IPSS quality of life question: a possible indicator of depression among patients with lower urinary tract symptoms

Timothy V. Johnson, MD,[1] Ammara Abbasi, MD,[1] Samantha S. Ehrlich, BS,[1] Renee S. Kleris, MD,[1] Ashli Owen-Smith, PhD,[2] Charles L. Raison, MD,[3] Viraj A. Master, MD[1,4]

[1]Department of Urology, Emory University School of Medicine, Atlanta, Georgia, USA
[2]Department of Behavioral Sciences and Health Education, Rollins School of Public Health, Emory University, Atlanta, Georgia, USA
[3]Department of Psychiatry, Emory University School of Medicine, Atlanta, Georgia, USA
[4]Winship Cancer Institute, Atlanta, Georgia, USA

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Introduction: *Depression and benign prostatic hyperplasia (BPH) are prevalent, especially in older patient populations. Emerging data suggest potential interactions between depression and BPH. We sought to assess whether the questions of the International Prostate Symptom Score (IPSS), specifically the quality of life (QoL) question, predict depression.*

Materials and methods: *We asked 541 consecutive male patients over the age of 40 in a tertiary care clinic to self-administer the IPSS QoL score and the Geriatric Depression Scale (GDS), a validated screening tool for depression. Receiver operating characteristics (ROC) curves were depicted and used to determine the area under the curve (AUC) and relative sensitivity and specificity of the individual questions of the IPSS relative to the GDS.*

Results: *Of the cohort, 17.2 percent screened positive for depression. More than half (54.7%) of nondepressed patients had a QoL score of 0-2, while a similar number of depressed patients (50.8%) had a QoL score of 5 or 6. The QoL question of the IPSS exhibited an AUC (95% CI, p value) of 0.735 (0.669-0.800, $p < 0.001$). A cut-off of QoL scores > 5 exhibited the highest specificity (93.1%)while a cut off of QoL scores > 1 exhibited a sensitivity of 90.0%.*

Conclusions: *Future studies should validate these findings and shed further light on this tool's clinical utility. Pending this future validation, patients with a score of 6 could be considered for further mental health evaluation.*

Key Words: lower urinary tract symptoms, major depressive disorder

Introduction

Benign prostatic hyperplasia (BPH) involves pathological progressive enlargement of the prostate gland, often resulting in lower urinary tract symptoms (LUTS) such as nocturia.[1] BPH/LUTS affect 75% of men in their 60s and 83% in their 70s.[1] Worsening BPH/LUTS symptoms reduce patient quality of life (QoL).[2-4] Moreover, recent studies have associated BPH symptoms with depression.[5-8] In 2009, Coyne et al reported that BPH and LUTS not only affect a patient's QoL, but may even be associated with depression.[5] Additionally, Kok et al recently reported a two-fold increase in risk of IPSS score > 7 among patients taking antidepressants.[6] Finally, prior studies have linked worsening International Prostate Symptom Scores (IPSS) and nocturia scores with increased risk of depression.[7-10]

Depression increases morbidity and mortality, diminishes social and physical function, and enhances subjective suffering.[11,12] Therefore, it may be important

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Address correspondence to Dr. Viraj Master, Department of Urology, Emory University School of Medicine, 1365 Clifton Road NE, Atlanta, GA 30322 USA

to identify depression among patients with LUTS. However, a rapid method of screening for depression in urology clinics may be burdensome. Numerous screening tools for depression exist.[13-15] While such tools are effective, they can add significant time to clinical visits and might increase patient frustration.

The IPSS is a screening tool already used worldwide to assess LUTS symptomatology. While studies have reported this IPSS's efficacy in assessing patient QoL, these questions have never been individually probed as potential screening tools for depression. Therefore, we conducted a cross-sectional study to assess the ability of the IPSS questions to predict depression in patients with LUTS. We hypothesized that the QoL question would be the best screening question for depression, as measured by receiver operating characteristics (ROC) analysis.

Materials and methods

Study setting and population

This cross-sectional study enrolled 541 consecutive male patients presenting to the urology clinics of Grady Memorial Hospital and Emory University Hospital. Grady Memorial Hospital, located in downtown Atlanta, is a tertiary-care facility serving the needs of a primarily underprivileged urban patient population and Emory University's Urology department is a tertiary care clinic. Exclusion criteria consisted of age less than 40. After complete description of the study to the subjects, written informed consent was obtained. The study received Institutional Review Board approval.

Data collection procedures

This protocol was modified from prior studies.[16-18] Participants were asked to self-administer the IPSS, which assesses the LUTS commonly associated with BPH: incomplete emptying frequency, intermittency, urgency, weak stream, straining, and nocturia. Additionally, the IPSS includes a QoL question. The International Scientific Committee (SCI), under the patronage of the World Health Organization (WHO), recommends the use of this QoL question to assess quality of life.[19] The QoL question asks patients to rate their QoL on a scale of 0 to 6: "0-delighted, 1-pleased, 2-Mostly satisfied, 3-Mixed, about equally satisfied and dissatisfied, 4-Mostly dissatisfied, 5-Unhappy, and 6-Terrible."

Participants then completed the short version of the Geriatric Depression Scale (GDS). In response to the high prevalence and difficulty in diagnosing depression in the elderly, Yesavage et al designed the GDS to be a rapid, reliable screening tool for geriatric depression.[15] The short version of the GDS consists of fifteen "yes/no" questions, with a score of > 5 suggestive of depression, and has been widely validated among different cohorts of patients, including younger patients.[20-24]

Finally, participants' background education level, ethnicity, socioeconomic status, and employment status was assessed.

Statistical analysis

Descriptive analyses and frequencies were conducted to assess patient demographics. Additionally, analysis of variance (ANOVA) was conducted to ROC curves were depicted. ROC curves are interpreted as the probability that the modeled phenotype can correctly discriminate subjects developing end points from those without end points, where 0.5 is chance discrimination and 1.0 is perfect discrimination.[25] ROC curves were used to determine the area under the curve (AUC) and relative sensitivity and specificity of the individual questions of the IPSS relative to the GDS, which served as the gold standard. As established in previous studies, a GDS score > 5 was used to define the presence of depression.[15] Statistical significance in this study was set at $p < 0.05$. All analyses were performed using SPSS version 18.0.

Results

Patient population

The 541 study participants reported a mean (SD) of 58.1 (15.1) years, Table 1. The population had a mean (SD) education level of 13.8 (3.4) years. The majority (51.1%) of the cohort was black, white 46% were white and 2.9% were Asian. The minority (42.6%) of patients were employed.

TABLE 1. **Study population characteristics**

Patient characteristics	**Total population (n = 541)**
Average age, years	58.1 ± 15.1
Average years of school completed	13.8 ± 3.4
Race (%)	
White	46.0%
Black	51.1%
Asian	2.9%
Employment status (%)	
Employed	42.6%
Unemployed	57.3%
Geriatric depression scale (%)	
Depressed	17.2%
Non-depressed	82.8%

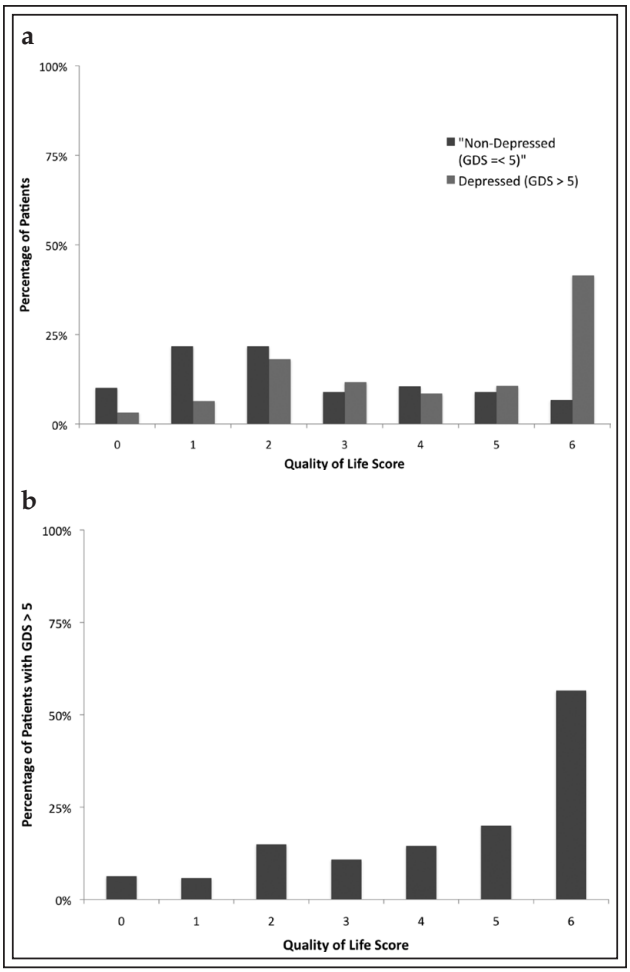

Figure 1. a) Distribution of quality of life scores by depression status, and **b)** Percentage of patients with GDS > 5 by quality of life score, (n = 541).

Distribution of depression by QoL score

Of the entire cohort, 93 (17.2%) screened positive for depression, according to the GDS. Figure 1a demonstrates the distribution of QoL scores by depression level. More than half (54.7%) of nondepressed patients had a QoL score of 0-2, while a similar number of depressed patients (50.8%) had a QoL score of 5 or 6. Figure 1b demonstrates an almost step-wise increase in the percentage of patients with depression by QoL response.

ROC and AUC analysis by IPSS questions

ROC analyses were conducted with AUC for comparisons across individual questions of the IPSS. All questions were significantly discriminate (AUC > 0.500, p value < 0.05). The weakest predictor of depression was question 2 of the IPSS concerning

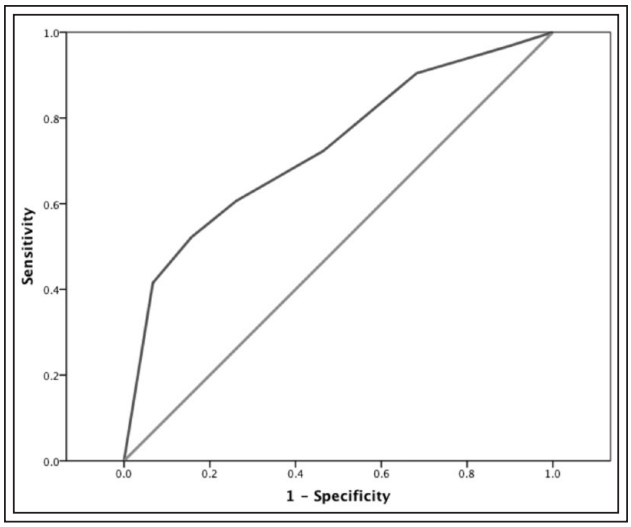

Figure 2. Receiver operating characteristic analysis curve comparing IPSS quality of life question versus positive depression screen from Geriatric Depression Scale.

frequency. This question had an AUC (95% CI, p value) of 0.606 (0.530-0.682, p = 0.003). The QoL question of the IPSS exhibited the highest AUC. This question had an AUC (95% CI, p value) of 0.735 (0.669-0.800, p < 0.001). Consequently, a ROC curve was drawn for diagnosis of depression (as measured by the GDS) versus QoL score, Figure 2.

This ROC curve produced potential score cut offs, Table 2. These cut offs identified QoL scores predictive of depression. For example, the most inclusive cut off (cut off 1) defined QoL scores > 0 as positive for depression. The most exclusive cut off (cutoff 6) defined QoL scores > 5 as positive for depression. Exclusivity decreased sensitivity but increased specificity.

TABLE 2. **Sensitivity and specificity for IPSS quality of life score at specified cutoffs**

Specified quality of life score cut off	Sensitivity %	Specificity %
1. QoL score > 0 is positive	96.3%	10.4%
2. QoL score > 1 is positive	90.0%	32.2%
3. QoL score > 2 is positive	72.5%	53.3%
4. QoL score > 3 is positive	61.3%	73.4%
5. QoL score > 4 is positive	55.0%	83.8%
6. QoL score > 5 is positive	46.3%	93.1%

QoL = quality of life

Discussion

Depression and LUTS

Recent studies suggest that BPH and LUTS not only reduces QoL but may even increase the risk of depression.[5-8] For example, higher total IPSS scores higher nocturia scores are associated with an increased risk of depression.[7-10] This relationship may not be simply a novel correlation. In other settings, depression increases morbidity and mortality, diminishes social and physical function, and enhances subjective suffering.[11,12] As a result, future management of LUTS may necessitate the diagnosis and treatment of depression. There is vital importance in identifying depression, a potentially debilitating disease that affected millions of patients worldwide.

Poor QoL score and depression

Due to the IPSS's widespread prevalence, we assessed the potential of the individual questions of the IPSS in screening for depression. Approximately 17% of our cohort screened positive for depression. This frequency was similar to the frequency of depression previously reported among patients with one or more chronic diseases (95-23%).[26] All of the IPSS questions were significantly predictive of depression, as measured by ROC and AUC. Specifically, AUC values range from 0.5 to 1. A value of 0.5 represents no predictive potential, while 1.0 represents perfect predictive potential. Of all the IPSS questions, the QoL question had the highest AUC (0.735) and therefore best predicted depression.

Compared to nondepressed patients, depressed patients reported significantly poorer QoL scores. The distribution of QoL scores by depression status varied dramatically, Figure 1a. While the majority of nondepressed patients reported "Delighted" or "Pleased" QoLs, the majority of depressed patients reported "Unhappy" or "Terrible" QoLs. Figure 1b suggests that every increase in QoL score increases the likelihood of a patient being depressed.

Sensitivity versus specificity and cut off points

In this study, a cut off score of > 1 maintained a 90% sensitivity. This cut off means that only 10% of patients with a QoL score of 0 or 1 are at risk for depression. However, this cut off falsely identified a large number of patients. Only 10% of patients who screened positive at this cut off were true positives. Alternatively, a cut off score of > 5 maximized specificity; 93.1% of those who screened positive were true positives. However, this cut off misses 54% of the patients who report better QoL scores.

A cut off point should be selected based on the need.[25] For example, screening tests typically attempt to minimize false negatives, allowing further, more specific testing, to sort between true positives and false positives. Therefore, screening tests require a higher sensitivity. Alternatively, diagnostic tests aim to minimize false positives, and thus require a higher specificity. The QoL score clearly remains a screening, not a diagnostic tool, best used for rapid assessment of possible risk of depression among patients who already self-administer the IPSS for LUTS. Therefore, lower cut offs likely carry great clinical utility.

Clinical implications and study limitations

With very recent emerging data regarding associations between depression and LUTS, clinicians and their patients may benefit from a quick and effective method for identifying patients at increased risk for depression. These results suggest that the IPSS QoL question significant predicts depression, as measured by the GDS. However, unlike the GDS, clinicians already administer the IPSS to many patients worldwide.

Importantly, it should be noted that the AUC for the IPSS QoL was of 0.735 (0.669-0.800, $p < 0.001$). This value is statistically significant and possibly useful. However, at this AUC its utility in screening for depression remains suggestive. The identification of cut offs and an optimized threshold warrants further validation in a different patient population. Additionally, while the GDS is a robust tool for identifying depressed patients, it is no substitute for a trained clinician. Future studies might confirm these results by comparing the IPSS QoL question to diagnosis by a psychiatrist. However, following external validation, these cut offs might benefit clinicians potentially through incorporation into BPH/LUTS guidelines.[19,27] Patients with significantly poor QoL may possibly benefit from referral for further mental health evaluation

Conclusions

Our findings suggest that the IPSS QoL question predicts depression among patients with LUTS. Given emerging links between depression and LUTS, this added benefit of the IPSS could save clinicians time and provide patients with much needed mental healthcare. Additional studies are needed to explore the impact of treating depression on the management of LUTS, as well as the relationship between these two prevalent diseases. □

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