

Association of depression/anxiety with lower urinary tract symptoms and erectile dysfunction in Chinese men aged from 22 to 50 years

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ABSTRACT Objective: To examine the relationships among lower urinary tract symptoms (LUTS), erectile dysfunction (ED) and mental health in Chinese men aged from 22 to 50. **Methods:** The subjects were 907 men aged between 22 and 50 years. The symptoms of mental distress were evaluated by the Zung Self-rating Depression Scale questionnaires and Zung Self-rating Anxiety Scale questionnaires. The symptoms of chronic prostatitis/chronic pelvic pain syndrome (CPPS), LUTS and ED were assessed by the US National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI), the International Prostate Symptom Score (IPSS) and the International Index of Erectile Function 5 (IIEF-5) score. **Results:** In the study, 894 subjects had their complete data. Their mean NIH-CPSI score was higher for the men with depression and anxiety than for those without (6.2 ± 6.2 vs. 5.0 ± 5.8 , $P=0.015$; 8.7 ± 8.1 vs. 4.7 ± 5.3 , $P<0.001$), with the mean IPSS score (5.9 ± 6.6 vs. 4.7 ± 5.8 , $P=0.029$; 8.4 ± 8.0 vs. 4.4 ± 5.5 , $P<0.001$). The mean IIEF-5 score was lower for the men with depression and anxiety than for those without (18.3 ± 4.4 vs. 20.2 ± 3.5 ; 17.2 ± 4.1 vs. 20.1 ± 3.6 , both $P<0.001$). The proportion of total ED was higher for the men with depression and anxiety than for those without (69.7% vs. 57.8% , $P=0.002$; 81.1% vs. 57.0% , $P<0.001$). **Conclusion:** Our study reveals associations among depression, anxiety, and CPPS, LUTS and ED in Chinese men aged 50 years and younger.

KEY WORDS Anxiety; Depression; Lower urinary tract symptoms; Erectile dysfunction; Prostatitis

22 ~ 50 岁中国人精神心理健康状况与下尿路症状及阴茎勃起功能障碍的相关性

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【摘要】目的: 研究 22 ~ 50 岁的中国男性心理健康与下尿路症状、勃起功能障碍之间的关系。**方法:** 研究对象为 907 名 22 ~ 50 岁的中国男性。采用 Zung 抑郁自评量表及焦虑自评量表评估研究对象的抑郁及焦虑状况的严重程度。采用美国国立卫生研究院慢性前列腺炎症状指数 (US National Institutes of Health Chronic Prostatitis Symptom Index, NIH-CPSI) 评估研究对象的慢性前列腺炎相关症状的严重程度, 采用国际前列腺症状评分 (the International Prostate Symptom Score, IPSS) 评估下尿路症状的严重程度, 采用国际勃起功能指数 5 (International Index of Erectile Function 5, IIEF-5) 评估阴茎勃起功能情况。**结果:** 共有 894 例研究对象的数据完整, 纳入最后统计分析。与没有抑郁和焦虑情绪的研究对象相比, 伴有抑郁和焦虑的研究对象的平均 NIH-CPSI 评分较高 (6.2 ± 6.2 vs. 5.0 ± 5.8 , $P=0.015$; 8.7 ± 8.1 vs. 4.7 ± 5.3 , $P<0.001$), 平均 IPSS 评分也较高 (5.9 ± 6.6 vs. 4.7 ± 5.8 , $P=0.029$; 8.4 ± 8.0 vs. 4.4 ± 5.5 , $P<0.001$), 平均 IIEF-5 评分较低 (18.3 ± 4.4 vs. 20.2 ± 3.5 ; 17.2 vs. 4.1 vs. 20.1 ± 3.6 , $P<0.001$), 总的 ED 比例较高 (69.7% vs. 57.8% , $P=0.002$; 81.1% vs. 57.0% , $P<0.001$)。**结论:** 在中国, 年龄 22 ~ 50 岁的男性中焦虑、抑郁情绪与下尿路症状、勃起功能密切相关。

【关键词】 焦虑; 前列腺炎; 下尿路症状; 勃起功能障碍

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In the last 30 years, China has been experienced rapid economic and social changes, which have led to a number of social problems, such as rapidly increasing cost of living, increasing risk of unemployment,

weakening family ties, and an increasing social and economic gap between the rich and the poor. These problems have had a major impact on mental health, including anxiety and depression, which could de-

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crease quality of life^[1].

Low urinary tract symptoms (LUTS) and erectile dysfunction (ED) are important facets of quality of life in men. LUTS have been associated with ED in several large-scale, community-based studies. Several studies revealed that both LUTS and ED were associated with mental health. The Massachusetts Male Aging Study demonstrated a strong positive association between ED and depressive symptoms among middle-aged to older adults^[2]. In male Japanese, ED was significantly associated with depression and anxiety only in people 45 to 55 years old^[3]. Moderate to severe LUTS were found associated with increased risk of clinically relevant depressive symptoms in older men in Hong Kong^[4-5]. Because of substantial social and cultural differences among countries, these findings may not apply to Chinese men. No study has investigated the association of mental health with LUTS and ED in young as opposed to old Chinese men. We aimed to ascertain the prevalence of depression and anxiety in Chinese men aged 50 years and younger. Furthermore, we sought to examine the association of depression and anxiety with LUTS and ED.

1 Materials and Methods

1.1 Study population

The institutional review board and ethical committee of Peking University Shougang Hospital approved this study. This was a cross-sectional survey of men living in the Shougang community, Shijingshan district, Beijing. Subjects were randomly selected from the state electoral list. We invited 907 men aged 50 years and younger to the hospital for interviews. Written informed consent was obtained from the participants, and all interviews were performed in the hospital.

The male interviewers surveyed the men on a one-to-one basis with a self-devised structured questionnaire. We collected their demographic data and complete medical and surgical histories. The men underwent detailed physical examinations.

1.2 Questionnaire

The psychological condition was evaluated by the Zung Self-Rating Depression Scale (SDS) and Self-Rating Anxiety Scale (SAS)^[6-7]. The scores of the 20 items in the SDS and SAS were separately totaled and multiplied by 1.25. The nearest number was taken as the standard score. An SDS standard score ≥ 53 indicated depression. An SAS standard score ≥ 50 indicated anxiety.

To identify the subjects with symptoms suggestive of chronic prostatitis/chronic pelvic pain syndrome (CPPS), we used the US National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI)^[8]. The NIH-CPSI measured aspects of the 3 most important symptom domains of the syndrome: pain (location, frequency, and severity; score range: 0 to 21), voiding problems (irritative and obstructive symptoms; score range: 0 to 10), and quality of life (score range: 0 to 12), with a total score ranging from 0 to 43.

The participants were asked to complete the Inter-

national Prostate Symptom Score (IPSS) questionnaire to measure symptoms of LUTS. The IPSS questionnaire included 7 questions covering frequency, nocturia, weak urinary stream, hesitancy, intermittency, incomplete emptying, and urgency^[9]. Symptom severity was categorized as no symptoms (IPSS 0), mild symptoms (IPSS 1-7), moderate symptoms (IPSS 8-19) and severe symptoms (IPSS 20-35).

The severity of ED was determined by the International Index of Erectile Function (IIEF-5) scale, a five-question validated measure of erectile function that included the following variable of sexual function: erectile function, orgasmic function, sexual desire, satisfaction with relations and overall satisfaction^[10]. The scores on the IIEF-5 were categorized as normal (>21), mild ED (17-21), mild to moderate ED (12-16), moderate ED (11-15), or severe ED (<11).

1.3 Statistical analysis

SPSS 16.0 was used for statistical analyses. Continuous variables were compared by Mann-Whitney *U* test and categorical variables by chi-square test. $P < 0.05$ was considered statistically significant.

2 Results

We had the complete data for 894 men. Their mean age was 43.0 ± 5.3 years (range: 22-50 years). The demographic and health characteristics are in Table 1. Of the subjects, 198 (22.1%) reported significant depressive symptoms (SDS standard score ≥ 53), 127 (14.2%) significant anxiety symptoms (SAS standard score ≥ 50), and 42 (4.7%) both symptoms (Table 2).

Table 1 Demographic characteristics of male subjects

Characteristics	Male subjects ($n=894$)
Age	
22-29 years	15(1.7%)
30-39 years	201(22.5%)
40-50 years	678(75.8%)
Marital status	
Married	846(94.6%)
Unmarried	36(4.0%)
Divorced	12(1.3%)
Education	
Primary school or less	13(1.5%)
Secondary school	209(23.4%)
Graduated from college	172(19.2%)
Waist circumference/cm, $\bar{x} \pm s$, median (range)	92.9 \pm 1.1, 94.0 (36.0-130.0)
Body mass index/(kg/m^2), $\bar{x} \pm s$, median (range)	26.0 \pm 3.5, 26.0 (15.7-41.0)
Low-density lipoprotein cholesterol level/(mmol/L), $\bar{x} \pm s$, median (range)	3.1 \pm 0.8, 3.0(0.7-6.6)
Triglycerides level/(mmol/L), $\bar{x} \pm s$, median (range)	2.2 \pm 1.9, 1.6(0.3-14.4)

The mean NIH-CPSI score was 5.3 ± 5.9 , which was the sum of pain (1.3 ± 2.3), urinary symptoms

(1.5 ± 2.3) and quality of life scores (1.7 ± 1.6 , Table 2). A total of 184 (20.6%) men had a moderate to severe NIH-CPSI score. The mean NIH-CPSI score was higher for the men with depression than for those without (6.2 ± 6.2 vs. 5.0 ± 5.8 , $P = 0.015$) and was higher for the men with anxiety than for those without (8.7 ± 8.1 vs. 4.7 ± 5.3 , $P < 0.001$). Also the proportion of men with moderate to severe NIH-CPSI scores was higher with depression than without (26.3% vs. 19%, $P = 0.025$) and anxiety (38.6% vs. 17.6%, $P < 0.001$). The mean total NIH-CPSI score was higher for the men with both depression and anxiety than for those without (8.8 ± 8.1 vs. 4.5 ± 5.3 , $P < 0.001$).

The severity of LUTS, evaluated by IPSS score, increased with anxiety or depression status (Table 2). The mean total IPSS score was 5.0 ± 6.0 , which was the sum of storage symptoms (2.6 ± 2.7) and voiding symptoms (2.4 ± 3.8). In all, 189 men (21.1%) reported moderate to severe LUTS. The mean IPSS score was higher with depression and anxiety than without (5.9 ± 6.6 vs. 4.7 ± 5.8 , $P = 0.029$) (8.4 ± 8.0 vs. 4.4 ± 5.5 , $P < 0.001$). The voiding subscore

was significantly higher with depression than without ($P = 0.012$). However, storage and voiding subscores were both significantly higher with anxiety than without (both $P < 0.001$). The proportion of men with moderate to severe LUTS was higher with depression and anxiety than without (27.3% vs. 19.4%, $P = 0.017$) (42.5% vs. 17.6%, $P < 0.001$). The mean IPSS score was higher for the men with both depression and anxiety than without (9.1 ± 7.4 vs. 4.3 ± 5.3 , $P < 0.001$).

ED changed with anxiety or depression status (Table 2). The mean total IIEF-5 score was 19.7 ± 3.8 . A total of 355 (39.7%), 158 (17.7%) and 27 (3.0%) men reported mild, mild to moderate and moderate ED, respectively. We found no severe cases of ED. The mean IIEF-5 score was lower with depression and anxiety than without (18.3 ± 4.4 vs. 20.2 ± 3.5 , $P < 0.001$; 17.2 ± 4.1 vs. 20.1 ± 3.6 , $P < 0.001$). The proportion of mild ED was higher with depression and anxiety than without (69.7% vs. 57.8%, $P = 0.002$; 81.1% vs. 57.0%, $P < 0.001$). The mean IIEF-5 score was lower for the men with both depression and anxiety than without (14.8 ± 3.3 vs. 20.4 ± 3.4 , $P < 0.001$).

Table 2 The association of depression and anxiety with lower urinary tract symptoms and erectile dysfunction in Chinese men with age from 22 to 50

Item	Overall (<i>n</i> = 894)	Depression		Anxiety		Both depression and anxiety	
		Yes (<i>n</i> = 198)	No (<i>n</i> = 696)	Yes (<i>n</i> = 127)	No (<i>n</i> = 767)	Yes (<i>n</i> = 42)	No (<i>n</i> = 611)
NIH-CPSI							
Total, $\bar{x} \pm s$	5.3 ± 5.9	6.2 ± 6.2	$5.0 \pm 5.8^*$	8.7 ± 8.1	$4.7 \pm 5.3^\#$	$8.8 \pm 8.1^\Delta$	4.5 ± 5.3
Pain, $\bar{x} \pm s$	1.3 ± 2.3	1.5 ± 2.4	1.2 ± 2.3	2.6 ± 3.4	$1.1 \pm 2.1^\#$	$2.0 \pm 2.6^\Delta$	1.0 ± 2.0
Urinary symptoms, $\bar{x} \pm s$	1.5 ± 2.3	1.7 ± 2.5	1.5 ± 2.2	2.5 ± 3.1	$1.4 \pm 2.1^\#$	$2.8 \pm 3.7^\Delta$	1.4 ± 2.1
Quality of life, $\bar{x} \pm s$	1.7 ± 1.6	2.0 ± 1.7	$1.6 \pm 1.6^*$	2.2 ± 1.9	$1.6 \pm 1.5^\#$	$2.4 \pm 2.1^\Delta$	1.5 ± 1.5
Moderate to severe score, <i>n</i> (%)	184 (20.6)	52 (26.3)	132 (19.0)*	49 (38.6)	135 (17.6)^\#	18 (42.9)^\Delta	101 (16.5)
IPSS							
Total, $\bar{x} \pm s$	5.0 ± 6.0	5.9 ± 6.6	$4.7 \pm 5.8^*$	8.4 ± 8.0	$4.4 \pm 5.5^\#$	$9.1 \pm 7.4^\Delta$	4.3 ± 5.3
Storage symptoms, $\bar{x} \pm s$	2.6 ± 2.7	2.9 ± 2.8	2.6 ± 2.7	4.1 ± 3.6	$2.4 \pm 2.5^\#$	$4.5 \pm 3.5^\Delta$	2.4 ± 2.5
Voiding symptoms, $\bar{x} \pm s$	2.4 ± 3.8	3.0 ± 4.4	$2.2 \pm 3.6^*$	4.3 ± 5.0	$2.0 \pm 3.4^\#$	$4.6 \pm 5.0^\Delta$	1.9 ± 3.3
Quality of life score, $\bar{x} \pm s$	2.0 ± 1.6	2.2 ± 1.6	2.0 ± 1.6	2.6 ± 1.8	$1.9 \pm 1.5^\#$	$2.7 \pm 1.9^\Delta$	1.9 ± 1.5
Moderate to severe score, <i>n</i> (%)	189 (21.1)	54 (27.3)	135 (19.4)*	54 (42.5)	135 (17.6)^\#	22 (52.4)^\Delta	103 (16.9)
Total IIEF-5, $\bar{x} \pm s$	19.7 ± 3.8	18.3 ± 4.4	$20.2 \pm 3.5^*$	17.2 ± 4.1	$20.1 \pm 3.6^\#$	$14.8 \pm 3.3^\Delta$	20.4 ± 3.4
ED diagnosed with IEF-5, <i>n</i> (%)							
Total	540 (60.4)	138 (69.7)	402 (57.8)*	103 (81.1)	437 (57.0)^\#	42 (100.0)^\Delta	341 (55.8)
Mild	355 (39.7)	73 (36.9)	282 (40.5)	44 (34.6)	311 (40.5)	15 (35.7)	253 (41.4)
Mild to moderate	158 (17.7)	43 (21.7)	115 (16.5)	47 (37)	111 (14.5)^\#	17 (40.5)^\Delta	85 (13.9)
Moderate	27 (3.0)	22 (11.1)	5 (0.7)*	12 (9.4)	15 (2.0)^\#	10 (23.8)^\Delta	3 (0.5)

NIH-CPSI, National Institutes of Health Chronic Prostatitis Symptom Index; IPSS, International Prostate Symptom Score; IIEF-5, International Index of Erectile Function 5; ED, erectile dysfunction; * $P < 0.05$, vs. with depression; # $P < 0.05$, vs. with anxiety; $\Delta P < 0.05$, vs. without depression or anxiety.

3 Discussion

Some Chinese men aged 50 years and younger experience some mental distress, such as anxiety and depression, which may be associated with urinary tract symptoms and erectile function. In our study, 22.1% of these men reported significant depressive symptoms and 14.2% significant anxiety symptoms. Prostate symptom indices, such as NIH-CPSI and IPSS scores were higher and erectile function score was lower for

the men with depression and anxiety than for those without. Total ED was higher for the men with depression and anxiety than without. Thus, mental problems may have some associations with urinary tract symptoms and erectile dysfunction in these men.

The prevalence of depression and anxiety we found was higher than in other surveys in Chinese populations^[1]. The discrepancy may be explained by the different diagnostic tools used for mental distress. Also the mean age of our subjects was relatively young,

43.0 ± 5.3 years. These men might experience more mental distress due to socioeconomic pressures. In China, psychiatrists are the interviewers in most psychiatric epidemiological surveys, which might suggest the interviewers' bias because the psychiatrists are more familiar with the severe psychiatric disorders in their clinical practice and may not identify the patients presenting less severe symptoms.

Our results demonstrate significant associations among NIH-CPSI, IPSS, IIEF-5 and depression or anxiety in relatively young Chinese men. Marszalek et al^[11] observed a close association among CPPS, LUTS and ED. The data from the Massachusetts Male Aging Study showed that depression and anger were highly correlated with ED. Nearly all men with symptoms of major depressive disorder had some degree of ED^[2]. Another study of Chinese men revealed that depressive symptoms and moderate LUTS were both independently associated with ED (odds ratio 2.3 and 3.7, respectively)^[4]. Psychological factors (depression and anxiety) were strongly related to ED in Japanese middle-aged adults (45 - 54 years old)^[3]. The authors reported a marked increase in prevalence of ED in late adulthood (55 years or older), which might indicate the role of other age-related factors, such as physical factors (atherosclerosis) in the etiology of ED. Because our men were largely in their 40 years old, psychological factors might be more closely associated with symptoms of CPPS, LUTS and ED.

However, CPPS, LUTS and ED might cause reactive secondary mental distress. Anderson et al^[12] reported that CPPS patients had significantly more perceived stress and anxiety than controls. Coyne et al^[13] investigated 14 139 men and found that men in all the LUTS subgroups (storage, voiding and postmicturition) reported the lowest levels of health-related quality of life and highest levels of anxiety and depression, with 35.9% of men meeting self-reported screening criteria for clinical anxiety and 29.8% meeting self-reported criteria for clinical depression. Severe LUTS was associated with an odd ratio of 3.9 of having clinically relevant depressive symptoms^[3]. Shiri et al^[14] found a bidirectional relationship between depression and ED. Compared with men free of depressive symptoms, the adjusted incidence density ratio of ED was 4.5 for the men with treated depressive symptoms and 1.2 for those with untreated depressive symptoms. The adjusted incidence density ratio of depressive mood was 1.9 for the men with ED. Men reporting increased psychological impact of erectile dysfunction also reported increased impairment in functional status, low sexual self-efficacy, and increased depression and anxiety^[15]. Thus, psychological factors and CPPS, LUTS, and ED might mutually reinforce each other.

Our study contains some limitations. One is the use of the SAS and SDS might not be appropriate for young Chinese men because the scales may over- or underestimate the prevalence of depression and anxie-

ty. Our cross-sectional design prevented the determination of causation, so we can only show an association of psychological factors and LUTS and ED. Determining which variable takes precedence or is etiologically antecedent is difficult. However, this study of a relatively large sample could be very helpful in calling attention to the health of young men and forming prevention strategies in developing countries, such as China.

In conclusion, this study reveals associations among depression, anxiety, and CPPS, LUTS, and ED in Chinese men aged 50 years and younger. Furthermore, concomitant depression and anxiety strengthen these associations. Our results might help call attention to the health of these men and form prevention strategies in developing countries, such as China.

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