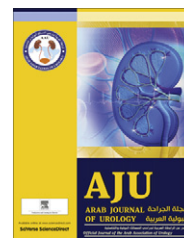**Arab Journal of Urology**

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ANDUROLOGY/SEXUAL MEDICINE

REVIEW

Erectile dysfunction in Arab countries. Part I: Prevalence and correlates

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Abstract   *Objective:*   To review the contemporary knowledge of local investigations in the Arab countries that were conducted to identify the magnitude of erectile dysfunction (ED) and its correlates among men in this region.

Methods: MEDLINE was reviewed for English-language reports from 2000 to 2011 for Arab countries, using the terms 'erectile dysfunction' and 'prevalence'.

Results: In all, 102 articles were found to be relevant to the review. Unfortunately only a few had a high level of evidence and the remaining studies were not controlled in their design. Several local studies showed that the prevalence of ED was > 40% among Arab men. Risk factors and medical comorbidities that negatively affect the cardiovascular system, endothelial function and ultimately erectile function were common in men in Arab countries. For instance, at least five Arab countries are included in the top 10 countries worldwide with a high prevalence of diabetes mellitus. The global statistics showed that other risk factors such as obesity, smoking, hypertension and dyslipidaemia are also very prevalent in Arab countries. This fact can explain the high incidence of both cardiovascular disease and ED among Arab men.

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coronary artery disease; EF, Erectile Function (domain); IHD, ischaemic heart disease; LVDD, left ventricular diastolic dysfunction; IVRT, isovolumic relaxation time

Conclusion: ED is very prevalent among Arab men. Arab countries are among those with the highest prevalence of endothelial dysfunction risk factors, which could explain this high prevalence of ED.

Introduction

Erectile dysfunction (ED) is a highly prevalent health problem that affects ≈30 million men in the USA. It is a common worldwide clinical problem, with tens of thousands of new cases per year [1]. Worldwide, the affected population is predicted to increase from 152 million in 1995 to 322 million in 2025. Unfortunately, in Arab countries there are no firm data on the true prevalence of ED, but anecdotal reports have shown a high incidence among different age groups and in patients with different comorbidities.

Due to the increasing life span and the high incidence of ED in this ageing population, a further increase in patients with ED can be expected [1,2]. As ED is associated with ageing, many of the assumed causes and clinical correlates of ED will be likewise associated with age-related disorders, include vascular insufficiency, hormonal derangement, interruption of neuronal pathway and medical comorbidities [3,4].

The characteristics of ED have been reported in many studies but they are not yet well investigated in the Arab region. This prompted several investigators in Arab countries to conduct research to identify the magnitude of the problem in this region. The objective of this review is to address the published data in the last 10 years for the prevalence of ED and its correlates in Arab countries.

Prevalence of ED, and its risk factors and medical comorbidities

General population

In cross-sectional office-based studies of > 1500 male patients visiting an andrology clinic, El-Sakka [5,6] showed that ED was very prevalent and ED risk factors were also very common in this community. In all, 92.6% of the patients had ED, 50.8% had premature ejaculation, and 7.6% had low sexual desire. Furthermore, 20% of the patients had psychogenic while 80% had organic causes of ED. Of the patients, ≈10% had mild, 40% had moderate and 50% had severe ED. There was a significant association between the increasing severity of ED and increased values in the cavernous veins of end-diastolic velocity (EDV), decreased values of peak systolic velocity (PSV), resistive index (RI) and penile rigidity meter values ($P < 0.001$ for each).

In a more recent study, Shaeer and Shaeer [7] explored epidemiological aspects of male sexuality using an online survey. They found that among Arab-speaking Internet users, the overall prevalence of ED was 45.1%, strongly correlating with various risk factors studied, including age, diabetes mellitus (DM), hypertension under treatment, depression, concerns over genital size, interpersonal distress, premature ejaculation, low libido, and subjective reports of penile deviation.

In another study from Upper Egypt, Zedan et al. [8] showed that of 658 men with ED, 17.3% had hypertension, 21.4% had DM and 40.1% were smokers. The prevalence of these risk factors was 2.8%, 3.7% and 28.7%, respectively, among controls, and they concluded that hypertension (odds ratio 5.4), DM (odds ratio 5.4) and smoking (odds ratio 3.1) were significant risk factors for ED.

Ghalayini et al. [9] reported that the prevalence of all degrees of ED was estimated at 49.9% in 905 men from Jordan aged ⩾18 years. In this group of men, the degree was mild in 25%, moderate in 13.5% and severe in 11.4%. The prevalence of severe ED increased from 2.7% in men in their twenties to 38.6% in their sixties and 46% in those aged ⩾70 years. They concluded that age is the single most significant risk factor. Other important risk factors included lower household income, physical inactivity, obesity, smoking, DM, hypertension and ischaemic heart disease.

Elbendary et al. [10] analysed risk factors in 434 Egyptian patients with organic ED age of < 40 years and 272 age-matched controls. They concluded that smoking and the use of recreational drugs are the most significant risk factors for organic ED in patients aged < 40 years. Al Helali et al. [11] described the pattern of ED in men in Jeddah city. They investigated all patients newly diagnosed with ED (388 men) who attended six andrology and urology clinics within a period of 3 months. The mean (SD, range) age was 43.23 (12.56, 20–86) years; 73% were married with one wife, 23.5% married with two wives, and 8% were single. About a half (43%) had received less than secondary education. Retired men constituted 13% of all patients. Lack of exercise was the most frequent risk factor (82%) among patients, followed

by smoking (56%), use of regular medication (44%), DM (30%), hypertension (15%), history of pelvic surgery (14%) alcoholism (13%), and drug addiction (8%).

In a cross-sectional community-based random sample of Egyptian men, Seyam et al. [12] reported on the prevalence of ED and its correlates in Egypt. They found that there was a fair correlation between ED and increasing age ($P \leqslant 0.001$). Men with complete ED comprised 13.2% of the sample, 26% of men in their 50s, 49% of men in their 60s and 52% of those aged $\geqslant 70$ years. The state of better erection correlated moderately with sexual desire and sexual satisfaction ($P \leqslant 0.01$). ED was associated with living in rural areas and lower socio-economic level ($P \leqslant 0.01$), with smoking, DM, heart disease, hypertension, liver disease, arthritis, peptic ulcer and renal disease ($P \leqslant 0.05$). ED was negatively associated with a good health-related quality of life (HRQL) ($P \leqslant 0.001$).

Shaeer et al. [13] reported on the prevalence of ED and its correlates among men attending primary-care clinics in Pakistan, Egypt and Nigeria. They found that the age-adjusted prevalence rates of ED were 57.4% in Nigeria, 63.6% in Egypt, and 80.8% in Pakistan. Older age, DM, peptic ulcers, prostate disease, depression-related symptoms, and caffeine consumption were independently associated with an increased prevalence of ED, whereas being moderately active to very active at work (hard physical labour) and during leisure time (strenuous exercise) was associated with half the prevalence of moderate-to-complete ED.

Abdulmohsen et al. [14] investigated physicians' knowledge, attitude and practice towards ED in Saudi Arabia. They concluded that male physicians scored significantly higher than females. Urologists scored the highest, followed by andrologists. Surprisingly, physicians with higher qualifications scored lower than those with intermediate qualifications, and even less than general practitioners. Those who had practised for $\geqslant 10$ years scored better than those with < 10 years of practice.

Furthermore, Abolfotouh and al-Helali [15] reported on the effect of ED on HRQL. ED was rated as mild (21%), moderate (60%) or severe (19%) in patients and was strongly associated with age. About two-thirds of the patients had a poor HRQL; severe ED was the only significant predictor. This factor could also affect prevalence and severity of ED.

DM

El-Sakka and Tayeb [16] reported that, of all patients with type 2 DM, 86.1% had various degrees of ED, including mild in 7.7%, moderate in 29.4% and severe in 49.1%. The prevalence of ED was 25% in patients aged < 50 years, which increased to 75% in those aged > 50 years. Of those without ED, 70% were aged < 50 years and 30% were > 50 years ($P < 0.001$). Patients with a history of DM for > 10 years were three times more likely to report ED than those with a history of < 5 years. Men with poor metabolic control were 12.2 times more likely to report ED than those with good metabolic control. Of diabetic patients with ED 53% had one or more diabetic-related complications compared with 20.5% with no ED ($P < 0.001$). el-Rufaie et al. [17] investigated sexual dysfunction among men with type II DM in a controlled study in the United Arab Emirates. The estimated high prevalence rate of sexual dysfunction among the diabetic group (89.2%) was significantly greater than in the hypertensive group (43.6%), and the apparently healthy group (16.7%). The commonest clinical presentations of sexual dysfunction among the diabetic men were impaired morning and spontaneous erections, erectile weakness, and ejaculatory disturbances. Less common presentations were reduced sexual interest and complete erectile failure. Al-Hunayan et al. [18] found that of 323 men with newly diagnosed type 2 DM, 31% had ED; comparing potent men and men with ED, there were statistically significant differences for smoking, duration of smoking, hypertension, education level, body mass index and serum glycosylated haemoglobin level. Khatib et al. [19], in a study that investigated prevalence and severity of ED and its correlations among Jordanian men with DM, concluded that the overall prevalence of ED was 62%; of these men 30.3% had severe ED. The prevalence increased with age from 26.5% (13 of 49) of patients aged < 40 years to 91% (87 of 96) in those aged $\geqslant 70$ years. Age, glycaemic control, hypertension, coronary artery disease (CAD), retinopathy and neuropathy were independent risk factors for ED.

El-Sakka [20] reported a study on the association between DM and changes in penile Doppler ultrasonography and axial penile rigidity variables in patients with ED. There was a statistically significant association between the presence of DM and a poor response to intracorporeal injection and decreasing PSV values and Rigidometer values ($P < 0.001$ for each). In diabetic patients, there was a statistically significant association between a longer duration of DM, poor control of DM, and the presence of more than one DM-related complication, and a decreasing response to intracorporeal injection, decreasing values of PSV, RI, and Rigidometer, and increasing values of EDV ($P < 0.05$ for each).

In another study assessing the relation between DM and other sexual problems, El-Sakka and Tayeb [21] evaluated the prevalence of Peyronie's disease (PD) in patients with type 2 DM who were screened for ED. Of a total of 1133 male diabetic Saudi patients, 8.1% were diagnosed as having PD. Penile plaque and curvature were the most common findings. About 75% of the patients had a long duration and progressive course of their complaint. Significant associations between PD

and both ED and longer duration of ED were detected. There were also significant associations between PD and age, obesity, smoking, duration and number of cigarettes smoked per day. Dyslipidaemia, psychological disorders and the presence of at least one risk factor were significantly associated with PD. There were significant associations between a longer duration and poor metabolic control of DM and PD. In the same domain, El-Sakka and Tayeb also assessed the impact of type 2 DM and PD, solely and together, on impairment of the vascular status of erection in patients with ED. They found that the means of the Erectile Function (EF) domain of the International Index of Erectile Function, and Questions 3 and 4, were significantly lower in patients with both DM and PD than in patients with either of the conditions alone. Patients with DM only had significantly lower means in the EF domain, Q3 and Q4 than patients with PD only. The means of PSV and RI were significantly lower, and the mean EDV was significantly higher in patients with both DM and PD than in patients with either of the conditions alone. They concluded that type 2 DM and PD solely and together negatively affect the vascular status of erection. Type 2 DM had the principle effect, but the presence of PD has an additive impairment effect on erection and Doppler variables [22].

In other related factors for the relation between DM and androgen alteration, El-Sakka et al. [23,24] assessed the prevalence and impact of the control of DM on the androgen pattern in men with type 2 DM-associated ED. Of all patients, 25.8%, 6.3% and 30.2% had low total testosterone, low dehydroepiandrosterone sulphate, and hyperinsulinaemia, respectively, at the baseline visit. There were significant increases in the mean (SD) total testosterone levels, from 4.2 (1.9) to 4.7 (2.1) and 5.3 (2.2) ng/mL, and significant decreases in insulin level, from 23.7 (17.4) and 22.8 (15.3) and 17.8 (13.9) μU/mL at the 3- and 6-month visits, respectively. There were significant associations between a good control of DM or decreased fasting blood sugar and normal levels of total testosterone at the 3- and 6-month visits. The prevalence of patients with normal testosterone levels and severe ED was significantly increased at the 3- and 6-month visits.

CAD, hypertension and stroke

El-Sakka et al. [25] evaluated risk factors for CAD in patients with ED. They found that of these patients, 26.9% had different degrees of ischaemic heart disease (IHD), of whom 84.8% were aged > 50 years. There was a significant association between age and IHD. There were significant associations between IHD and the increased severity and progressive course of ED. Furthermore, higher degrees of IHD were significantly associated with severe ED. DM, hypertension, dyslipidaemia and psychological disorders were present in

75.1%, 39.3%, 45.6% and 8.2% of the patients, respectively. Overall, 92.1% of the patients with ED had one or more coronary artery risk factors. The presence of at least one risk factor was significantly associated with ED in patients with IHD.

El-Sakka and Morsy [26], in a diagnostic study, assessed the role of measuring cavernosal artery blood flow as a screening tool for IHD in patients with ED. There was a statistically significant association between the presence of IHD and arteriogenic causes of ED, a poor response to intracorporal injection, poor rigidity in the Digital Inflection Rigidometer, and low PSV in the cavernous arteries. There was a statistically significant association between a higher grade of IHD and a decreasing PSV value. They concluded that the results of that study established that a reduced PSV of the cavernous artery is associated with IHD. Determining the PSV could be a reliable screening tool for detecting IHD in patients with ED.

Shamloul et al. [27] reported on the correlation between penile duplex ultrasonography findings and stress electrocardiography in men with ED. In all, 12 patients were diagnosed with positive IHD. Their mean PSV was 19.58 cm/s. In patients not diagnosed with IHD the mean PSV was 36.21 cm/s, the difference being statistically significant. The authors concluded that the PSV of cavernous arteries is a reliable measure for predicting IHD in patients with vasculogenic ED. Patients with a PSV of < 35 cm/s should be referred for a cardiological assessment as they have a real risk of having 'silent' IHD. Mittawae et al. [28] evaluated the incidence of ED, its severity, and other sexual function domains, in 800 Egyptian patients with hypertension. Of these patients, 92.3% had regular sexual activity (once to twice per week) and 43.2% had ED. Of these men, 5%, 12% and 26.2% had mild, moderate or severe ED, respectively. There was a highly statistically significant correlation between the duration of hypertension and the duration of weak erections.

Bener et al. [29] investigated the prevalence of ED and its severity in men in Qatar who had had a stroke, and assessed the comorbidities and risk factors associated with ED. Their findings showed a greater prevalence of ED in stroke patients in the population of Qatar. The most important comorbid factors for ED in stroke patients were DM, hypertension and hypercholesterolaemia, and the risk factors were smoking and obesity. The same group of authors also investigated the prevalence of ED, its severity, and other sexual function domains in hypertensive and normotensive Qatari men, and estimated the association between hypertension and predictors of ED. They concluded that the prevalence of ED was significantly higher in Qatari hypertensive men than in normotensive men. Age, level of education, DM, occupation and duration of hypertension were considered statistically significant predictors of ED [30].

Yassin et al. [31] reported in their review that cardiovascular diseases and ED are two faces of the coin of androgen deficiency. They concluded that it is now clear that ED is an expression of endothelial dysfunction. Testosterone deficiency is associated with an increased incidence of cardiovascular disease and DM. The latter is often the sequel of the metabolic syndrome. Visceral obesity, a pivotal characteristic of the metabolic syndrome, suppresses the hypothalamic–pituitary–testicular axis, leading to diminished testosterone production. Conversely, substantial androgen deficiency leads to signs and symptoms of metabolic syndrome. It is erroneous not to include testosterone measurements in the progress of the cardiovascular disease, DM and ED. These conditions correlate strongly with testosterone deficiency.

Jackson et al. [32,33] evaluated the link between ED and CAD, and provided a consensus report on the evaluation and management of ED associated with CAD. They stated that ED can arise before CAD becomes symptomatic, with a time window of 3–5 years. ED and CAD share the same risk factors, and endothelial dysfunction is the common denominator. Treating ED in cardiac patients is safe, provided that their risks are properly evaluated. El-Sakka et al. [34] recently assessed the association between the severity of ED and left ventricular diastolic dysfunction (LVDD) in patients with no overt cardiac complaint; 77.4%, 74.8%, 80% and 66.1% had an abnormal E/A ratio, deceleration time, and isovolumic relaxation time (IVRT) and mitral E velocity/tissue Doppler imaging E velocity (E/Em) ratio, respectively. Only the means of the IVRT and E/Em ratio had significant associations with an increased severity of ED ($P < 0.001$ for each). There were significant associations between an increased severity of ED and the following categorical echo variables; grade 1 and 2 of E/A ratio, deceleration time, IVRT, and grades 1, 2 and 3 of the E/Em ratio ($P < 0.05$ for each). They concluded that LVDD is prevalent among patients with ED-associated medical comorbidities but no overt cardiac complaint. There were significant associations between increased severity of ED and the presence of LVDD in those patients.

Other conditions: LUTS, chronic renal failure, PD, post-renal transplantation and lead exposure

El-Sakka [35], in a risk-analysis study, evaluated ED risk factors in patients with LUTS; 22.8% had mild, 42% had moderate and 35.2% had severe grades of ED. There were significant associations between LUTS and both the longer duration and the increased severity of ED. There were also significant associations between LUTS and the following ED risk factors; age, obesity, DM, hypertension and IHD. The presence of at least one risk factor was significantly associated with LUTS in patients with ED. In another related study, El-Sakka [36] investigated the underlying vascular association between LUTS and ED. Of these patients, 80.7% had different degrees of LUTS. There was a significant association between the presence of LUTS and arteriogenic and neurogenic causes of ED, poor response to intracorporeal injection, poor rigidity in the Rigidometer test, and a low PSV of the cavernous arteries ($P < 0.05$ for each). There was no significant association between the presence of LUTS and increasing values of EDV or decreasing values of RI of the cavernous arteries ($P > 0.05$ for each). There was a significant association between the higher degrees of LUTS and decreasing values of PSV ($P < 0.05$).

Ali et al. [37] investigated ED in patients with chronic renal failure undergoing haemodialysis in Egypt. They found that the prevalence of ED among these patients was 82.5%, compared to 30% among controls. The prevalence of ED in this group was significantly higher than in controls. The prevalence of ED in patients aged < 50 years was 80%, and it was 88% in those aged ⩾ 50 years, while the prevalence of ED among controls was 28% and 69.8%, respectively. Age ($r = -0.3368$, $P < 0.01$), serum urea level ($r = -0.5974$, $P < 0.001$), and creatinine level ($r = -0.5804$, $P < 0.001$) had a significant negative correlation with the presence of ED among these patients.

In a study that assessed prevalence of PD among patients with ED, El-Sakka [38] reported on a total of 1440 men with ED who were enrolled in this study; 7.9% of them had PD. There were significant associations between PD and both the longer duration and the increased severity of ED. There were also significant associations between PD and the following socio-demographic risk factors for ED; age, obesity, smoking, duration and number of cigarettes smoked per day. Concomitant diseases and medical comorbidities such as DM, dyslipidaemia, psychological disorders and the presence of at least one risk factor were significantly associated with PD in patients with ED.

In their study, El-Bahnasawy et al. [39] reported on 400 male renal transplant recipients; erectile function compared to that before the transplant was improved, deteriorated or remained static in 44%, 12.5% and 43.5% of the recipients, respectively. Age, haemoglobin level and presence of DM and/or peripheral neuropathy had significant and independent negative effects on erectile function. They concluded that renal transplantation has varying effects on erectile function. Anis et al. [40] reported on the possible hazardous effect of chronic lead exposure on erectile function, and the deposition of lead in the cavernous tissue, and concluded that chronic lead exposure might be associated with ED.

Summary and conclusion

In summary, male sexual potency and ED are not new issues in the Arab region. Shokeir and Hussein [41], in their review, reported on sexual life in Pharaonic Egypt.

In Pharaonic times, the Egyptians described impotence and recorded several methods to increase sexual power. The prevalence of ED is 20–90% among patients with different risk factors and medical comorbidities in Arab region countries. The most common risk factors and medical comorbidities were smoking, obesity, type 2 DM, hypertension, dyslipidaemia, CAD and depression. A long list of additional risk factors was reported in different studies, which included liver disease, arthritis, peptic ulcer, prostate disease, LUTS, history of pelvic surgery, chronic renal failure, PD, lead exposure, lower household income, physical inactivity, caffeine consumption, use of recreational drugs, alcoholism, and drug addiction. The high prevalence of severe ED in patients in this region could be attributed to: (1) the high prevalence of risk factors; (2) the poor control of those risk factors; (3) the delay in seeking medical advice; and (4) the non-compliance with treatment.

Conflict of interest

No conflict of interest to declare.

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