Prevalence of erectile dysfunction and associated factors among males visiting family medicine clinics in a Tertiary Care Hospital in Karachi, Pakistan

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ABSTRACT

Background: The burden of erectile dysfunction (ED) among the developed countries is found to be quite high. However, there is a paucity of data among developing countries to know its actual burden and factors associated with it. **Methods:** The current study is cross-sectional and was conducted in Family Medicine clinics of Liaquat National Hospital during May 2017–January 2018. A total of 450 males participated in this study with the age range of 24–77 years. More than half of the participants were graduates or above. **Results:** On multivariable analysis, age (aOR = 5.47, 95% CI: 2.74–10.89), alcohol use (aOR = 5.23, 95% CI: 1.45–18.84), diabetes (aOR = 6.61, 95% CI: 3.27–13.36), and current smoking (OR = 2.41, 95% CI: 1.35–4.31) were significantly associated with ED. ED risk was significantly lower in those who either attended secondary school (aOR = 0.33, 95% CI: 0.13–0.88) or were at least graduates (aOR = 0.40, 95% CI: 0.17–0.96) than illiterate when model was adjusted for other covariates. **Conclusion:** Erectile dysfunction in a Pakistani male population highlights the need for routine screening at the primary care level. There is a possibility that the actual burden is underreported due to cultural stigmatization; hence, further research is warranted to validate the findings.

Keywords: Erectile dysfunction, family medicine, Pakistan, prevalence, risk factors

Introduction

"Sexual dysfunction" in terms of desire (libido), arousal (erectile dysfunction), orgasm, and pain (dyspareunia) has been defined among men.[1] Erectile dysfunction (ED), previously defined as impotence, is the inability to achieve or maintain a rigid penile erection for satisfactory sexual intercourse.[2] ED is a condition with a prevalence of 19% in men between the ages of 25 and 70, rising above 25% from the age of 50. Worldwide the burden of ED is huge with projected prevalence estimated to be around 322 million by 2025.[3,4] Previously available literature documents higher rates of ED in United States (US) and Asia than the rest of the world.[5] According to the projected estimates, Asia will have 200 million men suffering from ED, reflecting a 130% growth in 2025.[6]

ED is also considered as a strong predictor of coronary artery disease, and in fact, cardiovascular assessment of a patient presenting with ED has been recommended.[7]

In developing countries, not many studies have been done to estimate the burden of sexual dysfunction, partly because of the burden of other non-communicable diseases that need

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to be addressed as well. Another reason for the paucity of data could be the different cultural values and social stigma associated with sexual dysfunction particularly in South Asia, which prevents males from discussing this issue with their primary care physicians. Surprisingly, a multicenter study in 2003 found that among men attending primary care clinics, the prevalence of ED was highest (80.8%) in Pakistan as compared to Egypt (63.6%) and Nigeria (57.4%).[8] Older age, depression, being obese, physical inactivity, co-morbid illnesses like diabetes, cardiovascular diseases, peptic ulcers, and prostate disease were found to be associated with ED.[9] In the US, among diabetics, ED prevalence was 51.3% so the finding of an ED prevalence of more than 80% in Pakistan among the general population is quite alarming.[10] Considering this high prevalence of ED more than a decade back, it is worth exploring the ED prevalence and its associated factors in our population.

Adequate sexual expression may enhance the quality of life and improve health so it is essential for primary care physicians to particularly inquire about it and provide counseling, but this could only be recommended once we actually know the burden and correlates of ED.

Therefore, the current study intends to explore the ED prevalence among a Pakistani population visiting primary health care clinics for various diseases and assess its association with various factors. The study findings will help physicians to understand the burden and dynamics of sexual dysfunction among our male population, to evaluate and address the modifiable risk factors of this condition.

Methodology

Study design and study participants

A cross-sectional study was conducted at Family Medicine Clinics of Liaquat National Hospital from May 2017 to January 2018. Adult sexually active males of age 18 years and above who visited the above-mentioned clinics and gave consent to take part were entered into the study. Physically or mentally disabled patients, those with severe illness requiring emergency care or hospitalization were not included in the study.

Sample size estimation

Our sample size estimation was based on the findings of 80.8% prevalence of ED from a previous study from Pakistan[8]; a minimum sample size of 239 was calculated through World Health Organization software to determine the ED prevalence with a confidence interval of 95% and a relative precision of 10%.

Questionnaire and data collection

Data on sexual dysfunction were collected from the patients through a validated questionnaire[11] which was modified and translated into Urdu according to the local needs and pre tested (10% of sample size) before collecting the data.

Approval for the study was acquired from ethical review committee dated 13th April, 2017. Privacy of each participant was maintained by interviewing in a separate room. Considering the cultural sensitivity of the issue, only male physician assistant interviewed the participants. Participants were allowed to refuse to reply to any question they would not want to answer and refuse to participate at any point during the interview. In case the patient gets diagnosed with ED, the family physician will there and then counsel, manage, and arrange for a follow-up.

Name of the participants was not disclosed on the questionnaire. Unique ID was allotted for identification. Data were kept under lock and with access provided only to concerned and authorized personnel. Data access to the computer was also password protected.

Ethical approval and informed consent

This was a survey-based study conducted in Family Medicine clinics. Ethical approval was taken from the hospital research and ethics committee (Dated 2 March 2017). Participants were explained about the study purpose and their participation in the study was voluntary. An informed written consent was also taken from the participants prior to their enrolment into the study.

Data analysis

SPSS version 20 was used for statistical analysis of the data. The median and interquartile range (IQR) was calculated for the age after assessing the normality distribution with the Shapiro-Wilk test. For categorical variables, frequency and percentage were calculated. Chi-square or Fisher's exact test was applied to determine the association between categorical variables and ED. Univariate binary logistic regression was run to assess the association with ED. Multivariable binary logistic regression using backward likelihood ratio elimination method was run for variables with $P < 0.25$ to assess the significance at each step. A P value below 0.05 was considered as statistically significant.

Results

A total of 450 males participated in the study. The age range of them was 24–77 years with median (IQR) age of 42 (35–49) years. The most presented age group was 31–40 years (n = 159, 35.33%). More than half of the participants were graduates or above (n = 239, 53.11%). Most of the participants were employed (n = 446, 99.11%). The frequency of ED was 21.11% (n = 95/450). Socio-demographic characteristics and its association with ED through Chi-square are depicted in Table 1.

Table 2 shows the factors associated with ED on univariable and multivariable regression. On univariable analysis, ED was significantly more prevalent among participants 40 years of age and above (OR = 7.87, 95% CI: 4.23–14.64). The frequency of ED was significantly low in patients who attended secondary schooling as compared to

Table 1: Patients' demographic and clinical characteristics among patients with and without ED			
Patient Characteristics	With ED *n* (%)	Without ED *n* (%)	*P*
Age			
≤40 years	13 (6.2)	197 (93.8)	**<0.001
>40 years	82 (34.2)	158 (65.8)	
Occupation			
Employed	95 (21.3)	351 (78.7)	†0.583
Unemployed	0 (0)	4 (100)	
Education			
Illiterate	12 (33.3)	24 (66.7)	*0.012
Madrassa	10 (45.5)	12 (54.5)	
Primary	9 (20)	36 (80)	
Secondary	18 (16.7)	90 (83.3)	
Above secondary	46 (19.2)	193 (80.8)	
Smoking status			
Never	43 (16.6)	216 (83.4)	*0.024
Former	4 (28.6)	10 (71.4)	
Current	48 (27.1)	129 (72.9)	
Alcohol addict			
Yes	7 (50)	7 (50)	†,*0.014
No	88 (20.2)	348 (79.8)	
History of spinal cord injury			
Yes	2 (16.7)	10 (83.3)	†1.00
No	93 (21.2)	345 (78.8)	
History of prostate removal due to cancer			
Yes	1 (50)	1 (50)	†0.378
No	94 (21)	354 (79)	
Diabetic			
Yes	33 (61.1)	21 (38.9)	**<0.001
No	62 (15.7)	334 (84.3)	
Hypertensive			
Yes	30 (45.5)	36 (54.5)	**<0.001
No	65 (16.9)	319 (83.1)	
Depression			
Yes	16 (41)	23 (59)	**0.001
No	79 (19.2)	332 (80.8)	
Elevated blood cholesterol level			
Yes	6 (24)	19 (76)	0.716
No	89 (20.9)	336 (79.1)	
Heart disease			
Yes	1 (25)	3 (75)	†1.00
No	94 (21.1)	352 (78.9)	
History of stroke			
Yes	1 (100)	0 (0)	†0.211
No	94 (20.9)	355 (79.1)	
Regularly take aspirin			
Yes	32 (57.1)	24 (42.9)	**<0.001
No	63 (16)	331 (84)	
Ride bicycle			
Yes	7 (23.3)	23 (76.7)	0.758
No	88 (21)	332 (79)	
Injured your penis			
Yes	4 (44.4)	5 (55.6)	†0.099
No	91 (20.6)	350 (79.4)	

*Significant at *P*<0.05, **Significant at *P*<0.01. †Fisher's exact test is reported

participants who attended formal schooling or had higher education (OR = 0.40, 95% CI: 0.17–0.94). Current smokers were more likely to have ED compared to the participants who had no history of smoking (OR = 1.87, 95% CI: 1.17–2.98). Depressive people were more likely to have ED in contrast non-depressed individuals (OR = 2.92, 95% CI: 1.48–5.79). People who used

alcohol had higher odds of ED contrasted with those who did not use alcohol (OR = 3.96, 95% CI: 1.35–11.57). People with diabetes were more likely to have ED in comparison with patients without diabetes (OR = 8.47, 95% CI: 4.60–15.59). The proportion of hypertensive patients with ED was significantly higher compared to patients who did not report a history of hypertension (OR = 4.09, 95% CI: 2.35–7.11). Regular intake of Aspirin had a significantly relationship with ED (OR = 7.0, 95% CI: 3.87–12.67).

Multivariable model was constructed with the following variables that had a *P* value of less than 0.25 in univariable analysis [Table 2]: age, education, history of depression, penile injury, smoking status, alcohol addiction, diabetes, and hypertension. On the multivariable model, after adjusting for other variables, the odds of ED was higher among patients more than 40 years of age (aOR = 5.47, 95% CI: 2.74–10.89) compared to those less than or equal to 40 years of age. The odds of ED were significantly lower in patients who either attended secondary school (aOR = 0.33, 95% CI: 0.13–0.88) or were at least graduates (aOR = 0.40, 95% CI: 0.17–0.96) as compared with those who were illiterate. Alcohol use was significantly linked to ED (aOR = 5.23, 95% CI: 1.45–18.84) as compared with no use of alcohol. The ED risk was higher in patients with diabetes (aOR = 6.61, 95% CI: 3.27–13.36) compared to non-diabetic.

Discussion

The ED prevalence in our study was only 21.1%, which is quite lower compared to most of the local and international studies. A study conducted among the patients with diabetes in Pakistan reported very high frequency, with almost 97.8% of participants with some degree of ED (mild: 17.1%; mild to moderate: 37.8%; moderate: 21.7%; severe: 20.7%). This is in contrast to our study in which the majority of patients (almost 88%) were non-diabetic. Higher prevalence of ED has been found among general population in other countries including Indonesia (35.6%), China (40.56%), Qatar (54.5%) and Malaysia (81.5%).[12-15] However recently, a retrospective study conducted in India among males attending sexual dysfunction clinics in a general psychiatry hospital, reported a frequency of 20.9%, which is comparable to the current study.[16] The reason for variability and inconsistent results might be explained by patient demographics and cultural characteristics, ED definition, and research methodologies which vary from one study to another. A relatively lower prevalence in our study may reflect inclusion of younger participants (77% were less than 50 years of age) in our study. Also due to the cultural stigma associated with sexual problems in Indo-Pak region, the participants may not have disclosed this information which accounts for underreported prevalence in these areas.

Table 2: Association of factors with ED				
Variables	Crude OR (95% CI)[a]	*P*	Adjusted OR (95% CI)[b]	*P*
Age				
≤40 years	Ref		Ref	
>40 years	7.87 (4.23-14.64)	**<0.001	5.47 (2.74-10.89)	**<0.001
Depression				
Yes	2.92 (1.48-5.79)	**0.002	1.71 (0.72-4.06)	0.224
No	Ref		Ref	
Education				
Illiterate	Ref		Ref	
Madrassa	1.67 (0.56-4.95)	0.358	1.65 (0.47-5.86)	0.435
Primary	0.50 (0.18-1.37)	0.177	0.50 (0.16-1.54)	0.227
Secondary	0.40 (0.17-0.94)	*0.036	0.33 (0.13-0.88)	*0.027
Graduate and above	0.48 (0.22-1.02)	0.057	0.40 (0.17-0.96)	*0.041
Penis injury				
Yes	3.08 (0.81-11.69)	0.099	3.59 (0.75-17.08)	0.109
No	Ref		Ref	
Smoking status				
Never smoked	Ref		Ref	
Former smoker	2.01 (0.60-6.70)	0.256	1.73 (0.40-7.47)	0.467
Current smoker	1.87 (1.17-2.98)	**0.008	2.41 (1.35-4.31)	**0.003
Alcoholaddiction				
Yes	3.96 (1.35-11.57)	*0.012	5.23 (1.45-18.84)	**0.012
No	Ref		Ref	
Diabetic				
Yes	8.47 (4.60-15.59)	**<0.001	6.61 (3.27-13.36)	**<0.001
No	Ref		Ref	
Hypertensive				
Yes	4.09 (2.35-7.11)	**<0.001	1.83 (0.93-3.63)	0.080
No	Ref		Ref	

*Significant at *P*<0.05, **Significant at *P*<0.01. [a]Univariate binary logistic regression, [b]Multivariable binary logistic regression, Ref: Reference category

Regarding socio-demographic characteristics, age had a significant association with ED in our study. This association seems plausible because of the concomitant presence of co-morbid illnesses and increased use of medications as aging occurs. However, even after adjustment of the covariates, age was still found as an independent risk factor in our study. This may be due to the physiological changes of atherosclerosis in blood vessels compromising blood flow to the penile organs and thus increasing the risk of ED with advancing age. The finding is in line with other recent studies done in Nigeria, and Turkey.[17,18] A widespread analysis of old literature from 1993 to 2009 also confirmed that worldwide prevalence of ED is rising with advance age.[19]

In our study, a significant association has found between the ED and level of education. Respondents with secondary education and above are at less risk of developing ED in contrast to those with primary level and had no formal schooling. This is consistent with another study done in Malaysia which reported similar findings.[20] The finding could be based on the assumptions that people with higher education level have more knowledge, better access to information and health care services compared to less educated people, and hence, reluctant to address sexual problems.

Depression has been found to be an important factor associated with ED in various studies. A study done among middle-aged and elderly men in Korea showed strong association of ED with depression on multivariable analysis.[21] Literature review identifies both behavioral and biological theory to explain the association between ED and depression.[22-24] According to behavioral model, persons with depression are more likely to engage in negative thoughts leading to fear, loss of self-image and performance anxiety leading to ED. On the other hand, biological model postulates that depression results in excess of catecholamine release from the hypothalamus leading to poor relaxation of Cavernosal muscle.[22] Though our study found a significant association of ED with the use of anti-depressants; however, this finding is not found to be significant in multivariate analysis hence no conclusion can be drawn regarding its association with ED. One of the possible explanations could be underreporting of depressive illness in our study which may have led to masking of its association with ED.

We found that the risk of developing ED was almost two times higher among current smokers as compared with those who never smoked. This association seems biologically plausible due to accelerated atherogenesis in penile vasculature caused by nicotine. This finding is supported by most of the studies except one study done in Qatar which reported high prevalence of ED among non-smokers compared to those who smoke.[25] This contrast could be due to the potential confounders including co-morbid illness and level of psychological stress, which were not statistically adjusted in this study through the regression model. Another very strong predictive factor of ED, which emerged from our study, is alcohol consumption. Alcohol use increased the likelihood of developing ED almost five times as compared with those

who do not consume alcohol. A population-based study done among Chinese people revealed similar findings compared with non-drinkers or those who consumed three or more standard drinks in a week (one standard drink equals 12 g of alcohol) were at more risk of developing ED (OR = 2.27, 95% CI: 1.28–4.03) after adjusting for age and cigarette smoking.[26] In the health professionals follow-up study, moderate consumption of alcohol (1-2 drinks per day) was associated with a lower prevalence of ED compared to heavy consumption or no consumption.[27] As reported in the literature, alcohol in moderate quantities improves erection and sexual desire because of its vasodilatory and anti-anxiety effects. However, large amount and chronic use may lead to suppressed sexual activity because of CNS sedation, hypogonadism and polyneuropathy causing penile nerve dysfunction. In our study, the interpretation of positive likelihood of ED with alcohol is not plausible because we did not quantify its consumption.

We also examined the association of chronic illness like diabetes and hypertension on the likelihood of developing ED and found a very strong association. This could be due to the concomitant presence of depression or alteration in psychological mood and lifestyle which may alter the sexual desire and may affect sexual function. Also, medications being prescribed for chronic diseases may be contributing factors.

The likelihood of developing ED among hypertensive males was found to be 1.8 times more as compared to non-hypertensive males. This is also supported by another study done among males in South-West Nigeria in which the prevalence of ED was 75% compared to 56.9% in normotensive individuals.[28] Several mechanisms have been implicated as causative factors including damage to vascular endothelium and inhibition of nitric oxide synthesis due to disease-related change in pathways which compromise blood flow necessary to maintain an adequate erection.[29]

In our study, the risk of developing ED is six times more among the patients with diabetes compared to non-diabetics even after adjustment of confounders. These results are congruent with several other studies where they have found consistently high prevalence of ED among diabetics ranging from 35 to 90%.[30] Moreover, men with diabetes may experience ED at an earlier age as compared with non-diabetics.[31]

Another interesting finding which emerged from this study is the increased prevalence of ED among Aspirin users compared to non-users of Aspirin. However, after adjustment in the multivariate model its association was not found to be significant. A recent systematic review reported contrasting results regarding the association between Aspirin and ED.[32] Some studies have identified a protective association of Aspirin by preserving impairment nitric oxide synthase and reducing hypercoagulability of blood flow in penile organs. On the other hand, a few studies concluded Aspirin as a risk factor because of their interference in the production of prostaglandin. In our study, Aspirin is

a confounder due to the widespread use of Aspirin among diabetics and hypertensive patients for primary prevention of heart disease which may have distorted its association with ED. However, adjusted model with other factors including chronic diseases revealed no independent association.

The findings of this study cannot be applied to our community in general because of the presence of younger people in our sample population which actually masks the true prevalence of ED in general population.

Conclusion

Erectile dysfunction in a Pakistani male population especially a higher frequency among the older age groups highlights the need for routine screening at the primary care level. There is a possibility that the actual burden is underreported due to cultural stigmatization hence further research is warranted to validate the findings.

Key points

- The prevalence of erectile dysfunction in a developing country highlights the importance of regular screening for sexual dysfunction at the primary care level.
- Those with higher education levels appear to have less risk of developing erectile dysfunction.
- Current smoking and alcohol use are found to be risk factors for erectile dysfunction.

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Conflicts of interest

There are no conflicts of interest.

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