (26.56%)
Thyroid disease	16 (4.17%)
Chronic kidney disease	34 (8.85%)
Dyslipidemia	171 (44.53%)
Vital signs and laboratories	
SBP <140 mmHg	339 (88.28%)
DBP <90 mmHg	364 (94.79%)
Fasting plasma glucose <100 mg/dL	72 (18.75%)
HbA1c <7.0%	116 (30.31%)
Total cholesterol <200 mg/dL	297 (77.34%)
HDL >40 mg/dL	230 (59.90%)
LDL <100 mg/dL	230 (59.90%)
Triglycerides <150 mg/dL	244 (76.73%)
eGFR >89 mL/min/1.73 m²	182 (47.40%)

Values are presented as mean (standard deviation) with range or as frequency (%). BMI, body mass index; DM, diabetes mellitus; SBP, systolic blood pressure; DBP, diastolic blood pressure; HbA1c, glycated hemoglobin; HDL, high-density lipoprotein; LDL, low-density lipoprotein; eGFR, estimated glomerular filtration rate.

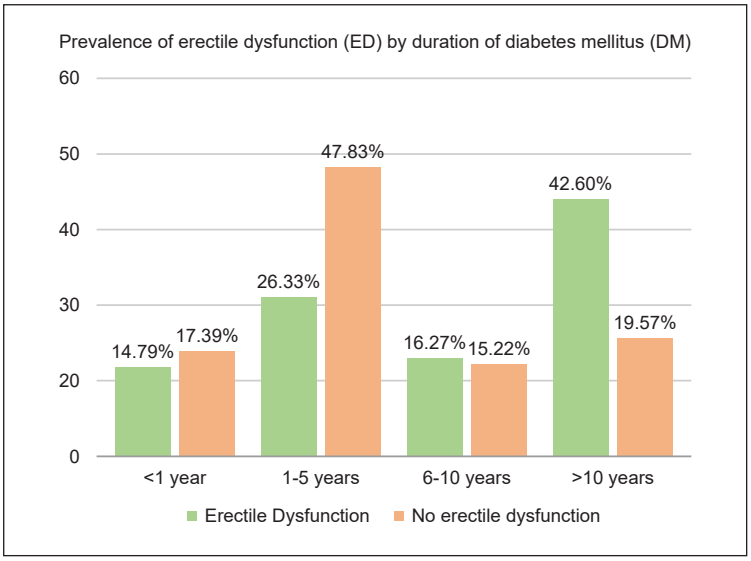

Figure 3. Prevalence of erectile dysfunction (ED) by duration of diabetes mellitus (DM) among diabetic patients. ED prevalence differed significantly across duration groups (<1 year, 1–5 years, 6–10 years, and >10 years) (P = 0.007).

Comorbidities and diabetes-related factors

Hypertension, coronary artery disease (CAD), and dyslipidemia were significantly associated with ED (Table 4). Compared with the non-ED group, participants with ED had higher rates of hypertension (69.52% vs 52.17%, p = 0.018), CAD (28.40% vs 13.04%, p = 0.027), and dyslipidemia (47.34% vs 23.9%, p = 0.003). No significant associations were observed for body mass index, family history of diabetes, thyroid disease, or chronic kidney disease (Table 4).

Table 3. Comparison of demographic and lifestyle characteristics between participants with and without erectile dysfunction (ED)

	ED, n = 338	No ED, n = 46	*P*-value
	Median (IQR); Frequency (%)		
Age (years)	60 (17)	48 (15)	<0.001
Marital status			0.765
Single	52 (15.38%)	8 (17.39%)	
Married	261 (77.22%)	37 (80.43%)	
Separated	4 (1.18%)	0	
Widow	21 (6.21%)	1 (2.17%)	
Smoking (pack-years)			0.880
Never-smoker	158 (46.75%)	21 (45.65%)	
Light smoker (1-10)	96 (28.40%)	15 (32.61%)	
Moderate smoker (11-20)	43 (12.72%)	6 (13.04%)	
Heavy smoker (>20)	41 (12.13%)	4 (8.70%)	
Drinking alcohol	94 (27.81%)	13 (28.26%)	0.949
Exercise			0.689
Regularly	114 (33.73%)	13 (28.26%)	
Sometimes	120 (35.50%)	19 (41.30%)	
Never	104 (30.77%)	14 (30.43%)	
Occupation			0.004*
White-collar	182 (53.85%)	36 (78.26%)	
Blue-collar	56 (16.57%)	6 (13.04%)	
Retired	100 (29.59%)	4 (8.70%)	
Education level			0.034*
Elementary graduate or less	4 (1.18%)	0	
High School graduate or less	56 (16.57%)	1 (2.17%)	
College graduate or less	243 (71.89%)	39 (84.78%)	
Post graduate	35 (10.36%)	6 (13.04%)	
Monthly household income			0.007*
Low socioeconomic status	92 (27.22%)	8 (17.39%)	
Middle socioeconomic status	70 (20.71%)	3 (6.52%)	
High socioeconomic status	176 (52.07%)	35 (76.09%)	

Prevalence of erectile dysfunction among patients with diabetes mellitus was 88.02% (95% CI, 84.35–91.09). Values are presented as median (interquartile range) or frequency (%). ED, erectile dysfunction; IQR, interquartile range. *P <0.05 was considered statistically significant.

Medications

Most participants with ED were receiving oral antidiabetic drugs alone (62.43%), followed by oral antidiabetic drugs with insulin (22.49%), insulin alone (9.76%), non-pharmacologic management (3.55%), and no treatment (1.78%). Statin use was higher in the ED group compared with the non-ED group (78.34% vs 65.22%, p = 0.048). No significant differences were observed between groups in the use of beta-blockers, calcium channel blockers, ARBs/ACE inhibitors, diuretics, or fibrates.

Vital signs and laboratory parameters

No significant differences were observed between participants with and without ED in systolic blood pressure, diastolic blood pressure, fasting plasma glucose, HbA1c, total cholesterol, HDL cholesterol, or triglyceride levels (all p >0.05). Significant differences were observed in LDL cholesterol and eGFR categories (Table 4). LDL cholesterol levels <100 mg/dL were more common among participants with ED (62.13% vs 43.48%, p = 0.015), whereas an eGFR >89 mL/min/1.73 m² was more common among participants without ED (71.74% vs 44.08%, p = 0.001).

Multivariable analysis of factors associated with erectile dysfunction

Variables found to be significant in univariate analyses were included in the multivariable logistic regression model (Table 5). Dyslipidemia remained independently associated with ED, with participants with dyslipidemia having higher odds of ED compared with those without dyslipidemia (AOR = 2.57, 95% CI: 1.20–5.53; p = 0.015). In contrast,

Table 4. Comparison of clinical characteristics of participants with and without erectile dysfunction (ED)

	ED, n = 338	No ED, n = 46	*P*-value
	Median (IQR); Frequency (%)		
BMI (kg/m²)			0.492
<18.5 (underweight)	4 (1.18%)	1 (2.17%)	
18.5-23.9 (normal)	76 (22.49%)	6 (13.04%)	
24-28.9 (overweight)	143 (42.31%)	21 (45.65%)	
>29 (obese)	115 (34.02%)	18 (39.13%)	
Duration of DM (years)			0.007
<1	50 (14.79%)	8 (17.39%)	
1-5	89 (26.33%)	22 (47.83%)	
6-10	55 (16.27%)	7 (15.22%)	
>10	144 (42.60%)	9 (19.57%)	
Family history of DM	254 (75.15%)	38 (82.61%)	0.266
Diabetes treatment			0.067
None	6 (1.78%)	0	
Non-pharmacologic	12 (3.55%)	1 (2.17%)	
OAD alone	211 (62.43%)	39 (84.78%)	
Insulin	33 (9.76%)	2 (4.35%)	
OAD and insulin	76 (22.49%)	4 (8.70%)	
Comorbidities			
Hypertension	235 (69.52%)	24 (52.17%)	0.018
Coronary artery disease	96 (28.40%)	6 (13.04%)	0.027
Thyroid disease	14 (4.14%)	2 (4.35%)	>0.999
Chronic kidney disease	29 (8.58%)	5 (10.87%)	0.582
Dyslipidemia	160 (47.34%)	11 (23.91%)	0.003
Hypertension treatment			
Beta blocker	63 (18.64%)	5 (10.87%)	0.195
CCB	94 (27.81%)	13 (28.26%)	0.949
ARB/ACE	141 (41.72%)	18 (39.13%)	0.738
Diuretics	8 (2.37%)	0	0.603
Alpha blocker	0	0	-
Dyslipidemia treatment			
Statins	264 (78.34%)	30 (65.22%)	0.048
Fibrates	18 (5.33%)	1 (2.17%)	0.713
Vital signs and laboratory parameters			
SBP <140 mmHg	297 (87.87%)	42 (91.30%)	0.497
DBP <90 mmHg	321 (94.97%)	43 (93.48%)	0.720
Fasting plasma glucose <100 mg/dL	63 (18.64%)	9 (19.57%)	0.880
HbA1c <7.0%	101 (29.88%)	15 (32.61%)	0.705
Total cholesterol <200 mg/dL	263 (77.81%)	34 (73.91%)	0.554
HDL >40 mg/dL	201 (59.47%)	29 (63.04%)	0.642
LDL <100 mg/dL	210 (62.13%)	20 (43.48%)	0.015*
Triglycerides <150 mg/dL	212 (75.99%)	32 (82.05%)	0.401
eGFR >89 mL/min/1.73 m²	149 (44.08%)	33 (71.74%)	0.001*

Values are presented as frequency (%). DM, diabetes mellitus; OAD, oral antidiabetic drug; CCB, calcium channel blocker; ARB, angiotensin receptor blocker; ACE, angiotensin-converting enzyme inhibitor; SBP, systolic blood pressure; DBP, diastolic blood pressure; HbA1c, glycated hemoglobin; HDL, high-density lipoprotein; LDL, low-density lipoprotein; eGFR, estimated glomerular filtration rate. **P* <0.05 was considered statistically significant.

participants with high socioeconomic status had lower odds of ED compared with those with low socioeconomic status (AOR = 0.31, 95% CI: 0.13–0.75; $p = 0.010$).

Hypertension (AOR = 1.98, 95% CI: 1.00–3.94; $p = 0.051$) and insulin use (AOR = 2.61, 95% CI: 0.96–7.08; $p = 0.060$) were associated with higher odds of ED but did not reach statistical significance in the adjusted model.

Table 5. Multivariable logistic regression analysis of factors associated with erectile dysfunction (ED)

Factors	AOR	95% CI	*p*-value
Duration of diabetes (years)			
<1	Reference		
1-5	0.75	0.28, 1.98	0.563
6-10	1.55	0.47, 5.04	0.470
>10	2.36	0.78, 7.17	0.130
Good glycemic control	1.38	0.65, 2.91	0.403
Oral antidiabetics	0.32	0.08, 1.25	0.101
Insulin	2.61	0.96, 7.08	0.060
BMI			
Underweight	0.31	0.02, 4.26	0.382
Normal	Reference		
Overweight	0.80	0.28, 2.28	0.674
Obese	1.01	0.34, 3.00	0.983
Smoking (pack-years)			
Never-smoker	Reference		
Light smoker (1-10)	0.79	0.36, 1.75	0.569
Moderate smoker (11-20)	0.82	0.29, 2.35	0.712
Heavy smoker (>20)	1.24	0.36, 4.24	0.728
Alcohol use	1.16	0.54, 2.47	0.704
Exercise			
Regularly	1.19	0.49, 2.93	0.701
Sometimes	0.82	0.35, 1.89	0.637
Never	Reference		
Hypertension	1.98	1.00, 3.94	0.051
Dyslipidemia	2.57	1.20, 5.53	0.015*
Social status			
Low socioeconomic status	Reference		
Middle socioeconomic status	1.64	0.40, 6.79	0.494
High socioeconomic status	0.31	0.13, 0.75	0.010*

Adjusted odds ratios (AOR) with 95% confidence intervals (CI) and *p*-values are presented. Reference categories are indicated. **P* <0.05 was considered statistically significant.

DISCUSSION

The main finding of this study is the high prevalence of ED among Filipino men with T2DM, affecting 88.02% of participants. The prevalence is generally higher in Asian and African countries: in the Philippines, it ranges from 78.8% to 99%, while studies in Ethiopia and Eastern Sudan report prevalences of 83.8% and 81.1%, respectively.[12,13,16,17] These data are likely influenced by socio-economic factors and healthcare access. In other Asian countries, ED prevalence in T2DM patients ranges from 59.38% to 64.2%, with a lower rate of 52.9% reported in a study in Europe.[5,6,18] The prevalence of ED in the Philippines remains high. This is consistent with previous studies of Zulueta et al., at 84.6%, Piores et al., at 99%, and Maniwang at 78.8%, reinforcing the consistent high burden of ED in the country.[12-14] Although most studies used the IIEF-5 tool for consistency, differences in sample size, methodology, and study design may affect the reported rates. A summary of these selected studies is presented in Table 6.

In the Philippines, health-seeking behavior, particularly concerning sexual health, is influenced by cultural, religious, and economic factors. Open discussions about sexual health are often stigmatized, leading to reluctance among men to seek medical advice. Economic barriers, such

as the cost of healthcare, further limit access to services, especially among lower-income populations.[19]

The persistently high prevalence of ED remains a serious concern. This study aims to improve glycemic control and prevent complications like ED, with a focus on early screening and treatment for men with diabetes who are at a higher risk of developing ED. Most research on ED in diabetes has focused on Western populations, but this study fills a gap by specifically addressing Filipino patients.

This expanded research initiative involves multiple sites, including hospital private clinics, outpatient services, and an affiliated community clinic, to raise awareness about the diagnosis of ED. Through engagement with diverse groups, the study estimated the prevalence and contributing factors of ED among Filipino men with diabetes to aid in enhancing early screening and treatment strategies for diabetic patients.

Age, duration of diabetes, and their role in ED

Age and the duration of diabetes were significantly associated with ED in this study, consistent with findings from both local and international studies.[6,12-14,16,20] While age alone played a significant role in the onset of ED, its impact was more pronounced when combined with a longer duration of diabetes.[21] Specifically in this study, the risk of ED increased with the duration of diabetes, with individuals having diabetes for over 10 years being 2.36 times more likely to develop ED compared to those with diabetes for less than a year (OR=2.36, 95% CI 0.78-7.17, p = 0.130); however, this association did not reach statistical significance (p = 0.130).

The combined effects of aging and diabetes on vascular dysfunction significantly contribute to the pathophysiology of ED. Both conditions lead to endothelial dysfunction—a hallmark of insulin resistance—that impairs Nitric Oxide (NO) production, a crucial vasodilator for erectile function. This results in vascular stiffness and reduced nitric oxide bioavailability, both of which are vital for a normal erectile response.[22,23] Given NO's essential role in penile erection, its dysregulation explains why insulin resistance and diabetes frequently contribute to sexual dysfunction.[22]

Additionally, insulin resistance is associated with inadequate vasodilation and paradoxical vasoconstriction in both coronary and peripheral arteries, worsening cardiovascular complications, and increasing ED risk.[24]

Interestingly, good glycemic control was not significantly associated with erectile ED (AOR = 1.38, 95% CI: 0.65–2.91, p = 0.403). In contrast, insulin therapy showed a trend toward significance with a 2.61-fold higher likelihood (AOR = 2.61, 95% CI: 0.96–7.08, p = 0.060) suggesting a potential relationship on ED risk. However, the lack of statistical significance in both results suggests that further investigation is needed as findings may be influenced by variations in treatment regimens or to the study's cross-sectional design, which limits causal inference.

Chronic hyperglycemia in diabetes activates several biochemical pathways, including formation of advanced glycation end products, the polyol pathway, and the activation of protein kinase C, all of which are believed to contribute to endothelial dysfunction, neuropathy, and structural changes in penile tissue.[25] This finding is consistent with the observation that the majority of patients on insulin (n = 63/115) had a diabetes duration of over 10 years. This may indicate that patients requiring insulin therapy are more

Table 6. Comparative summary of studies on erectile dysfunction prevalence among patients with diabetes mellitus

Author (Year), Country	Study Type	Diagnosis Tool	Prevalence	Limitations
Tabora J et al. (2025), Philippines	Prospective, cross sectional (n = 384)	IIEF-5	88.02%	Single center, less community clinic participants, inability to quantify phosphodiesterase 5 inhibitors (PDEi5) use among participants
Maniwang D (2019), Philippines[14]	Descriptive, correlational, cross sectional study (n = 85)	IIEF-5	78.8%	Limited identified variables and sample size
Piores OM et al. (2004), Philippines[13]	Cross sectional, analytic (n = 127)	IIEF 15	99%	No HbA1c determination, majority of sample size is from diabetes clinic
Zulueta V et al. (2001), Philippines[12]	Descriptive (n = 52)	IIEF 15	84.6%	No mentioned limitations
Gobena MB et al. (2023), Ethiopia[16]	Facility-based cross-sectional study (n = 210)	IIEF-5	83.8%	Cause-and-effect relationship cannot be reported
Parmar RS et al. (2022), India[18]	Hospital-based cross-sectional observational study (n = 357)	IIEF-5	59.38%	Confounding factors (hypolipidemic drugs)
Omar S et al. (2022), Eastern Sudan[17]	Cross-sectional study (n = 331)	IIEF-5	81.1%	Components not tested include LDL and HDL, exercise, family history, employment, income
Tamrakar D et al. (2021), Nepal[37]	Cross-sectional hospital-based study (n = 160)	IIEF-5	76.87%	Single-center study
Xu Y et al. (2018), China[6]	Observational, cross-sectional study (n = 495)	IIEF-5	64.2%	Single-center cross-sectional study, recruited in a diabetes hospital
Derosa G et al. (2015), Italy[19]	Observational, cross-sectional study (n = 220)	IIEF	52.9%	Cross sectional, observational nature that does not allow us to identify a causal link
Vo KT et al. (2014), Vietnam[8]	Cross-sectional study (n = 151)	IIEF-5	84%	IIEF-5 sensitivity and specificity, convenience sampling, small sample size

likely to have advanced disease progression, leading to vascular complications that contribute to ED.[26,27]

The relationship between insulin therapy and ED remains unclear.[28] Recent evidence showed no direct causal effect of insulin use on ED outcomes, while another study showed improvement of erectile function with insulin use through better glycemic control.[28,29] Given the lack of statistical significance in our study, these findings should be interpreted carefully and viewed as preliminary.

Furthermore, hypogonadism, resulting from disruption of the hypothalamic–pituitary–testicular axis and decreased levels of sex hormone-binding globulin, may also contribute to the development of ED in patients with long-standing diabetes.[25]

Insulin therapy may reflect more advanced metabolic dysregulation, rather than being a direct cause of ED. Early metabolic control and preventive interventions should be considered to reduce these complications.

Cardiovascular comorbidities and their impact on ED

Beyond insulin resistance, conditions common in diabetes including obesity, hypertension, dyslipidemia, and aging elevate the risk of cardiovascular disease (CVD) and ED by promoting inflammation, oxidative stress, and endothelial damage. Patients with diabetes-related complications had a higher prevalence of ED than those without ED.[26,27,30] This study found that diabetes-related complications and cardiovascular comorbidities such as hypertension (69.52% vs. 52.17%, $p = 0.018$), coronary artery disease (28.40% vs. 13.04%, $p = 0.027$), and dyslipidemia (47.34% vs. 23.91%, $p = 0.003$) were more prevalent in patients with ED. Similar findings were reported by Xu et al., which showed that ED was more common in patients with hypertension, heart disease, and dyslipidemia among individuals with T2DM.[6]

Cardiovascular disease and ED risk

CVD itself is a significant risk factor for ED, with nearly 50% of men with CAD confirmed by catheterization also having ED.[26,27] In this study, ED was more prevalent in patients with CAD (28.40% vs 13.04%, $p = 0.027$). The shared pathophysiology of ED and CVD, centered on endothelial dysfunction and atherosclerosis may explain this association. Studies suggests that subclinical atherosclerosis can precede ED by up to 10 years, while vasculogenic ED predicts future myocardial infarctions and strokes within 5 years.[27,30,31] Even in the absence of diabetes, hypertension and hyperlipidemia remain highly prevalent in men with ED, at 40% and 42%, respectively, reinforcing the role of vascular dysfunction.[26] These conditions accelerate atherosclerosis in both penile and coronary arteries, often preceding cardiovascular disease. Thus, ED should not be viewed in isolation but rather as a potential early indicator of systemic vascular disease, highlighting need for early cardiovascular screening and intervention.[32]

Dyslipidemia as a predictor of ED

Among the risk factors assessed, dyslipidemia was significantly associated with ED, increasing the odds by 2.57 times (AOR = 2.57, 95% CI: 1.20–5.53; $p = 0.015$). Although hypertension was not significantly associated with ED in the adjusted model ($p = 0.051$), its established role in vascular dysfunction suggests a potential contribution to ED pathophysiology.

Lipid imbalances contribute to endothelial dysfunction and atherosclerosis, impairing blood flow to the penile arteries and increasing ED risk. Since penile cavernosal arteries are smaller than coronary arteries, they develop atherosclerotic blockages earlier, leading to vasculogenic ED years before clinical signs of coronary artery disease.[27,33,34]

While other studies suggest a link between cardiovascular comorbidities and ED, hypertension did not reach statistical significance (AOR = 1.98, 95% CI: 1.00–3.94; $p = 0.051$), and CAD was not included in the multivariable model. Nevertheless, the findings support the role of vascular and endothelial dysfunction in ED pathophysiology. Future research should explore these underlying mechanisms, particularly the role of dyslipidemia.

Social status and ED risk

Although findings on the impact of socioeconomic status remain inconsistent, this study found that high socioeconomic status was significantly associated with lower odds of ED, with individuals in this group having 69% lower odds of ED compared to those with low socioeconomic status (AOR = 0.31, 95% CI: 0.13–0.75, $p = 0.010$).[6,14,35-37] These findings are consistent with previous studies that report an inverse relationship between socioeconomic status and erectile dysfunction, where lower income and related social determinants were identified as risk factors for ED.[11,35]

Socioeconomic disparities can influence health outcomes, including sexual health and the management of ED. Individuals with lower incomes may face greater barriers to accessing to healthcare and medications, which could contribute to the development and progression of erectile dysfunction.[36] Consistent with our findings, Mei Chen et al. reported that cumulative social determinants of health such as income, employment, and education, were associated with increased risk of ED, suggesting that multiple socioeconomic disadvantages may compound vulnerability.[11]

Although the direction of this association aligns with previous evidence, variability in results across local and regional studies highlights the need for cautious interpretation and further research with larger, more balanced samples.

Strengths and limitations

The strengths of this study include an adequate sample size and the use of the validated IIEF-5 questionnaire, which enhances the reliability and comparability of the findings. While this study was able to include various demographic and clinical factors, it still has several limitations. First, its cross-sectional design precludes causal inference. Second, participants were recruited through convenience sampling from a tertiary hospital network and affiliated clinics, which may limit generalizability and introduce selection bias. Third, although the study captured important clinical and socioeconomic variables, it did not measure serum testosterone, formally assess hypogonadism, quantify PDE5 inhibitor exposure, or evaluate psychological factors such as depression and anxiety. These unmeasured variables are clinically relevant in the assessment of ED and may have introduced residual confounding or limited mechanistic interpretation. Finally, some socioeconomic categories contained small numbers, which may have affected the stability of adjusted estimates.

CONCLUSION

The prevalence of ED among Filipino men with T2DM in this study was 88.02% (338/384; 95% CI: 84.4–91.1). Dyslipidemia and socioeconomic status were independently associated with ED and may help identify patients who may benefit from more thorough screening. Further studies involving larger cohorts and improved sampling methods are needed to validate these findings and to further explore factors contributing to high prevalence of ED observed in this population.

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CRediT Author Statement
JT: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft preparation, Writing – review and editing, Visualization, Supervision, Project administration, Funding acquisition; **RA:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft preparation, Writing – review and editing; **HHC:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft preparation, Writing – review and editing, Visualization, Supervision, Project administration, Funding acquisition; **JMC:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft preparation, Writing – review and editing; **BR:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – review and editing; **RAS:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – original draft preparation, Writing – review and editing, Supervision, Project administration.

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