Sudan Journal of Medical Sciences
Volume 19, Issue no. 3, DOI 10.18502/sjms.v19i3.14643
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Research Article

Prevalence of Erectile Dysfunction among Sudanese Patients at Gezira Hospital for Renal Disease and Surgery

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Abstract

Background: Erectile dysfunction (ED) is a disorder that makes it hard or impossible to keep or get an erection that is good enough for sexual activity. ED can be caused by physical, mental, or combined factors, and it is usually associated with a long-term health issue.

Methods: The study is a prospective and cross-sectional research conducted in a hospital setting. It took place from December 2019 to December 2022 at Gezira Hospital for Renal Disease and Surgery. The study sample consisted of 246 patients.

Results: The most frequently affected age groups were 30–40 years and 50–60 years, accounting for 26% and 25.2% of the sample, respectively, while the least affected age groups were >20 years and >70 years, representing 1.2% and 3.7% of the sample, respectively. The most common symptoms reported by the patients were ED alone (74%) and ED with penile curvature (22%). The most prevalent causes were psychogenic, Peyronie's disease, and venogenic, affecting 54.1%, 24.4%, and 16.3% of patients, respectively. The most frequent comorbidities associated with ED were diabetes mellitus (DM) and hypertension, occurring in 12.2% and 4.1% of the patients, respectively. There was a statistically significant correlation between age and etiology (*P*-value = 0.00), age and symptom (*P*-value = 0.012), and symptom and cause (*P*-value = 0.000).

Conclusion: The age group of 30–40 years was the most affected by ED, and ED alone was the most frequent symptom. Psychological factors were the main cause of ED, and DM was the most common comorbidity associated with ED.

Keywords: erectile dysfunction, psychogenic, diabetes mellitus, Sudan, Gezira Hospital for Renal Diseases and Surgery.35

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Received: 1 December 2023
Accepted: 19 June 2024
Published: 30 September 2024

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Editor-in-Chief:
Prof. Nazik Elmalaika Obaid Seid Ahmed Husain, MD, M.Sc, MHPE, PhD.

1. Introduction

Erectile dysfunction (ED) is a condition where a man cannot get or keep an erection that is firm enough for satisfying sexual intercourse [1]. The causes of ED can be physical, psychological, or both, and are often related to chronic diseases [2].

The rate of ED rises sharply from about 6% in men aged 20–29 to 50–70% in men aged 40–79. By 2025, it is expected to affect more than 320 million men worldwide [1].

ED is linked to various factors that affect the body and mind, such as aging, diabetes, chronic alcoholism, depression, drugs, especially blood pressure medications, high cholesterol, smoking, and previous abdominal surgery [3]. ED can also induce relationship tension and impair the quality of life and mental health of the afflicted men and their partners [4, 5]. Some cultural beliefs and practices may make it difficult for some men to seek and receive appropriate treatments for ED, and some doctors may not feel comfortable discussing their patients' sexual issues [6]. Moreover, some patients may not disclose their sexual problems due to shame or lack of awareness that it is a medical issue [7].

The development of effective oral treatments and other new therapies have piqued the interest and increased hopes of men with ED and their partners [8].

2. Objectives

The objectives of the study were to: estimate the prevalence of ED among various age groups; recognize the most prevalent symptoms and etiologies of ED in the study sample; investigate the association between ED and coexisting conditions such as diabetes mellitus (DM) and hypertension; and evaluate the statistical relevance of the relationships between age, symptoms, and etiologies of ED.These objectives aim to elucidate the underlying factors that contribute to ED and provide a basis for enhancing the management and treatment of this condition.

3. Materials and Methods

This study was cross-sectional, prospective, and hospital based. It took place at Gezira Hospital for Renal Disease and Surgery, Gezira State, Sudan, from December 2019 to December 2022. The study sample included 246 patients who met the inclusion criteria. The inclusion criteria were:

- being an adult (age >16);
- being in the study period;
- having a penile Doppler U/S done; and
- being diagnosed and followed-up at Gezira Hospital for Renal Disease and Surgery.

The data were obtained using a planned survey that included past checkup and penile Doppler ultrasound outcomes. The data were examined using the SPSS version 26. The connection between variables was assessed using Chi-square. A *P*-value of 0.05 was deemed statistically significant.

4. Sampling technique

The study employed a total population sampling method within the hospital setting. This technique involved incorporating every patient who visited Gezira Hospital for Renal Disease and Surgery with ED and satisfied the predetermined inclusion criteria from December 2019 to December 2022.

4.1. Diagnosis of etiology

Diagnosis of etiology was done according to the following factors:

- Psychological
  - History (sudden onset, normal morning erection).
  - By exclusion (normal Doppler U\S and no other risk factors).
  - Limitation of the diagnosis was absence of RigiScan (NPTR).
- Vasculogenic (depends on penile Doppler U\S)
  - Arteriogenic PSV < 25 cm\s and EDV < 3 cm\s.
  - Venogenic PSV > 25 cm\s and EDV > 3 cm\s.
- Neurogenic
  - History (lower limb numbness, pelvic fracture, DM).
  - Exclusion (normal doppler, not on medications).
- Technique of Doppler U\S
  - Using of papavarine or alprostadil (PGE1).
  - Waiting 10 mins before performing Doppler U\S.

4.2. Criteria used for diagnosing ED

ED is diagnosed based on clinical history, physical examination, and supporting diagnostic tests. The penile Doppler ultrasound is used to distinguish between the vascular causes of ED, namely arteriogenic and venogenic ED.

4.2.1. Penile Doppler ultrasound parameters

The following criteria were used to determine the vascular origin of ED:

Arteriogenic ED: This is suspected when there is inadequate arterial blood flow to the penis. The diagnostic criteria on penile Doppler ultrasound are:

- Peak Systolic Velocity (PSV) lower than 25 cm/s and
- End Diastolic Velocity (EDV) lower than 3 cm/s.

Venogenic ED: This condition is indicated by a failure to sustain the erection due to venous leakage. The criteria on penile Doppler ultrasound are:

- PSV higher than 25 cm/s and
- EDV higher than 3 cm/s.

4.2.2. Interpretation of results

- A normal penile Doppler ultrasound would show a PSV higher than 30 cm/s and an EDV lower than 5 cm/s after intracavernosal injection of a vasodilator.
- Abnormal findings indicative of arteriogenic ED include a PSV lower than 25 cm/s and an EDV lower than 3 cm/s.
- Findings suggestive of venogenic ED include a PSV higher than 25 cm/s and an EDV higher than 5 cm/s.

4.2.3. Limitations

The accuracy of the penile Doppler ultrasound can be influenced by the patient's anxiety, the use of vasoactive medications, and the technician's expertise.

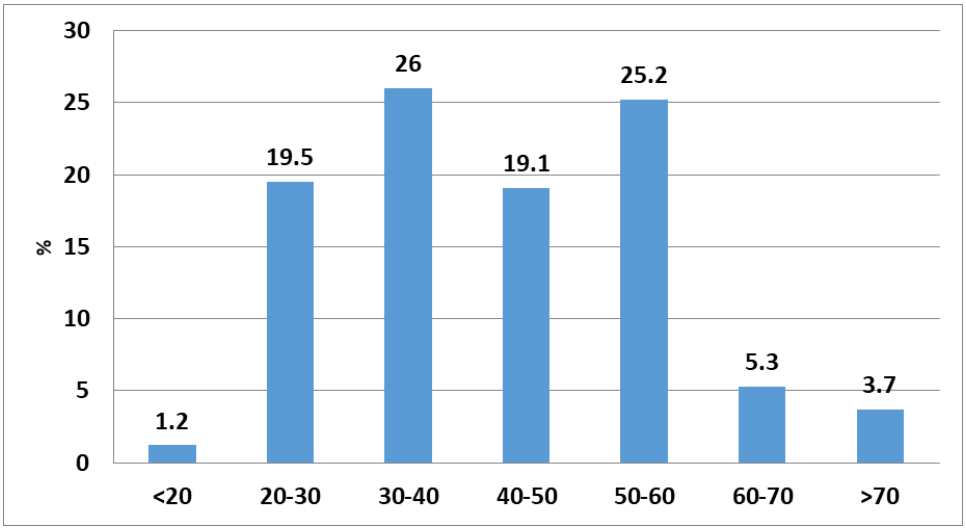

Figure 1: Age groups distribution among patients of ED at Gezira Hospital for Renal Diseases and Surgery (n = 246).

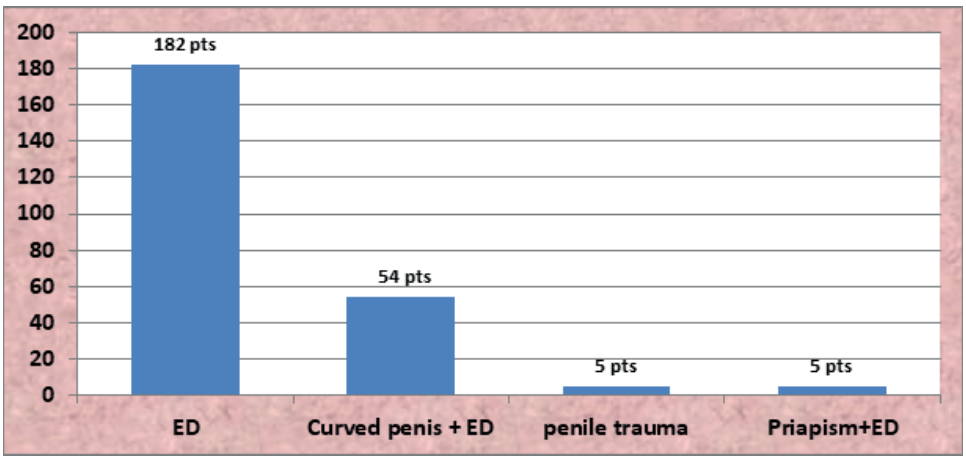

Figure 2: Presenting symptoms among patients of ED at Gezira Hospital for Renal Diseases and Surgery (*n* = 246).

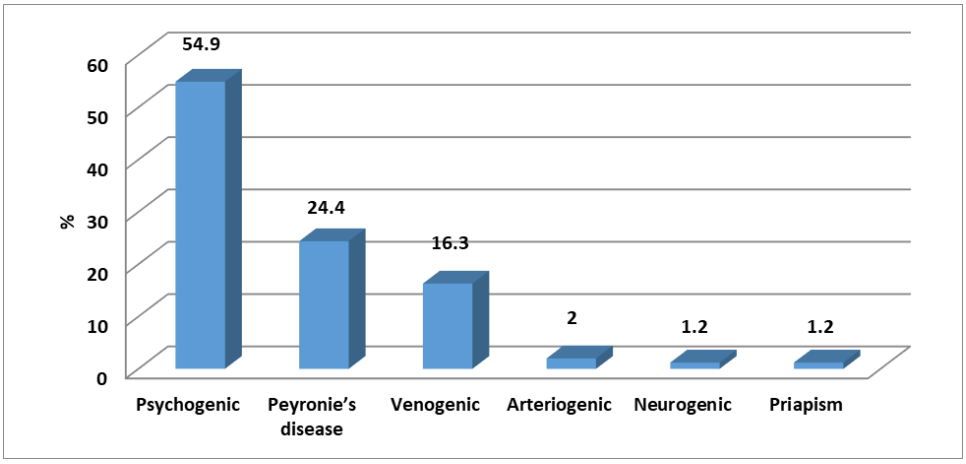

Figure 3: Underlying causes of ED among patients of ED at Gezira Hospital for Renal Diseases and Surgery (*n* = 246).

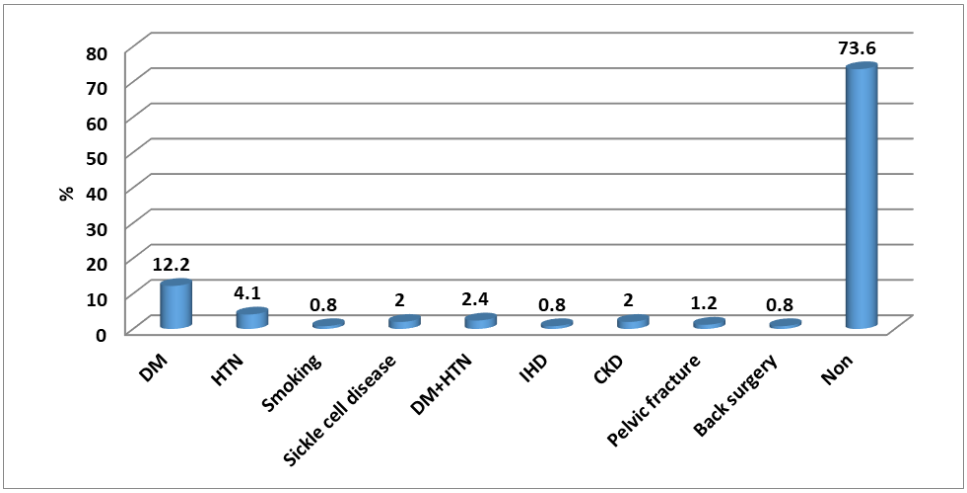

Figure 4: Associated chronic ilnesses among patients of ED at Gezira Hospital for Renal Diseases and Surgery (*n* = 246).

TABLE 1: The association between age group and causes of ED among patients at Gezira Hospital for Renal Diseases and Surgery.

Age group and etiology (yrs)	Psychogenic	Peyronie's disease	Venogenic	Arteriogenic	Neurogenic	Priapism	Total	P-value
<20	2	0	0	0	0	1	3	0.000
20–30	35	6	4	0	2	1	48	
30–40	41	12	10	0	1	0	64	
40–50	24	12	9	2	0	0	47	
50–60	26	19	15	2	0	0	62	
60–70	1	9	2	1	0	0	13	
>70	6	2	0	0	0	1	9	
Total	135	60	40	5	3	3	246	

TABLE 2: The correlation between age group and symptoms of ED among patients at Gezira Hospital for Renal Diseases and Surgery.

Age group and presentation (yrs)	Isolated ED	Curved penis + ED	Penile trauma +ED	Priapism+ ED	Total	P-value
>20	1	1	0	1	3	0.012
20–30	35	10	1	2	48	
30–40	52	10	2	0	64	
40–50	37	8	2	0	47	
50–60	43	17	0	2	62	
60–70	6	7	0	0	13	
>70	8	1	0	0	9	
Total	182	54	5	5	246	

Table 3: The link between symptoms and causes of ED among patients at Gezira Hospital for Renal Disease and Surgery.

Presentation and etiology	Psychogenic	Peyronie's disease	Venogenic	Arteriogenic	Neurogenic	Priapism	Total	P-value
Isolated ED	113	26	37	3	1	2	182	0.000
Curved penis + ED	16	32	3	0	2	1	54	
Penile trauma + ED	3	2	0	0	0	0	5	
Priapism + ED	3	0	0	2	0	0	5	
Total	135	60	40	5	3	3	246	

Table 4: The connection between coexisting conditions and symptoms of ED among patients at Gezira Hospital for Renal Disease and Surgery.

Comorbidities and presentation	Isolated ED	Curved penis + ED	Penile trauma + ED	Priapism + ED	Total	P-value
DM	22	7	0	1	30	**0.928**
HTN	7	3	0	0	10	
Smoking	2	0	0	0	2	
SCD	4	0	0	1	5	
DM + HTN	5	1	0	0	6	
IHD	1	1	0	0	2	
CKD	5	0	0	0	5	
Pelvic fracture	3	0	0	0	3	
Back surgery	2	0	0	0	2	
None	131	42	5	3	181	
Total	182	54	5	5	246	

Table 5: The connection between coexisting conditions and causes of ED among patients at Gezira Hospital for Renal Disease and Surgery.

Co morbidities and etiology	Psychogenic	Peyronie's disease	Venogenic	Arteriogenic	Neurogenic	Priapism	Total	P-value
DM	18	7	3	2	0	0	30	0.173
HTN	3	2	2	1	1	1	10	
Smoking	0	0	2	0	0	0	2	
SCD	4	1	0	0	0	0	5	
DM+HTN	4	2	0	0	0	0	6	
IHD	0	2	0	0	0	0	2	
CKD	1	1	3	0	0	0	5	
Pelvic fracture	3	0	0	0	0	0	3	
Back surgery	2	0	0	0	0	0	2	
None	100	45	30	2	2	2	181	
Total	135	60	40	5	3	3	246	

5. Results

The study sample consisted of 246 patients, with the largest age group being 30–40 years, representing 26% (*n* = 64) of the sample, followed by 50–60, 20–30, 40–50, 60–70, >70 years, and <20 years, accounting for 25.2% (*n* = 62), 19.5% (*n* = 48), 19.1% (*n* = 47), 5.3% (*n* = 13), 3.7% (*n* = 9), and 1.2% (*n* = 3) of the sample, respectively (Figure **1**).

The most prevalent symptom was ED alone, occurring in 74% (*n* = 182) of the cases, followed by ED with penile curvature, penile trauma with ED, and priapism with ED, affecting 22% (*n* = 54), 2% (*n* = 5), and 2% (*n* = 5) of the cases, respectively (Figure **2**).

The most common cause of ED was psychogenic, affecting 54.9% (*n* = 135) of the patients, followed by peyronie's disease, venogenic, arteriogenic, neurogenic, and priapism, affecting 24.4% (*n* = 60), 16.3% (*n* = 40), 2% (*n* = 5), 1.2% (*n* = 3), and 1.2% (*n* = 3) of the patients, respectively (Figure **3**).

Patients who had ED along with comorbidities were 26.4% (*n* = 65) of the sample, and the most frequent comorbidity was DM, affecting 12.2% (*n* = 30) of the patients, followed by hypertension, DM and hypertension, sickle cell disease, chronic kidney disease, pelvic fracture, ischemic heart disease, smoking and back surgery, affecting 4.1% (*n* = 10), 2.4% (*n* = 6), 2% (*n* = 5), 2% (*n* = 5), 1.2% (*n* = 3), 0.8% (*n* = 2), 0.8% (*n* = 2), and 0.8% (*n* = 2) of patients, respectively (Figure **4**).

The relationship between age and both cause and symptom was statistically significant ($P < 0.001$ and $P = 0.012$, respectively; Tables 1 & 2).

Symptom and cause also had a statistically significant relationship ($P < 0.001$), while symptom and comorbidities did not ($P = 0.928$; Tables 3 & 4).

There was a strong relation between comorbidities and cause, but it was not statistically significant in this study (*P*-value of 0.173; Table 5).

6. Discussion

The study involved 246 patients in total. The age groups of 30–40 years and 50–60 years were the most affected by ED, comprising 26% and 25.2% of the sample, respectively, while the age groups of >20 and >70 years were the least affected, making up 1.2% and 3.7% of the sample, respectively. These findings were consistent with Mutha *et al.* who reported that 41% of ED patients were in the 30–39 age group [1]. Another study by Ponholzer *et al.* showed a high prevalence of ED among different age groups: 26–29% in those aged 20–50, which increased to 37.5% in 51–60 years and 71.2% in 71–80 years [9]. Most of the causes of ED in this study were found in the age group of 30–40 years, which is the most common age of marriage in Sudan and reflects the moral and religious norms for sexual activity in the country.

The most frequent symptoms in this study were ED alone and ED with penile curvature, occurring in 74% and 22% of the cases, respectively, and the most common causes of ED were psychogenic, peyronie's disease, and venogenic, affecting 54.1%, 24.4%, and 16.3% of the patients, respectively.

Mutha *et al.* noted that 64% of ED cases were drug related, 186/606 had urology disorders, and 154/606 and 102/606 had mental disorders [1]. ED alone was the most reported symptom, which can be explained by the predominance of psychogenic factors, so no other local physical signs were expected to be present.

Oyelade *et al.* reported that several factors (age, hypertension, antihypertensive drugs, diabetes, and heart disease) were significantly associated with ED without controlling for confounders, but these associations became nonsignificant after adjustment. Potential confounding factors (OR = 8.31 [95% CI: 1.02–67.65], $P = 0.048$) [10]. This result is consistent with our study, where age and cause

had a significant association with a *P*-value of 0.000, but comorbidities and cause did not have a significant association with a *P*-value of 0.173. Seid *et al.* demonstrated that ED was affected by age (AOR = 15.013, CI: 3.212–70.166), diabetes (AOR = 3.77, CI: 1.291–11.051), and lower monthly income (AOR = 0.285, CI: 0.132–0.615). There were no relationships with body mass index, blood sugar control, and alcohol consumption [11].

DM was the most common disease associated with ED in this study, which might be due to poor peripheral blood circulation and peripheral neuropathy that affect the erectile function.

6.1. Potential confounding factors

The study has revealed several important findings regarding the frequency, signs, etiologies, and coexisting conditions related to ED. However, it is essential to consider potential confounding factors that could have affected the results.

6.1.1. Selection bias and statistical power

The study's results, obtained from a single hospital, may not be representative due to potential overrepresentation of certain demographics. Moreover, the sample size may have been inadequate to detect statistically relevant relationships among less frequent symptoms, etiologies, and coexisting conditions of ED.

6.1.2. Reporting bias and cultural influences

The delicate nature of ED may lead to underreporting due to patient hesitation in revealing symptoms, influenced by cultural beliefs and social stigma, which can impact both participation in studies and the reliability of self-reported data.

6.1.3. Comorbidity and medication interactions

The presence of multiple comorbidities in patients with ED may interact synergistically or conceal symptoms, while the varied medications used can also affect or relieve ED symptoms, further complicating data interpretation and study findings.

6.1.4. Diagnostic and technological limitations

The dependence on specific diagnostic criteria for penile Doppler ultrasound may not fully capture all vascular abnormalities related to ED, and the lack of RigiScan testing could result in the underdiagnosis of cases, especially those with a psychogenic component.

7. Conclusion

ED was highly prevalent among young men aged 30–40 years. The most frequent symptom was ED alone, and the main cause of ED was psychogenic. DM was the most common comorbidity associated with ED. We recommend psychological counseling for patients with ED as it is the most common cause, better control of diabetes to help reduce the impact of ED, and more studies to improve the services provided.

Declarations

Acknowledgements

The authors appreciate the staff of Gezira Hospital for Renal Diseases and Surgery for their assistance in gathering patient data, and express their special gratitude to the statistics and data analysis department for their input. The authors also thank the

journal's reviewers and editors for their feedback that enhanced the quality of this research.

Ethical Considerations

Ethical approval was obtained from Ministry of Health and Hospital authority. Written informed consent was obtained from each patient after explaining the aim of the study and it was used only for academic purposes. The participation was voluntary. Data were analyzed anonymously and privacy issues were strictly respected.

Competing Interests

None.

Availability of Data and Material

Materials were collected from GHRDS and can be provided upon request.

Funding

There was no financial support for this work.

Abbreviations and Symbols

AOR: Adjusted odds ratio
DM: Diabetes mellitus
ED: Erectile dysfunction
EDV: End-diastolic velocity
PGE1: Prostaglandin E1
NPTR: Nucturnal penile tumescence and rigidity
OR: Odds ratio
PSV: Peak systolic velocity
SPSS: Statistical package for the social sciences
US: Ultrasound

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