ORIGINAL ARTICLE

Erectile dysfunction and lower urinary tract symptoms: prevalence and risk factors in a Hong Kong primary care setting

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Objectives To study the prevalence and associated risk factors of erectile dysfunction and lower urinary tract symptoms in a primary care population in Hong Kong.

Design Questionnaire study.

Setting Sai Ying Pun Jockey Club General Outpatient Clinic, Hong Kong.

Participants Male patients (n=950) seen between November 2010 and February 2011.

Main outcome measures International Prostate Symptom Score, and the five-item version of the International Index of Erectile Function.

Results The point prevalence of any degree of erectile dysfunction in our sample was 68% (mild 13%, mild-to-moderate 14%, moderate 16%, and severe 24%). Univariate analysis showed that age, education, working status, marital status, and smoking were associated factors. Further multiple logistic regression analysis identified age and smoking as significantly associated. The point prevalence of moderate and severe lower urinary tract symptoms was 36% and 32%, respectively. For the predictors of such symptoms, univariate analysis identified five factors (age, education, working status, marital status, and smoking) and only working status was not significantly associated with these symptoms in the multiple logistic regression analysis. The Pearson coefficient test showed a significant negative relation (r= –0.525; P<0.0001) between the two outcome measures (International Prostate Symptom Score and the five-item version of the International Index of Erectile Function).

Conclusions We showed that erectile dysfunction and lower urinary tract symptoms are common health problems in Chinese males seen in primary care. The correlation between the two outcome measures was statistically significant. Primary care physicians should increase awareness on erectile dysfunction and lower urinary tract symptoms so as to provide early screening and detection, as well as comprehensive treatment.

Key words
Erectile dysfunction; Lower urinary tract symptoms; Prevalence; Primary health care; Risk factors

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New knowledge added by this study

- Erectile dysfunction and lower urinary tract symptoms are important common health problems in Chinese males seen in primary care.
- The International Prostate Symptom Score and the International Index of Erectile Function–5 score yielded a statistically significant negative correlation in Chinese males seen in our primary care setting.

Implications for clinical practice or policy

- Primary care physicians should have increased awareness of erectile dysfunction and lower urinary tract symptoms in males.
- Primary care physicians should provide early screening and detection, as well as comprehensive treatment for lower urinary tract symptoms and erectile dysfunction in males.

Introduction

Erectile dysfunction (ED) is defined as the inability to achieve or maintain erections sufficient for satisfactory sexual performance.[1] It is a significant public health problem with a large impact on psychosocial well-being in men, and has a high prevalence.[2-4]

勃起功能障礙及下尿路症狀：香港基層醫療的發病率及危險因素

目的 評估下尿路症狀和勃起功能障礙在香港基層醫療的患病率及其相關危險因素。

設計 問卷調查。

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參與者 2010年11月至2011年2月期間於上述診所應診的950名男性病人。

主要結果測量 國際前列腺症狀評分（IPSS）和國際勃起功能指數5項版本（IIEF-5）。

結果 勃起功能障礙整體時點發病率為68%（輕度13%、輕度至中度14%、中度16%、重度24%）。單因素分析顯示年齡、教育程度、就業狀況、婚姻狀況和吸煙與勃起功能障礙相關。此外，多元回歸分析發現年齡和吸煙與勃起功能障礙顯著相關。中度和重度下尿路症狀的時點發病率分別為36%和32%。單因素分析發現五項因素（年齡、教育程度、就業狀況、婚姻狀況和吸煙）與下尿路症狀相關，而多元回歸分析發現只有就業狀況和下尿路症狀無顯著相關。皮爾遜係數測試表明IIEF-5和IPSS明顯呈負相關（r= –0.525，P<0.0001）。

結論 勃起功能障礙和下尿路症狀在香港基層醫療男性中是常見的。勃起功能障礙和下尿路症狀在統計學上相關。基層醫療醫生應提高意識，以便為基層醫療男性提供早期篩查、檢測和治療。

Numerous studies of ED have been conducted in western countries, and especially by urologists. Only a few studies were reported in Asia,[5-8] and there has been no local study in a Hong Kong primary care male population. We therefore conducted such a study on the point prevalence of ED and its correlates in Hong Kong.

According to previous studies, ED is more likely in men with lower urinary tract symptoms (LUTS) than in those without such symptoms.[9-12] Men with LUTS frequently reported that urinary symptoms have had a negative effect on their sexual life.[9,10,12] Moreover, there was no previous study on the correlation between ED and LUTS for males seen in primary care. We therefore sought to determine whether such a correlation exists in our local primary care male population.

Methods

This was a cross-sectional study to review the prevalence, risk factors, and any correlation between ED and LUTS. Adult male subjects attending the Sai Ying Pun Jockey Club General Outpatient Clinic (GOPC) were invited to fill in a self-administered questionnaire (Appendix).

The questionnaire had three parts. The first section explored demographic data, including age, as well as education, work, marital, living, and smoking status. The second section assessed LUTS using the International Prostate Symptom Score (IPSS). The IPSS is a validated questionnaire with higher scores correlating with more severe urinary symptoms (range, 0-35).[13] Depending on the IPSS, LUTS is classified as absent or mild (score <7), moderate (score 8-19), or severe (score 20-35). The third section assessed ED using an abridged validated five-item version of the International Index of Erectile Function (IIEF-5).[14] It was first translated into Chinese and then back-translated into English by a team of experienced bilingual 'field workers' who translated and participated in previous questionnaire surveys.[8] Accordingly, ED scores were classified as normal (22-25), mild (17-21), mild-to-moderate (12-16), moderate (8-11), and severe (5-7) based on the answers to the five questions. These questionnaires were distributed to male patients of the Sai Ying Pun Jockey Club GOPC from November 2010 to February 2011, and the recipients were invited to fill in the questionnaire on a voluntary basis, there being no financial incentive. Mentally incapacitated men, and men aged less than 18 years were excluded from this study. The study protocol and questionnaires were approved by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (HKU/HA HKW IRB; reference number UW 10-397). The study was conducted according to Good Clinical Practice Guidelines.

Statistical analysis

Data were analysed using the Statistical Package for the Social Sciences (Windows version 15.0; SPSS Inc, Chicago [IL], US). To identify significant factors associated with ED and LUTS, univariate analysis was first performed using the Pearson Chi squared tests and parametric Student's *t* tests, as appropriate. For each independent variable, 95% confidence intervals (CIs) and odds ratios (ORs) were obtained. A two-sided P value of <0.05 was used to assess statistical significance. The factors found to have a significant correlation were further analysed by multiple logistic stepwise regression models with a power of 0.9. Any P<0.05 was considered statistically significant. Pearson correlation coefficients were used to examine the relationship between IIEF-5 scores and IPSS results.

Results

In this study, 950 questionnaires were collected. Our patients' demographic and other characteristics are shown in Table 1. The reply rate of our subjects was 66%. The characteristics of our subjects matched those of Sai Ying Pun Jockey Club GOPC patients.

Most of our subjects were aged 50 years or more, and their median age was 65 (range, 25-85) years; 52% were retired. Most were married (87%) and living with relatives/family/friends (90%). Only 20% of our subjects were active smokers.

Prevalence of erectile dysfunction

The point prevalence of any degree of ED in our sample was 68% (95% CI, 0.651-0.710). Details of point prevalence of different categories of ED are shown in Table 2. In all, 21% of our subjects (n=204/950; 95% CI, 0.190-0.242) in our sample were sexually inactive with an IIEF-5 score of 0 to 4 points.

The point prevalence of severe ED increased with age. Over half of the subjects aged more than 70 years had severe ED. The association is illustrated in Figure 1.

Risk factors for erectile dysfunction

Univariate analysis showed that age (P<0.0001), education (P<0.0001), working status (P<0.0001),

TABLE 1. Demographic and other characteristics of the subjects (n=950)

Characteristics	No. (%) of patients
Age (years)	
<41	76 (8)
41-50	99 (10)
51-60	198 (21)
61-70	245 (26)
>70	332 (35)
Refused to answer	0 (0)
Education level	
Nil or primary	313 (33)
Secondary	365 (38)
Tertiary or above	272 (29)
Refused to answer	0 (0)
Working status	
Full-time/part-time	388 (41)
Unemployed	26 (3)
Retired	498 (52)
House husband	11 (1)
Full-time student	5 (1)
CSSA*	22 (2)
Refused to answer	0 (0)
Marital status	
Single	96 (10)
Married	824 (87)
Divorced/separated	30 (3)
Refused to answer	0 (0)
Living status	
Living alone	85 (9)
With relatives/family/friends	853 (90)
Residential home	12 (1)
Refused to answer	0 (0)
Smoking status	
Non-smoker	592 (62)
Ex-smoker	173 (18)
≤20 Pieces/day	101 (11)
>20 Pieces/day	84 (9)
Refused to answer	0 (0)

* CSSA denotes Comprehensive Social Security Assistance scheme

TABLE 2. Point prevalence of erectile dysfunction and lower urinary tract symptoms

	Point prevalence	95% Confidence interval
Erectile dysfunction	647 (68%)	0.651-0.710
Mild	128 (13%)	0.115-0.158
Mild-to-moderate	137 (14%)	0.123-0.168
Moderate	150 (16%)	0.136-0.183
Severe	232 (24%)	0.279-0.375
Lower urinary tract symptoms		
Moderate	341 (36%)	0.329-0.390
Severe	305 (32%)	0.292-0.351

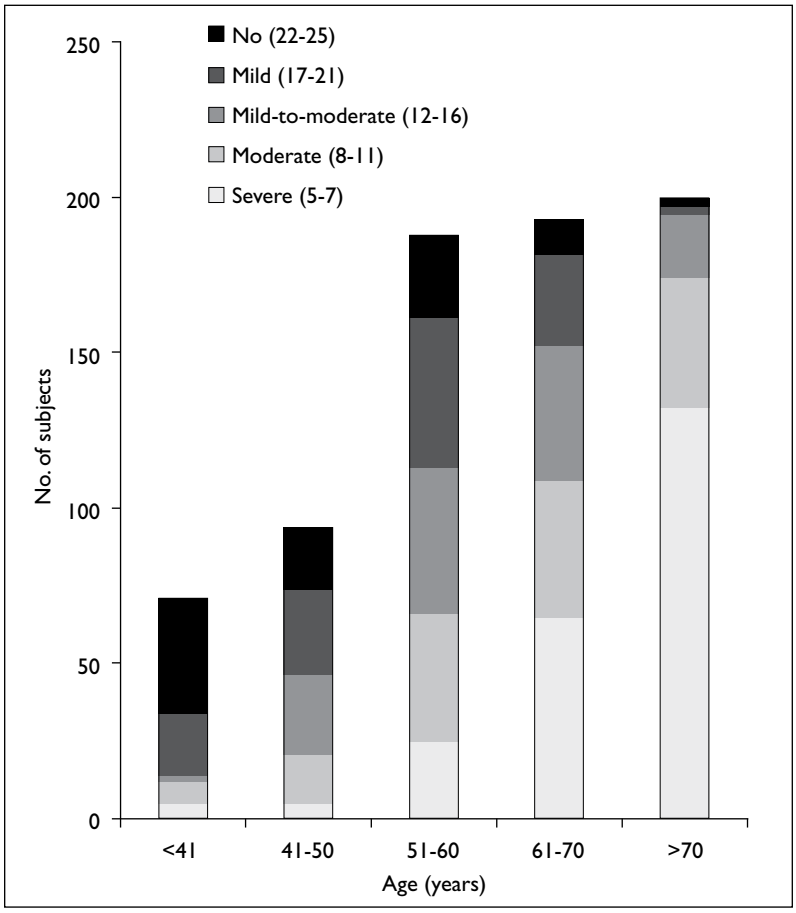

FIG 1. Erectile dysfunction of differing severity in different age-groups
204 Sexually inactive subjects were excluded from this chart

marital status (P=0.03), and smoking (P<0.001) were associated with ED. Further, multiple logistic stepwise regression analysis identified age and smoking as significantly associated with ED (Table 3). For active smokers, the OR for having ED was 5.826 (95% CI, 2.532-13.405; P<0.0001), suggesting a strong relationship.

Prevalence of lower urinary tract symptoms

The point prevalence of moderate and severe LUTS is shown in Table 2. Our male subjects have more severe LUTS when they age. The point prevalence of severe LUTS increased from 7% in the age-group of <41 years old to 50% in the age-group of >70 years old. This association is illustrated in Figure 2.

Risk factors for lower urinary tract symptoms

The univariate analysis showed that age (P<0.0001), education (P<0.0001), working status (P<0.0001), marital status (P<0.0001), and smoking (P<0.0001) were all significant associations. Multiple logistic regression analysis identified age, education, marital status, and smoking to be significantly associated with ED. The results of multivariable analysis are shown in Table 3.

Correlation between erectile dysfunction and lower urinary tract symptoms

The Pearson coefficients between the variable IIEF-5 score and total IPSS showed a significant inverse (negative) relationship (r= –0.525; P<0.0001), indicating that those with worse LUTS also had worse ED symptoms. The negative correlation was statistically significant for groups older than 40 years.

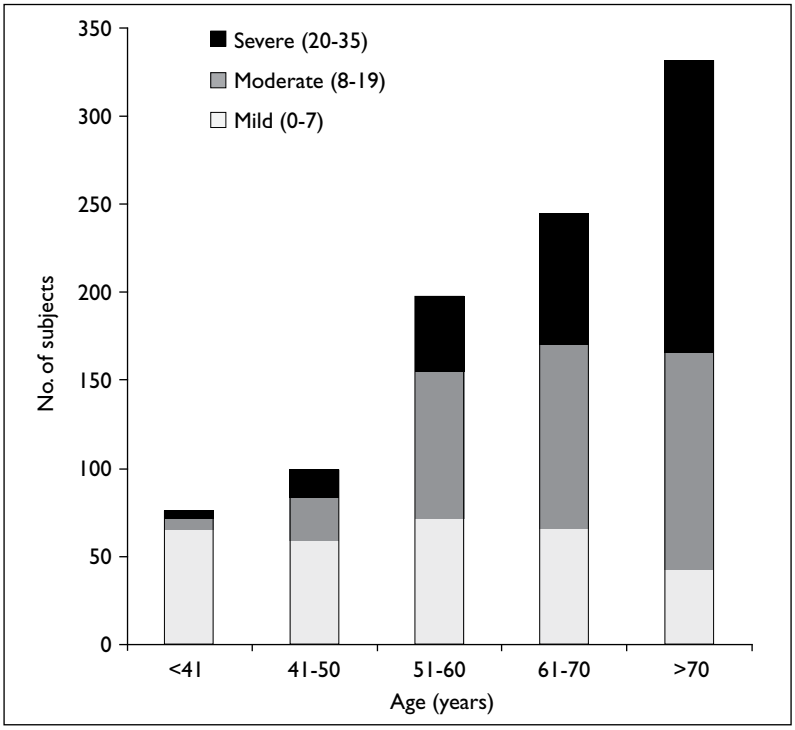

FIG 2. Lower urinary tract symptoms in different age-groups showing severity of symptoms

Discussion

This is the first primary care study conducted in Hong Kong to investigate the point prevalence and correlates of ED and LUTS. The point prevalence of any degree of ED in our sample was 68%, which was slightly higher than that reported in other Asian studies.[5-8] One of the reasons was that most of our subjects were aged more than 50 years old (82%) and there were 204 who were sexually inactive. Another reason is that most GOPC patients have chronic illnesses like hypertension and diabetes, which can be

TABLE 3. Multivariate analysis of risk factors for erectile dysfunction and lower urinary tract symptoms

Risk factor	Odds ratio (95% confidence interval)	P value
For erectile dysfunction		
Age (years)		
<41	0.012 (0.004-0.043)	<0.0001
41-50	0.044 (0.012-0.153)	<0.0001
51-60	0.078 (0.023-0.263)	<0.0001
61-70	0.211 (0.058-0.760)	0.017
>70	1	-
Smoking status		
Non-smoker	1	-
Ex-smoker	1.461 (0.711-2.999)	0.302
Present smoker	5.826 (2.532-13.405)	<0.0001
For lower urinary tract symptoms		
Age (years)		
<41	0.024 (0.010-0.055)	<0.0001
41-50	0.097 (0.055-0.172)	<0.0001
51-60	0.293 (0.187-0.460)	<0.0001
61-70	0.452 (0.290-0.703)	<0.001
>70	1.00	-
Education level		
Nil or primary	1.00	-
Secondary	0.611 (0.410-0.910)	0.015
Tertiary or above	0.773 (0.492-1.216)	0.266
Marital status		
Single	1.00	-
Married	0.707 (0.384-1.302)	0.266
Divorced/separated	0.284 (0.107-0.755)	0.012
Smoking status		
Non-smoker	1.00	-
Ex-smoker	1.781 (1.128-2.814)	0.013
Present smoker	2.085 (1.358-3.201)	0.001

confounding factors. Elderly patients (≥65 years old), those with chronic illnesses, and the underprivileged are our priority in this service population. Our study shows that ED is very common. It is not a condition seen by urologists alone. Studies have shown that approximately 70% of men with ED remain untreated.[15] Very often, patients are embarrassed to disclose their ED. Therefore, screening for ED should be included as a part of the initial history and physical examination for men seen in primary care settings.[16,17] Not attending to ED may also miss the opportunity of managing related/associated risk factors and/or co-morbid diseases (ie hypertension, dyslipidaemia, or diabetes).[18,19] Co-morbid diseases with ED were not examined in the current study but could be included in any future primary care research. Primary care physicians are the first contact point of the patient, and should actively screen, assess, and provide earlier interventions for those with ED.

Regarding risk factors, we found age and smoking were significant risk factors for ED. Previous studies in Asia[5-8] and the West[2,3] also demonstrated that increasing age correlated with the prevalence of ED. For smoking, we found that active smokers are more likely to have ED (OR=5.826; 95% CI, 2.532-13.405). Apart from the dose-response effect, an Italian study also showed a duration-response effect.[20] These findings are useful for primary care physicians to provide up-to-date and detailed information on the harmful effects of smoking.

There is a notable difference in the prevalence of moderate-to-severe LUTS in Asian studies, which ranged from 14% in Singapore to 56% in the Philippines.[21] In our study, the point prevalence of moderate-to-severe LUTS was 68%, which is alarming. This high figure may be partially due to more than 80% of our subjects being over 50 years old. It also reflects how common LUTS is in the primary care male population. Primary care physicians should have high awareness about LUTS when delivering anticipatory care.

Regarding risk factors that correlated with LUTS, we found age, education level, marital status, and smoking were significantly associated with moderate-to-severe LUTS. Previously, another Hong Kong study had shown that depression, a history of coronary heart disease, and alcohol consumption (seven drinks or more per week) were also associated with an increased risk of moderate-to-severe LUTS.[22] We shall explore more risk factors in any future primary care study into LUTS.

In many prior studies, LUTS was shown to be a risk factor of ED.[12,23,24] The largest multinational study MSAM-7[12] conducted in the United States and six European countries (on 12 815 men aged 50-80 years) reported it to be a major risk factor for sexual dysfunction in older men, independent of other risk factors. In our study, a negative correlation between the IIEF-5 score and IPSS score indicated that those with worse LUTS also had worse ED symptoms; the correlation attained statistical significance in those aged ≥41 years (Table 4).

Although the pathogenic relationship between LUTS and ED is not yet completely understood, studies implicate both psychosocial and pathophysiological processes.[10,25,26] Anatomical mechanisms, such as activation of the noradrenergic system in bladder outlet obstruction or local effects of an enlarged prostate on cavernosal nerves, have also been proposed to explain the correlation. McVary[27] attributed the correlation between LUTS and ED to: (a) a common alteration in nitric oxide synthase/nitric oxide in the prostate and penile smooth muscle; (b) autonomic hyperactivity affecting prostate growth and ED; (c) increased Rho-kinase activity; and (d) prostatic and penile ischaemia.

Limitations

One limitation of our study was that it was an observational cross-sectional investigation that can only suggest but not prove an association between a disease and a putative risk factor. Regarding the sampling, we sampled men attending a GOPC. Therefore, profiles may not be generalised to whole primary care population, especially those attending private primary care providers. We suggest that follow-up studies should involve a population-based self-administered questionnaire comprising items on socio-demographic status. Such items could include

TABLE 4. Patient responses to International Prostate Symptom Score (IPSS) and five-item version of the International Index of Erectile Function (IIEF-5), stratified by age

Age-group (years)	No. of patients	Mean ± standard deviation		Correlation of IPSS total vs IIEF-5	
		IPSS total	IIEF-5	*r*	P value
<41	71	3.55 ± 5.76	19.62 ± 5.98	-0.163	0.174
41-50	94	9.57 ± 9.52	16.91 ± 5.48	-0.567	<0.0001
51-60	188	12.27 ± 8.44	14.81 ± 5.74	-0.471	<0.0001
61-70	193	14.12 ± 8.21	11.54 ± 5.68	-0.244	0.001
>70	200	18.88 ± 8.41	7.82 ± 3.51	-0.310	<0.0001
All patients	**746**	**13.35 ± 9.39**	**12.81 ± 6.46**	**-0.525**	**<0.0001**

lifestyle factors, medical conditions and medications, erectile function, and LUTS. Such studies should target a cross-section of primary care patients in Hong Kong.

Conclusions

We showed that ED and LUTS are common health problems in the Chinese primary care male population. More than half of the patients were suffering from some degree of ED and moderate-to-severe degree of LUTS. We also showed that IIEF-5 score and IPSS yielded a statistically significant negative correlation in Hong Kong primary care males attending our clinic. Primary care physicians should increase their awareness on ED and LUTS, so as to provide early screening and detection, as well as comprehensive treatment.

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Appendix

Additional material related to this article can be found on the HKMJ website. Please go to <http://www.hkmj.org>, search for the appropriate article, and click on **Appendix in PDF** following the title.

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