

A PROSPECTIVE CROSS-SECTIONAL STUDY TO EVALUATE THE VASCULOGENIC ETIOLOGY USING PENILE DOPPLER IN PATIENTS ON TREATMENT WITH ANTIDEPRESSANT DRUGS PRESENTING WITH ERECTILE DYSFUNCTION IN A TERTIARY CARE CENTRE

Sudhakar Vadivel¹, Devarajan I², Srinivasan M³, Suresh G⁴, Amarnath Chelladurai⁵, Balaji Ayyamperumal⁶, Manikandan R⁷

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Corresponding Author:

Dr. Suresh G,
Email: suresh110183@gmail.com

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¹Associate Professor, Department of Radiodiagnosis, Stanley Medical College, Tamilnadu, India

²Associate Professor, Department of Vascular Surgery, Thanjavur Medical College, Tamilnadu, India

³Assistant Professor, Department of Radiodiagnosis, Thanjavur Medical College, Tamilnadu, India

⁴Assistant Professor, Department of Radiodiagnosis, Stanley Medical College, Tamilnadu, India

⁵Professor, Department of Radiodiagnosis, Stanley Medical College, Tamilnadu, India

⁶Associate Professor, Department of Radiodiagnosis, Thanjavur Medical College, Tamilnadu, India

⁷Junior Resident, Department of Radiodiagnosis, Stanley Medical College, Tamilnadu, India

Abstract

Background: Erectile dysfunction, often caused by antidepressants, can lead to depression and anxiety, affecting a man's quality of life. Sexual side effects are considered the most disturbing and disruptive side effects. Antidepressants such as SSRIs can have a negative impact on any phase of the sexual cycle by causing a decrease in libido, an impairment in arousal, and erectile dysfunction; SSRIs are most commonly associated with delayed ejaculation and absent or delayed orgasm. **Materials and Methods:** A prospective cross-sectional study was conducted on patients presenting with erectile dysfunction on treatment with antidepressant drugs. After obtaining the participant's written consent, a pre-designed proforma was filled from the patient's clinical details for penile colour Doppler imaging. An evaluation was done using the MINDRAY DC-60 and RESONA-I9 ultrasound machine. **Result:** With most patients in the < 40 age group (57.1% of individuals), the vasculogenic aetiology of erectile dysfunction is more prevalent than psychogenic aetiology in patients taking antidepressant drugs. The percentage of arterial insufficiency was 51.4%, and those with venous insufficiency was 35.3%. About 48.6% of patients not having arterial insufficiency were further assessed for venous insufficiency, of which only six patients had venous insufficiency. Thus, venous insufficiency was not statistically significant among patients in this outcome population. **Conclusion:** Most patients had arterial insufficiency with statistical significance. Therefore, caution is needed in choosing appropriate drugs for a patient's condition to avoid harmful adverse effects such as organic erectile dysfunction.

INTRODUCTION

Erectile dysfunction is a widely prevalent, multi-factorial dysfunction involving alterations in any of the components involved in erection.^[1] "Erectile dysfunction (ED)" "is defined as the persistent inability to achieve or maintain an erection adequate for satisfactory sexual activity."^[2] Multi-factorial components involved in erectile dysfunction include organic (neurogenic, vasculogenic, endocrinological, iatrogenic causes) and psychological causes.^[1] "Erectile dysfunction can have deleterious effects on a man's quality of life; most patients have symptoms of depression and anxiety related to sexual

performance".^[1] It is documented that sexual dysfunction is one of the common side effects of antidepressants, particularly - selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitor (SNRIs) medications.^[3] These side effects are an important cause of non-compliance of treatment by patients with various psychiatric illnesses, thereby producing relapse of symptoms and treatment failure.^[4] Treatment-emergent sexual dysfunction has been reported with virtually all of the antidepressants. The incidence of erectile dysfunction attributed to antidepressant medications varies between studies, making it difficult to estimate incidence or

prevalence.^[3] "Penile Doppler sonography (US) continues to play an essential role in the diagnostic workup of ED, mainly for patients with poor or no response to oral therapy. Doppler US examination combines an intracavernosal injection of vasoactive agents to exclude anatomic abnormalities and assess penile hemodynamics".^[5] The study aimed to evaluate vasculogenic aetiology in patients treated with antidepressant drugs presenting with erectile dysfunction.

MATERIALS AND METHODS

A prospective cross-sectional study was conducted on patients presenting with erectile dysfunction on treatment with antidepressant drugs.

Inclusion Criteria

Patients on antidepressant drugs under evaluation for erectile dysfunction were included.

Exclusion Criteria

Patients who were unwilling to give informed written consent and patients with features of erectile dysfunction before antidepressant drugs were excluded.

Based on the reference study sized by Montejo et al,^[6] in our study, we included 35 patients. After obtaining the participant's informed consent, a pre-designed proforma was collected from the patient's clinical details and subjected to penile colour Doppler imaging. An evaluation was done using the MINDRAY DC-60 and RESONA-I9 sonography machine.

Colour Doppler Ultrasonography (CDUS): Can identify and classify the organic component of ED. Based on the findings on Doppler US, ED can be categorised into arterial and venous types. Arteriogenic Erectile Dysfunction involves impairment of the arterial influx into the cavernosum due to various causes.^[5] In contrast, an impaired veno-occlusive mechanism causes a venous leak, resulting in what is known as Venogenic Erectile Dysfunction. Peak Systolic Velocity (PSV) is the most accurate indicator of arterial disease. Arterial insufficiency is diagnosed when the PSV is less than 25 cm/sec, with 92% accuracy.^[5] Veno-occlusive ED shows a persistent End Diastolic Velocity (EDV) over 5 cm/sec during all phases of erection, and flow in the Deep Dorsal Vein (DDV) is visible on Doppler US during all phases of erection.

Although the anatomical and structural changes on the grey-scale US of the cavernosa are informative, the functional characteristics after injection are more important. Diagnosis is usually made during real-time scanning based on structural and functional data. Before performing Doppler US, we reviewed the

patient's self-reported replies to questionnaires and event logs of erectile function, such as the International Index of Erectile Function.

PSV and EDV are the major Doppler parameters for diagnosing ED. The change in the diameter of the CA and the flow signals of DDV, as well as the resistive index (RI), are minor parameters for differentiating between the types of ED.^[5] A PSV of 25 cm/sec is a key indicator of arterial insufficiency.

Statistical Analysis

The data was analysed with IBM SPSS Statistics for Windows, Version 23.0. (Armonk, NY: IBM Corp). Descriptive statistics, frequency analysis, and percentage analysis were used for categorical variables, and the mean and SD were used for continuous variables. In the Occurrence of a significant difference in repeated measures, the Repeated measures of ANOVA were used with Bonferroni correction to control the type I error on multiple comparisons. The Chi-Square test was used to find the significance of categorical data. The probability value of .05 is considered significant in all statistical tools.

RESULTS

Study shows early onset of erectile dysfunction with most patients < 40 years of age. Accordingly, 57.1% of individuals under 40 have erectile dysfunction, and the mean age was 37.8 ± 9.2. About 48.6% of patients not having arterial insufficiency were further evaluated for venous leak, of which only six patients had venous insufficiency.

Among them, the vasculogenic aetiology of erectile dysfunction is more prevalent than psychogenic aetiology in patients taking antidepressant drugs. The percentage of arterial insufficiency was 51.4%, and those with venous insufficiency was 35.3%. Therefore, among those patients taking antidepressants and presenting with erectile dysfunction, it is found that arterial insufficiency predominates venous insufficiency [Table 1].

There is a significant difference in mean peak systolic velocity and resistive index (p<0.001) but no significant difference in mean end-diastolic velocity (p=0.257) [Table 2].

The mean duration of drug intake was 15.1 ± 5.9 months. 11.1% of individuals on Amitriptyline experienced arterial insufficiency, and Fluoxetine had a relatively high incidence of arterial insufficiency at 27.8%, while a majority (55.6%) of individuals in this group exhibited the condition. Comparison of antidepressants with arterial insufficiency showed a significant difference (p=0.003) [Table 3].

Table 1: Demographic data of the study

		Frequency	Percentage
Age group	<40 years	20	57.1
	≥40 years	15	42.9
Antidepressant	Amitriptyline	9	25.7
	Fluoxetine	13	37.1

	Paroxetine	10	28.6
	Sertraline	3	8.6
Arterial Insufficiency	No	17	48.6
	Yes	18	51.4
Venous Insufficiency	No	11	64.7
	Yes	6	35.3

Table 2: Mean PSV, EDV, and RI

	Mean \pm SD		
	PSV	EDV	RI
0 Mins	10.3 \pm 5.16	50 \pm 2.4	0.49 \pm 0.17
5 Mins	16.51 \pm 9.42	5.1 \pm 3.1	0.61 \pm 0.2
10 Mins	18.5 \pm 10.32	4.4 \pm 3	0.73 \pm 0.16
15 Mins	18.91 \pm 8.88	4.4 \pm 2.5	0.73 \pm 0.15
20 Mins	14.63 \pm 6.44	4.9 \pm 1.8	0.64 \pm 0.13
P-value	0.0005 **	0.257	0.0005 **

Table 3: Comparison of antidepressants with arterial insufficiency

Antidepressant	Arterial insufficiency		P value
	No	Yes	
Amitriptyline	7 (41.2%)	2 (11.1%)	0.003 **
Fluoxetine	8 (47.1%)	5 (27.8%)	
Paroxetine	0.00%	10 (55.6%)	
Sertraline	2 (11.8%)	1 (5.6%)	
Total	17 (100%)	18 (100%)	

DISCUSSION

About 35 patients referred from outpatient departments were evaluated for erectile dysfunction with penile Doppler after explaining the procedure and possible adverse effects along with informed written consent. A brief interview with patients was conducted before the procedure to make sure that patients have symptoms of erectile dysfunction after the start of medications. Patients are initially evaluated for arterial insufficiency. Patients with normal arterial studies were further evaluated for venous sufficiency. It was observed that most patients presenting with erectile dysfunction were found to have arterial insufficiency and had no obvious erection during evaluation for insufficiency. In contrast, those with venous insufficiency had sub-optimal erections.

Most patients referred from psychiatric OPD are in the age group of < 40 years. Based on previous studies done earlier,^[7] erectile dysfunction is more common among persons above the age of 40 years. However, our study group mainly consisted of young patients who were on antidepressant therapy and reported erectile dysfunction after starting the medications for depression. Accordingly, 57.1% of individuals under 40 have erectile dysfunction in this study, which differs from Narinder Kaur et al.^[7] Among antidepressant drugs, there were varying incidences of erectile dysfunction. In our study, Paroxetine had an increased incidence of erectile dysfunction than any other drug. That agrees with the study done by Montejo et al,^[6] where the percentage of Paroxetine causing erectile dysfunction was 34%. In our study, the presence of arterial insufficiency with Paroxetine was 55.6%, contributing 28.6% to the total percentage of arterial insufficiency. The

percentage of erectile dysfunction in patients on Fluoxetine was 16%, according to Montejo et al.^[6]

In our study, the percentage was 28.7%, contributing 37.1% to the percentage of arterial insufficiency. However, 47.1% of patients on fluoxetine treatment were not found to have arterial insufficiency. The percentage of erectile dysfunction in patients on sertraline was 16%, according to Montejo et al.^[6] Many patients taking amitriptyline among those referred for erectile dysfunction (11.1%) had arterial insufficiency, contributing to 25.7% of total arterial insufficiency. However, 41.2% of patients on Amitriptyline treatment were not found to have arterial insufficiency. The observed pattern shows the common use of amitriptyline and Fluoxetine compared to other drugs. However, Paroxetine is observed to cause maximum erectile dysfunction of 55.6%, contributing 28.6% to the percentage of total arterial insufficiency, thereby supporting the research by Montejo et al.^[6]

In our study, the vasculogenic aetiology of erectile dysfunction is more prevalent than the psychogenic aetiology. However, this contradicts the study by Usman Khanzada et al,^[8] in all patients with erectile dysfunction, where the psychogenic cause was more common than an organic cause. In that study, about 50.5% of patients had normal colour Doppler, indicating psychogenic erectile dysfunction, while 48.5% had vasculogenic erectile dysfunction. This study shows the presence of vasculogenic aetiology in patients taking antidepressant drugs compared to all patients evaluated for erectile dysfunction.^[8] In our study, the percentage of arterial insufficiency was 51.4%, and for those with venous insufficiency, it was 35.3%. In this study, among those patients taking antidepressants and presenting with erectile dysfunction, it is found that arterial insufficiency predominates venous insufficiency. Accordingly,

51.4% had arterial insufficiency in our study, which is in concordance with the study by Narinder Kaur et al.^[7]

In our study, 48.6% of patients not having arterial insufficiency were further evaluated for venous insufficiency manifesting as a venous leak, of which only six patients had venous insufficiency. In contrast, the rest had normal penile Doppler parameters. Thus, venous insufficiency was not statistically significant among patients in this study population on antidepressants. Most of the study population had arterial sufficiency with high statistical significance - indicative of organic (vasculogenic) cause. Very few patients had normal penile Doppler study despite being reported to have erectile dysfunction - possibly due to psychogenic causes. Patients with venous insufficiency should also have erectile dysfunction due to organic cause. Hence, penile Doppler evaluation can effectively identify the cause of erectile dysfunction and effectively triage patients for appropriate management.

Limitation of the Study

The study faces limitations due to patient reluctance to disclose erectile dysfunction, hindering the formation of a robust study group. Numerous confounding factors, like alcoholism, smoking, diabetes, and hypertension, complicate assessment, as effective screening is challenging without a substantial patient pool. Determining the influence of confounding drugs on erectile dysfunction is problematic. Although penile Doppler study aids in evaluating and distinguishing between psychogenic and vasculogenic causes, invasive DSA angiography remains the gold standard, but wasn't employed. Some participants developed erectile dysfunction after initiating treatment, but the precise timing of organic onset couldn't be determined. Future research should involve pre- and post-treatment penile Doppler evaluations.

CONCLUSION

The study favours the presence of organic (vasculogenic) aetiology in patients on treatment with antidepressant drugs presenting with erectile dysfunction. Most of the patients studied had arterial insufficiency with high statistical significance. Hence, caution is needed in choosing appropriate drugs to avoid harmful adverse effects such as organic erectile dysfunction.

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