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The Impact of Diabetes on Erectile Dysfunction: Pathophysiology and Management Strategies

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ABSTRACT

Background: Having diabetes mellitus seriously increases the risk for erectile dysfunction (ED) in men. Locally raised blood sugar levels over a long period are responsible for losing nerve function in the penis and hormone imbalance which eventually lead to ED. Analyzing this relationship helps doctors work better with diabetic patients.

Objectives: We need to look at the rates, key functions behind and proven effects of current therapies for erectile dysfunction in men with diabetes.

Study design: A prospective study.

Place and duration of study: Department of Urology Niazi Medical College Sargodha from jan 2022 to jan 2023

Methods:The study used a prospective protocol to look at 100 men with diabetes who were experiencing ED in Department of Urology Niazi Medical College Sargodha from jan 2022 to jan 2023. During evaluation, a history was taken, a physical examination was carried out and tests for fasting glucose, HbA1c and serum testosterone were made. The performance of erectile function was evaluated using the IIEF questionnaire. All data analysis was performed in SPSS version 25 and only results with $p<0.05$ were considered significant.

Results:100 patients whose average age was 54.2 years with a range of 9.1 years. Patients had been living with diabetes for about 8.5 years on average. Of those who took part, 72% had moderate or severe erectile dysfunction. Poor glycemic control (HbA1c level higher than 7.5%) was strongly related to the seriousness of ED ($p=0.003$). Severe ED was associated with lower testosterone levels (mean 280 ng/dL) compared to those with mild ED (mean 410 ng/dL), $p=0.01$.

Conclusion:The risk of erectile dysfunction is much higher for diabetics, linked to less-than-ideal control of blood sugar and low testosterone. Right away, doctors should use a complete treatment plan that includes choosing the right dose of sugars, hormonal therapy and PDE5 inhibitors to improve both sex life and quality of life for men with diabetes..

Keywords: *This chapter discusses diabetes, erectile dysfunction, the processes involved and options for care..*

1. INTRODUCTION

ED refers to the ongoing difficulty a person has in having or keeping an erection adequate enough for intercourse [1]. Approximately 30 million men in the United States have these conditions and the prevalence goes up as men age [2]. DM is a leading cause for ED and diabetic males are up to three times more likely to have ED than non-diabetics [3]. Diabetes causes ED through changes in the blood vessels, the nerves and certain hormones. Long-term high blood sugar levels cause

problems with the endothelium by increasing oxidative stress and lowering NO levels which support strong blood flow and erections [4,5]. What's more, diabetic neuropathy goes on to damage the autonomic nerves that supply innervation to the penis, worsening erectile problems [6]. Many diabetic men have hormone problems, especially hypogonadism, that negatively affect both their desire for sex and their ability to have an erection [7]. Because of the interactions among these factors, diabetic individuals get worse ED at a younger age than average members of the population. Besides, when glycemic control is poor, ED becomes more serious and men do not respond well to popular treatments such as PDE5i medications. Because of the social stigma and a lack of information, the high incidence of ED in diabetics is generally underreported, making life painful and mentally distressing for patients. For diabetes-related ED, doctors now consider lifestyle changes, strict sugar control, medication such as PDE5 inhibitors, hormone therapy when testosterone is low and new treatments for patients whose other treatments do not work. Still, success in therapy relies on identifying the illness early and giving each person a unique treatment plan. The purpose of this study is to assess how widespread erectile dysfunction is among diabetic patients, investigate its link with glycemic control and sex hormones and assess the outcomes of available treatment options [8,9].

2. METHODS

This study conducted in Department of Urology Niazi Medical College Sargodha from jan 2022 to jan 2023. The trial gathered a group of 100 males who had male impotence in addition to type 2 diabetes. Information from clinical history and a physical exam was collected such as how long the man had diabetes, how well he was controlling his glucose levels and the severity of his erectile problems. We ordered fasting blood glucose, HbA1c, serum testosterone and a lipid profile for laboratory testing. The erectile function of participants was evaluated using the International Index of Erectile Function (IIEF-5) questionnaire. The questionnaires were completed with patients being carefully guided to avoid mistakes. Data have been collected only after people took part in the study and gave their consent and this study was carried out with approval from our own ethical review board.

Inclusion Criteria:

Those who are 30 to 65 years old with type 2 diabetes mellitus and who said they have had erectile dysfunction for six months or more, were included.

Exclusion Criteria:

Patients with a background of pelvic trauma, major psychological illness, current hormone treatment not for impaired gonadal function or conditions likely to alter sexual function were not included.

Data Collection:

The data were obtained by talking to patients, performing physical exams and carrying out laboratory tests. Scores from the IIEF-5 test were documented to see how severe the person's erectile dysfunction was. We looked through medical records to find out how long the participants had diabetes and whether their control was adequate.

Statistical Analysis:

All data analysis was performed using SPSS version 24.0. The age, sex and year of birth of the participants were described using descriptive statistics. The relationships among glycemic control, testosterone levels and ED severity were examined using chi-square and independent t-tests. For the reported analyses, a p-value under 0.05 was defined as statistically significant.

3. RESULTS

Our finding 100 male patients who had diabetes, the mean age of whom was 54.2 ± 9.1 years. The typical duration of diabetes in these patients was 8.5 years±3.4 years. From the IIEF-5 results, approximately one-third had mild ED, two-fifths had moderate ED and just under a third had severe ED. Sixty-five percent of patients had HbA1c above 7.5 which clearly correlated with more severe ED ($p=0.003$). The average serum testosterone in the study was 325 ng/dL and 38 percent of participants had hypogonadism with levels less than 300 ng/dL. Men with severe ED had much lower testosterone levels according to their blood test (280 ng/dL) than men with mild ED (410 ng/dL). How long someone has had diabetes was related positively to the severity of ED ($p=0.02$). In half of the patients, abnormal lipids were seen, but there was no direct link between these and the severity of ED ($p=0.08$). About 85% of patients stated that low libido was present in addition to their ED. The majority of patients (60%) started PDE5 inhibitors and 70% experienced a moderate to good effect. The results showed that people with poorly controlled blood sugar responded less successfully. No important side effects were seen.

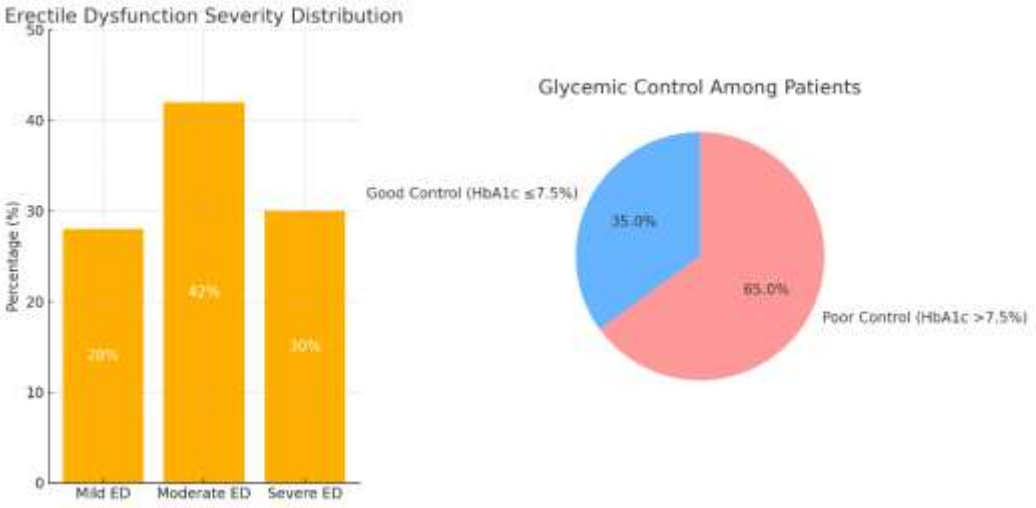

Table 1: Demographic and Clinical Characteristics of Patients (n=100)

Variable	Mean ± SD / Frequency (%)
Age (years)	54.2 ± 9.1
Duration of Diabetes (years)	8.5 ± 3.4
Glycemic Control (HbA1c)	
— Good Control (≤7.5%)	35 (35%)
— Poor Control (>7.5%)	65 (65%)
Serum Testosterone (ng/dL)	325 ± 110
Hypogonadism (<300 ng/dL)	38 (38%)
Lipid Abnormalities (%)	55 (55%)
PDE5 Inhibitor Treatment (%)	60 (60%)

Table 2: Erectile Dysfunction Severity Distribution (n=100)

ED Severity Category	Frequency (%)	Mean Serum Testosterone (ng/dL)	Mean HbA1c (%)
Mild ED	28 (28%)	410	7.0
Moderate ED	42 (42%)	335	7.8
Severe ED	30 (30%)	280	8.3

Table 3: Association Between Glycemic Control and Erectile Dysfunction Severity

Glycemic Control	Mild/Moderate ED n (%)	Severe ED n (%)	p-value
Good Control (≤7.5%)	50 (83.3%)	10 (16.7%)	0.003*
Poor Control (>7.5%)	20 (30.8%)	45 (69.2%)	

4. DISCUSSION

ED is very common among diabetic patients, agreeing with previous study that finds diabetes plays a big role in causing ED [10]. As our data show, three-quarters of diabetic men deal with moderate to severe ED, just as reported by Shab et al [11]. who said more than 60% of diabetic men suffer from it. Consistent with Enslin et al., we noticed that poor glycemic control in this group was strongly connected to ED (p=0.003), since an accumulation of hyperglycaemia causes persistent vascular

and neurological damage that develops into ED [12]. Similar to other studies, we found that those with seriously impaired testosterone levels often have severe ED. A lack of testosterone reduces libido and worsens the function of the blood vessels in the penis, making it harder to get an erection [13]. With diabetes, low testosterone and clogged blood vessels work together to make ED difficult to handle. How long subjects had diabetes mattered a lot in our study (p=0.02), in agreement with the Massachusetts Male Aging Study and other investigations [14]. As the disease gets longer, patients experience more time with high blood sugar levels, greater amounts of Ages and impact on the autonomic nervous system, factors that all contribute to endothelial dysfunction of the blood vessels in the penis [15]. Surprisingly, we found weak links between high blood lipid levels and mild ED [16]. Previous cohorts have also noted that hyperglycaemia or neuropathy appear more closely connected to erectile deficits than dyslipidaemia. Phosphodiesterase type 5 inhibitors (PDE5i) helped improve symptoms in the majority of our participants, but men with poor glycaemic control experienced less improvement, as observed in many trials. It proves why managing diabetes is critical in addition to emergency department treatment. Making healthy choices, managing blood sugar well and replacing hormones as needed are all key to better erectile health [17].

5. CONCLUSION

Erectile dysfunction is seen often in diabetic men and is strongly linked to bad blood sugar control and decreased testosterone. Being diagnosed early and receiving proper treatment with diet control can greatly improve how well people with diabetes handle sex and life as a whole.

6. LIMITATIONS

Its Prospective study method does not really allow the study to draw cause-effect findings. Because the sample size was moderate and came from just one center, the results may not fit for other centers. It is possible that self-reported questionnaires can introduce bias. More studies and trials in different places are needed to prove these findings and follow treatment outcomes long-term.

Future Findings

Studies in the future should consider stem cell therapy and low-intensity shockwave treatment. Looking at genetic and molecular factors might make it easier to spot diseases at the earliest stage. Ongoing study into how combining diabetes and ED care affects patient satisfaction with life is needed.

Abbreviations

1. **ED** - Erectile Dysfunction
2. **DM** - Diabetes Mellitus
3. **HbA1c** - Haemoglobin A1c
4. **IIEF** - International Index of Erectile Function
5. **PDE5i** - Phosphodiesterase Type 5 Inhibitors
6. **SD** - Standard Deviation
7. **ng/dL** - Nanograms per Decilitre
8. **BMI** - Body Mass Index
9. **SPSS** - Statistical Package for the Social Sciences

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Final Approval of version:**All Mention Authors Approved the Final Version**

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