

Cardiovascular Risk Factors in Patients with Erectile Dysfunction at Idrissa Pouye General Hospital, Dakar, Senegal

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Abstract

Introduction: Beyond its impact on quality of life, erectile dysfunction (ED) is now considered a potential clinical marker of cardiovascular disease because of shared mechanisms such as endothelial dysfunction, atherosclerosis, hypertension, diabetes, dyslipidaemia, smoking and obesity. The objectives of this study were to assess cardiovascular risk in patients with erectile dysfunction, evaluate ED severity and analyse the relationship between ED severity and cardiovascular risk. **Methods:** This was a prospective, descriptive and analytical study conducted from 1 March to 30 June 2019 in the Urology and Cardiology Departments of Idrissa Pouye General Hospital in Dakar. Men aged at least 40 years who consulted for ED, met the IIEF-5 criteria and provided oral informed consent were included. Patients with post-traumatic or iatrogenic ED, congenital malformations of the external male genitalia or loss of autonomy were not included. Patients underwent history taking, clinical examination, electrocardiography, transthoracic echocardiography and laboratory testing. ED severity was classified using IIEF-5 scores as severe (5 - 10), moderate (11 - 15) or mild (16 - 20). Framingham 10-year general cardiovascular risk was calculated in 48 patients with the required laboratory data and categorized as low (<10%), moderate (10% to <20%) or high (≥20%). Data were analysed using SPSS 24.0, with statistical significance set at $p < 0.05$. **Results:** A total of 50 men were included. Mean age was 57 ± 10 years, with a range from 40 to 78 years. The 60 - 69-year age group accounted for 42% of cases. Married pa-

tients represented 92%, and 80% had a middle socioeconomic level. ED was moderate in 52%, severe in 26% and mild in 22%. Cardiovascular risk factors were frequent: age ≥ 50 years in 76%, hypertension in 58%, dyslipidaemia in 48%, smoking in 36%, diabetes in 28%, physical inactivity in 26% and abdominal obesity in 22.9%. Among the 48 patients with complete data for Framingham scoring, 50.0% were at high cardiovascular risk, 16.7% at moderate risk and 33.3% at low risk. Among the same 48 patients with complete cardiovascular-risk-factor data, 30 (62.5%) had at least three risk factors and 18 (37.5%) had fewer than three. Advanced age ($p = 0.024$) and the presence of at least three cardiovascular risk factors ($p = 0.017$) were significantly associated with more severe ED. **Conclusion:** Erectile dysfunction was frequently associated with an unfavourable cardiovascular risk profile in this study. These cross-sectional associations support systematic cardiovascular risk assessment in men consulting for ED but do not establish that ED predicts subsequent cardiovascular events.

Keywords

Erectile Dysfunction, Cardiovascular Risk, Hypertension, Framingham Score, Senegal

1. Introduction

Erectile dysfunction (ED) is defined as the persistent or recurrent inability of a man to achieve or maintain an erection sufficient to allow satisfactory sexual activity, lasting for at least three months. It is a common disorder, long under-reported because of its intimate nature, but it has an important impact on quality of life, self-esteem, the couple relationship and psychological well-being [1]-[4]. In the source document, ED is also presented as a disorder affecting relationship quality within the couple.

Beyond its sexual dimension, ED is now considered a potential clinical marker of cardiovascular disease. Erection is a complex vascular-tissue phenomenon, dependent on endothelial integrity, penile arterial perfusion, neurological control, hormonal status and psychological factors. Alterations in endothelial function, atherosclerosis, metabolic syndrome, hypertension, diabetes, dyslipidaemia, smoking and obesity are involved in both ED and cardiovascular disease [5]-[10]. This shared pathophysiology explains the growing interest in ED as a sentinel symptom of cardiovascular risk.

Several studies have shown that ED may precede the occurrence of cardiovascular events, particularly in middle-aged men. The penile arteries, because of their small calibre, may express the consequences of systemic atherosclerosis early, before the onset of coronary, cerebrovascular or peripheral manifestations [11]-[15]. Screening for cardiovascular risk factors in patients consulting for ED therefore represents an opportunity for prevention.

In Senegal, data devoted to cardiovascular assessment of men with ED remain limited. The objectives of this study were to assess cardiovascular risk in patients with erectile dysfunction, evaluate the severity of ED and analyse the relationship between ED severity and cardiovascular risk.

2. Methods

This was a prospective, descriptive and analytical study conducted from 1 March to 30 June 2019 in the Urology and Cardiology Departments of Idrissa Pouye General Hospital in Dakar. This is a level 3 hospital located in the municipality of Grand Yoff. The Urology Department has an outpatient consultation unit, an in-patient unit, an operating theatre and a urological emergency unit. The Cardiology Department includes a consultation and functional investigations unit, an in-patient unit, a cardiac intensive care unit and an angiography and interventional rhythmology room.

The study population consisted of patients who consulted the Urology Department for erectile dysfunction and agreed to participate in the study after providing oral informed consent. Men aged at least 40 years, presenting with ED according to the IIEF-5 score criteria and having given consent were included. Patients with ED secondary to accidental or iatrogenic trauma, those with congenital malformations of the external male genitalia, and non-autonomous patients were not included. Oral informed consent was documented in the original study as an inclusion requirement. The study records available for this revision did not contain an ethics-committee approval or waiver identifier, nor a detailed description of how oral consent and confidentiality were formally documented.

Recruitment was carried out in the outpatient urology clinic. The original study documentation does not state that recruitment was strictly consecutive and does not provide a screening log from which the numbers screened, excluded or refusing participation can be reconstructed; the thesis nevertheless notes that some patients refused participation. Two of the 50 included participants lacked the lipid results required for complete Framingham and cardiovascular-risk-factor classification. Included patients were then referred to cardiology, where they underwent history taking, clinical examination, electrocardiography, transthoracic echocardiography and laboratory testing. The data collected included sociodemographic characteristics, medical and surgical history, personal and family cardiovascular risk factors, lifestyle habits, socioeconomic status, cardiovascular symptoms and clinical parameters.

Laboratory testing included fasting blood glucose, glycated haemoglobin, total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides and serum creatinine. The electrocardiogram looked for rhythm disorders, conduction abnormalities or repolarisation abnormalities. Echocardiography assessed left ventricular systolic function, chamber dimensions and segmental wall motion abnormalities. Overall cardiovascular risk was estimated using the 2008 Framingham general cardiovascular disease risk model described by D'Agostino *et al.* [16]. The 10-year risk cat-

egories used in this study were low (<10%), moderate (10% to <20%) and high ($\geq 20\%$). The score was calculable in 48 participants with the required laboratory data; two participants without lipid results were not classified. The original model was derived in adults aged 30 - 74 years. For study participants aged ≥ 75 years, the point table reproduced in the original thesis used the ≥ 75 -year age category; these estimates therefore represent extrapolation beyond the derivation age range and should be interpreted cautiously. ED severity was assessed using the IIEF-5. Scores of 5 - 10 were classified as severe ED, 11 - 15 as moderate ED, and 16 - 20 as mild ED; scores of 21 - 25 indicated normal erectile function and scores of 1 - 4 were considered non-interpretable. The questionnaire available in the source study was in French. The source thesis reports difficulty completing the IIEF-5 among patients who did not understand French, and no validated local-language translation or standardized interpreter-assisted procedure was documented. Data were entered using Sphinx Plus V5 and analysed with SPSS 24.0. Bivariate analysis used Fisher's exact test, with statistical significance set at $p < 0.05$.

3. Results

A total of 50 men with erectile dysfunction were included. Mean age was 57 ± 10 years, with a range from 40 to 78 years. The 60 - 69-year age group was the most represented, accounting for 42% of the population. Married men constituted the large majority of the sample, at 92%, with a slight predominance of monogamous marital status, observed in 58% of patients. Most patients had been educated in French, at 82%, while 18% had not attended school. The most represented educational levels were secondary and higher education. Professionally, 70% of patients were working and 30% were retired. Socioeconomic status was middle in 80% of patients, low in 12% and high in 8% (**Table 1**).

ED severity assessed by the IIEF-5 showed a predominance of moderate forms, found in 26 patients, or 52%. Severe disorders concerned 13 patients, or 26%, and mild forms 11 patients, or 22% (**Figure 1**). An electrocardiogram was performed in all patients and found subepicardial ischaemia in five subjects, or 10% (**Table 1**).

Table 1. Sociodemographic characteristics of the study population.

Variable	Result
Total sample	50 (100%)
Mean age	57 ± 10 years
Age range	40 - 78 years
Age group 40 - 49 years	10 (20%)
Age group 50 - 59 years	13 (26%)
Age group 60 - 69 years	21 (42%)
Age group ≥ 70 years	6 (12%)
Married	46 (92%)

Continued

Monogamous union	29 (58%)
Polygamous union	17 (34%)
Schooled patients	41 (82%)
No formal schooling	9 (18%)
Professionally active	35 (70%)
Retired	15 (30%)
Low socioeconomic status	6 (12%)
Middle socioeconomic status	40 (80%)
High socioeconomic status	4 (8%)

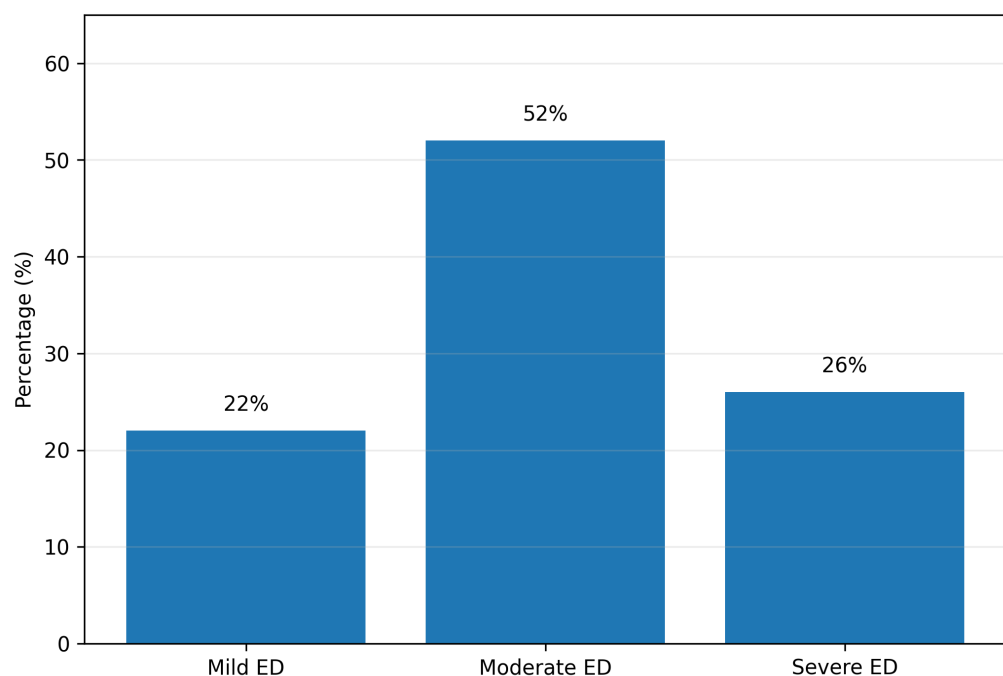
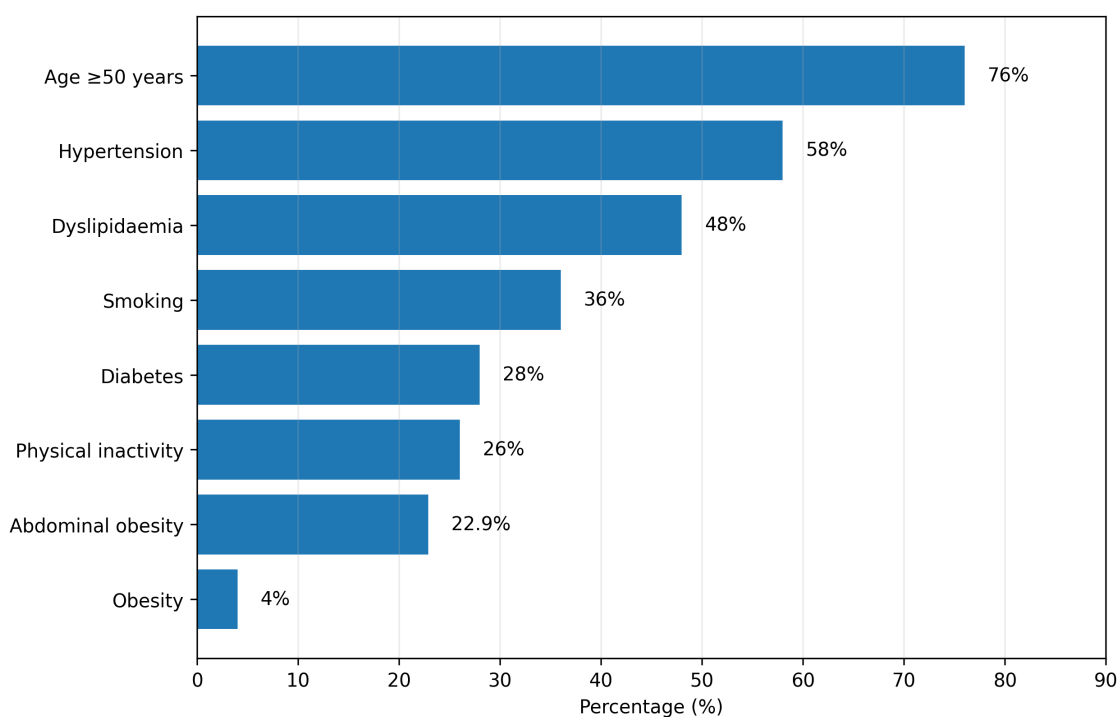


Figure 1. Distribution according to erectile dysfunction severity (n = 50).

Cardiovascular risk factors were frequent. Age greater than or equal to 50 years concerned 76% of patients. Hypertension was found in 58% (29/50), of whom 55% were already followed and treated, while 45% were diagnosed during the study. At the study visit, 27 patients had hypertensive-range blood pressure (18 with grade 1 and 9 with grade 2 hypertension), whereas 23 had normal or high-normal blood pressure; this study-visit blood-pressure variable, rather than the overall history/diagnosis of hypertension, was used in the bivariate analysis in **Table 3**. Mean systolic blood pressure was 136.77 ± 18 mmHg and mean diastolic blood pressure was 84.10 ± 9.78 mmHg. Dyslipidaemia was present in 48% of patients, diabetes in 28%, smoking in 36%, including 8% active smokers, and physical inactivity in 26%. Obesity according to BMI was found in 4%, while 24% were overweight. Abdominal obesity concerned 22.9% of patients (**Figure 2** and **Table 2**).

Table 2. Erectile dysfunction severity, cardiovascular risk factors and investigations.

Variable	Count	Percentage/Value
Mild ED	11	22%
Moderate ED	26	52%
Severe ED	13	26%
Age $\geq$ 50 years	38	76%
Hypertension	29	58%
Dyslipidaemia	24	48%
Smoking	18	36%
Diabetes	14	28%
Physical inactivity	13	26%
Abdominal obesity	11	22.9%
Obesity by BMI	2	4%
Overweight	12	24%
Subepicardial ischaemia on ECG	5	10%
Mean LVEF on echocardiography	—	65.84% $\pm$ 7.26%

**Figure 2.** Main cardiovascular risk factors among patients with erectile dysfunction (n = 50).

The Framingham score was calculable in 48 of 50 patients; two participants lacked the lipid results required for scoring. Among these 48 participants, 24 (50.0%) had high cardiovascular risk, 8 (16.7%) moderate risk and 16 (33.3%) low risk (**Figure 3**). The number of cardiovascular risk factors could likewise be clas-

sified in 48 participants: 30 (62.5%) had at least three risk factors and 18 (37.5%) had fewer than three; two participants were unclassified because of missing lipid results. The association of hypertension and diabetes was found in 20% of patients. Bivariate analysis found a significant association between advanced age and ED severity ($p = 0.024$). The presence of at least three cardiovascular risk factors was also associated with more severe ED ($p = 0.017$). In contrast, hypertensive-range blood pressure at the study visit, diabetes, dyslipidaemia, BMI, smoking and the Framingham score were not individually statistically significantly associated with ED severity (**Table 3**).

Table 3. Relationship between cardiovascular risk factors and erectile dysfunction severity.

Factor	Mild ED	Moderate ED	Severe ED	p
Age $\leq$ 60 years	10 (35.71%)	13 (46.43%)	5 (17.86%)	0.024
Age $>$ 60 years	1 (4.55%)	13 (59.09%)	8 (36.36%)	
Hypertensive-range BP at study visit: yes	5 (18.52%)	17 (62.96%)	5 (18.52%)	0.23
Hypertensive-range BP at study visit: no	6 (26.08%)	9 (39.13%)	8 (34.78%)	
Diabetes: yes	2 (14.28%)	9 (64.28%)	3 (21.43%)	0.536
Dyslipidaemia: yes	4 (16.67%)	15 (62.5%)	5 (20.83%)	0.341
Abdominal obesity: yes	0	6 (54.54%)	5 (45.45%)	0.078
<3 CV risk factors	7 (38.89%)	5 (27.78%)	6 (33.33%)	0.017
≥ 3 CV risk factors	3 (10%)	20 (66.67%)	7 (23.33%)	
Low Framingham risk	7 (43.75%)	5 (31.25%)	4 (25%)	0.155
Moderate Framingham risk	2 (25%)	5 (62.5%)	1 (12.5%)	
High Framingham risk	1 (4.17%)	16 (66.67%)	7 (29.17%)	

ED: erectile dysfunction; CV: cardiovascular; BMI: body mass index; LVEF: left ventricular ejection fraction. Note: Framingham and CV-risk-factor-count analyses used $n = 48$ because two participants lacked lipid results. "Hypertensive-range BP at study visit" refers to grade 1/2 BP and differs from diagnosed hypertension (29/50).

4. Discussion

This study describes a high frequency of cardiovascular risk factors among men aged at least 40 years consulting for erectile dysfunction at Idrissa Pouye General Hospital. The main finding was that 86% of patients had at least one cardiovascular risk factor. Among the 48 participants with complete data for the composite risk-factor count, 62.5% had at least three risk factors. These cross-sectional findings indicate a substantial cardiovascular risk-factor burden among men consulting for ED, but they do not establish that ED itself predicts future cardiovascular events.

The mean age of 57 years and the predominance of the 60 - 69-year age group are consistent with the literature, which shows a marked increase in the prevalence

and severity of ED with age. In our series, advanced age was significantly associated with ED severity. This finding may be explained by the progressive accumulation of risk factors, reduced endothelial function, subclinical atherosclerosis, decreased nitric oxide bioavailability and ageing-related hormonal changes [5]-[8] [11]-[15].

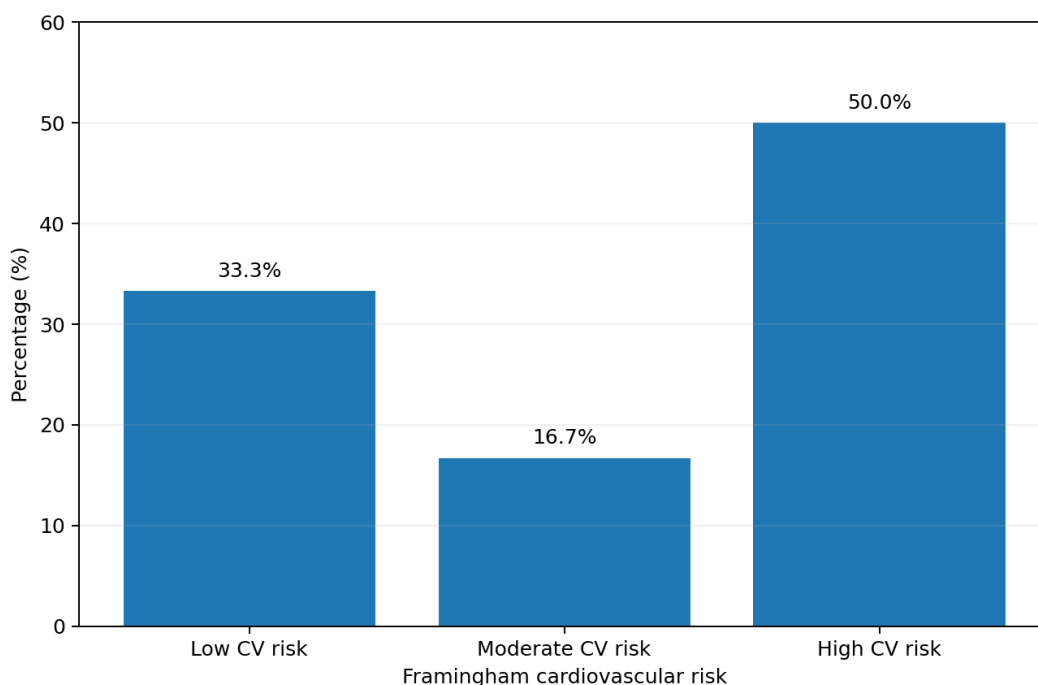


Figure 3. Distribution according to Framingham cardiovascular risk among participants with complete laboratory data (n = 48).

The predominance of moderate ED, found in more than half of the patients, suggests that patients consult at an already significant stage of the disorder. The intimate nature of the symptom, sociocultural representations of male sexuality, embarrassment in discussing the subject and lack of awareness of the link with cardiovascular risk may delay consultation. In the source document, the authors also emphasise the difficulty of addressing a subject that remains taboo in our regions.

Hypertension was the most frequent risk factor after age, found in 58% of patients. It is known to impair erectile function through several mechanisms: endothelial dysfunction, arterial stiffness, microvascular damage and potential effects of some antihypertensive treatments [17]-[20]. Dyslipidaemia, present in nearly half of patients, is also an important factor because of its role in atherogenesis and impaired penile arterial perfusion. Diabetes, found in 28%, promotes ED through the combination of vascular, neuropathic and endothelial damage [21]-[26].

An important finding is the significant association between the accumulation of at least three cardiovascular risk factors and ED severity. This observation is consistent with the concept of global vascular risk: ED severity appears to be more

closely related to cumulative risk burden than to any isolated factor. Although the Framingham score was not significantly associated with ED severity in our series, 24 of the 48 participants with complete Framingham data (50.0%) were classified as high risk. This supports cardiovascular risk assessment in this clinical population, while the absence of longitudinal follow-up prevents conclusions about prediction of subsequent cardiovascular events.

This study has several limitations: small sample size, single-centre recruitment, absence of a control group without ED and incomplete laboratory data in some patients. The original source did not retain a screening log with the numbers screened, excluded and refusing participation; two participants lacked lipid results required for Framingham and composite risk-factor classification. The IIEF-5 was available in French, and no validated local-language translation or standardized interpreter procedure was documented for participants who did not understand French. In addition, the available source records did not contain an ethics-committee approval/waiver identifier or detailed documentation procedures for oral consent and confidentiality. Finally, Framingham estimates for participants aged ≥ 75 years were based on the ≥ 75 -year point category reproduced in the study thesis and therefore extend beyond the 30 - 74-year derivation cohort. Despite these limitations, the study provides useful descriptive data in a field that has been little studied in Senegal and supports collaboration between urologists, cardiologists and general practitioners for cardiovascular risk assessment in men presenting with ED.

5. Conclusions

Erectile dysfunction in men aged at least 40 years was frequently associated with cardiovascular risk factors in this prospective series conducted at Idrissa Pouye General Hospital in Dakar. Patients had a marked risk profile, dominated by age, hypertension, dyslipidaemia, smoking, diabetes, physical inactivity and abdominal obesity. Among the 48 participants with complete laboratory data for Framingham scoring, 50.0% were classified as high cardiovascular risk, and 30/48 (62.5%) had at least three cardiovascular risk factors.

Moderate ED was the most frequent form. Advanced age and the accumulation of at least three cardiovascular risk factors were significantly associated with increased ED severity. These results demonstrate cross-sectional associations between ED severity and cardiovascular risk burden; they do not demonstrate that ED predicts subsequent cardiovascular events.

Systematic screening for cardiovascular risk factors in patients consulting for ED should be integrated into clinical practice. In this context, ED may provide a useful clinical opportunity to identify and address cardiovascular risk factors, rather than being interpreted from these data as a proven prospective warning marker. Multidisciplinary management involving urology, cardiology, therapeutic education and correction of risk factors may improve overall cardiovascular care and patients' sexual quality of life.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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