

# The Relationship Between Diabetes Mellitus and Erectile Dysfunction: A Literature Review

Safira Prameswari Rahmi Maulidya<sup>1</sup>, Hermina Novida<sup>2</sup>, Reny I'tishom<sup>3</sup>, Mohammad Ayodhia Soebadi<sup>4</sup>

<sup>1</sup>*Safira.prameswari.rahmi-2020@fk.unair.ac.id*

<sup>1</sup>*Faculty of Medicine, Airlangga University, Surabaya 60132, Indonesia*

<sup>2</sup>*Department of Internal Medicine, Dr. Soetomo General Hospital, Airlangga University Hospital, Airlangga University, Surabaya 60132, Indonesia*

<sup>3</sup>*Department of Biomedical Science, Faculty of Medicine, Airlangga University, Surabaya 60132, Indonesia*

<sup>4</sup>*Department of Urology, Dr. Soetomo General Hospital, Airlangga University Hospital, Airlangga University, Surabaya 60132, Indonesia*

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## Abstract

Diabetes mellitus is a chronic degenerative disease characterized by an increase in normal blood sugar levels which causes high levels of glucosuria. Measuring HbA1c is an accurate way to determine high blood sugar levels over the last two to three months. Erectile dysfunction is the inability to have or maintain an erection for at least the last 6 months, up to the incidence of erectile dysfunction based on the IIEF-5 score.

The prevalence in Indonesia, Riskesdas data highlights 10 million diabetes patients and 17.9 million individuals at risk of developing the condition. This means that Indonesia has quite high diabetes mellitus. Meanwhile, the prevalence research indicates a prevalence of approximately 4% for moderate to severe erectile dysfunction as measured by the Sexual Health Inventory for Men (SHIM). Therefore, controlling diabetes mellitus is the key to preventing ED.

*Keywords: Diabetes Mellitus, Erectile Dysfunction*

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## 1. Introduction

Diabetes mellitus is a non-communicable disease prevalent across all age groups, particularly in adults and the elderly. It is characterized by elevated blood glucose levels due to inadequate insulin release or utilization by the body. The high glucose levels result from insufficient insulin secretion, leading to excessive secretion of the enzyme arginase II in the corpus cavernosum. This excess enzyme inhibits the activity of Nitric Oxide (NO) necessary for smooth muscle contraction in blood vessels. Consequently, penile blood vessels experience impaired dilation, causing a decrease in blood flow to the erectile organ and triggering erectile dysfunction (ED) (Derosa et al., 2012).

Erectile dysfunction is defined as the inability of a man to achieve or maintain an erection sufficient for sexual activity. The exact causes of ED remain unclear, but it is generally attributed to vascular, neurogenic, and hormonal disturbances (Sumampouw et al., 2015).

In Indonesia, Riskesdas data identifies 10 million diabetes patients and 17.9 million at-risk individuals. East Java province is among the top 10 in national diabetes prevalence, securing the ninth position with a prevalence of 6.8% (Infodatin, 2020) and Indonesia research indicates a prevalence of approximately 4% for moderate to severe erectile dysfunction as measured by the Sexual Health Inventory for Men (SHIM) (McMahon et al., 2012). While precise prevalence figures in Indonesia are not firmly established, estimates suggest that around 16% of males aged 20-75 experience erectile dysfunction (Bongkriwan et al, 2014).

## 2. Diabetes Mellitus and Erectile Dysfunction

### 2.1. Definition of Diabetes Mellitus

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia, resulting from disruptions in insulin secretion, peripheral insulin action, or a combination of both. The World Health Organization (WHO) defines it as a chronic disease with multi-etiological origins, marked by elevated blood sugar levels and disturbances in carbohydrate, lipid, and protein metabolism due to insufficient insulin function.

The International Diabetes Federation (IDF) reports a substantial increase in global diabetes prevalence, rising from 151 million (4.6% of the population) in 2000 to 537 million (10.5%) in 2021. Projections indicate a further increase to 643 million (11.3%) by 2030 and 783 million (12.2%) by 2045 without adequate interventions. Chronic hyperglycemia in diabetes contributes to organ damage and complications, including microvascular (retinopathy, nephropathy, neuropathy) and macrovascular issues, significantly increasing the risk of cardiovascular diseases 2 to 4 times (Goyal, 2023).

### 2.2. Diagnosis of Diabetes Mellitus

Diabetes symptoms can be acute or chronic. Acute symptoms include polyphagia, polydipsia, polyuria, rapid weight loss, tingling sensations, fatigue, and sexual dysfunction. Chronic symptoms involve numbness, sensations of heat or needle-like pricks, cramps, fatigue, blurred vision, loose teeth, and reduced sexual ability, including erectile dysfunction. Pregnant women with diabetes may face complications such as miscarriage or stillbirth, and infants may be born with excessive weight.

Diagnosis relies on various blood glucose tests, including random blood sugar, fasting blood sugar, oral glucose tolerance test, and HbA1C. Diabetes is indicated by a random blood sugar level of 200 mg/dL or higher, fasting blood sugar level of 126 mg/dL or higher, or HbA1C level of 6.5% or higher. Prediabetes is diagnosed with fasting blood sugar levels between 100-125 mg/dL, oral glucose tolerance test results between 140-199 mg/dL, or HbA1C levels between 5.7-6.4% (Restyana, 2015).

### 2.3. Definition of Erectile Dysfunction

Erectile dysfunction, also known as impotence, is characterized by the inability to maintain an erection sufficient for sexual intercourse. Based on a synthesis of several studies, erectile dysfunction can be influenced by a variety of factors. Chronic kidney disease, for instance, may impact male erectile function due to disruptions in the endocrine system, vascular system, psychological factors, and neurogenic disturbances (Simanjuntak et al., 2014.)

While the exact causes are not fully understood, men above 40 years exhibit a higher prevalence, correlating with age and other concurrent diseases. Erectile dysfunction serves as a symptom of various pathologies, posing a significant cardiovascular risk factor that is often underutilized in clinical practice (Sooriyamoorthy et al., 2023).

#### 2.4. Diagnosis of Erectile Dysfunction

In diagnosing erectile dysfunction (ED), it is essential to elicit a thorough medical and social history from the patient, accompanied by a comprehensive physical examination. The purpose of this approach is to ensure an accurate diagnosis, assess the severity of the patient's ED, and determine the appropriate therapeutic interventions. In addition to the information gathered through anamnesis and physical examination, specific diagnostic assessments are necessary. Notably, the International Index of Erectile Function (IIEF-5) and Erectile Hard Score (EHS) are employed for this purpose. Both scores play a crucial role in diagnosing the severity of erectile dysfunction experienced by the patient. (Dahril, 2017)

### 3. The Relationship Between Diabetes Mellitus and Erectile Dysfunction

The relationship between diabetes mellitus and erectile dysfunction (ED) is multifaceted and complex. According to a study by Malavige et al, ED is a common and distressing complication of diabetes. The pathophysiology and management of diabetic ED significantly differ from nondiabetic ED. The prevalence of ED among diabetic men varies widely, from 35% to 90%, due to differences in methodology and population characteristics.

The association between Diabetes Mellitus (DM) and erectile dysfunction (ED) has been investigated through various studies. A 2017 study by Panelewen et al identified a notable correlation between the age of individuals with type 2 diabetes mellitus (T2DM) and the severity of erectile dysfunction, indicating a more pronounced impact in older patients.

Ciandra et al conducted a 2014 study revealing an 85% incidence of ED in stroke patients, with a higher occurrence in those also affected by DM. This study further highlighted that individuals with lower educational attainment exhibited a higher likelihood of experiencing ED. There was significant association between the duration of type 2 diabetes and hypertension with the incidence of ED.

### 4. Conclusion

A significant association has been observed between Diabetes Mellitus (DM) and erectile dysfunction (ED), with multiple influencing factors contributing to the severity and incidence of ED in individuals with DM. These influential factors encompass age, educational level, fasting blood sugar levels, and the presence of hypertension. The interplay of these variables underscores the complex relationship between DM and ED, emphasizing the need for comprehensive consideration of various factors in understanding the manifestation and progression of erectile dysfunction in the diabetic population.

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