



## Relationship between Benign Prostatic Hyperplasia and International Prostatic Symptom Score

Iffat Raza<sup>1\*</sup>, Nuzhat Hassan<sup>1</sup>, Anis Jafri<sup>2</sup> and Pashmina Gul<sup>3</sup>

<sup>1</sup>Department of Anatomy, Ziauddin University, Karachi, Pakistan.

<sup>2</sup>Bahria University, Karachi, Pakistan.

<sup>3</sup>Ziauddin Hospital, Clifton Campus, Karachi, Pakistan.

### Authors' contributions

This work was carried out in collaboration between all authors. The concept, design of the study, writing the manuscript was done by author IR. Author NH did critical analysis and final approval of the manuscript. Authors AJ and PG helped in the clinical analysis of manuscript. All authors read and approved the final manuscript.

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### ABSTRACT

Benign prostatic hyperplasia is the most common prostatic pathology and its incidence has accelerated recently [1]. Benign prostatic hyperplasia (BPH) is diagnosed histologically as enlargement of mucosal and sub mucosal glands with the proliferation of prostatic stroma occurring within the prostatic transition zone [2]. BPH compresses the urethra resulting in anatomic benign prostatic obstruction and may present as lower urinary tract symptoms (LUTS). The prevalence of LUTS can be progressive in the aging male [3]. LUTS associated with BPH usually affects 45% of males in their 50s, and 80% of males are affected by LUTS in their 70s [4]. Benign Prostatic Hyperplasia is not a life threatening condition, but has negative impact on a patient's quality of life as evidenced in community and clinical studies [5]. Obstruction related LUTS that develops in BPH occurs as a result of dynamic and static components [6]. In order to evaluate the BPH/LUTS American Urology Association devised a scoring system called AUASI (American Urological Association Symptom Index) which consists of six questions and International Prostate

\*Corresponding author: Email: [razaiffat2@gmail.com](mailto:razaiffat2@gmail.com);

Symptom Score (IPSS) is based on seven questions and their answers concerning urinary symptoms [7].

**Data Selection:** Literature published during 2008-2014 were selected for review from cross-sectional and cohort studies.

**Data Extraction:** Data was collected and assembled from NCBI, Google Scholar, journals of Radiology and Urology.

**Conclusion:** The accurate assessment of LUTS plays a pivotal role in the interpretation of benign prostatic hyperplasia therefore, the authenticity of symptom scores is crucially important. International prostatic symptom score is the paradigm questionnaire for subjective evaluation of symptoms of the lower urinary tract [8]. The IPSS and IPSS quality of life (QoL) questionnaire can be an important tool for the diagnosis of BPH.

*Keywords: International prostatic symptom score; visual prostatic symptom score.*

## 1. INTRODUCTION

Benign prostatic hyperplasia (BPH) has been a major health problem for aging males because of its related symptoms and complications. Although it is not a life threatening condition, BPH has an adverse effect on a patient's quality of life, as manifested in community and clinical trials [9].

LUTS associated with BPH usually affects 45% of males in their 50s, and 80% of males are affected by LUTS in their 70s [4]. According to another study, it has been computed that BPH affects approximately 50% of males at 60 years of age and 80% of males at 80 years [10]. Generally it causes no sign or symptom, but in some cases it causes LUTS which interferes with the quality of life [11]. BPH affected about 210 million men globally in 2010 and it is estimated that 612 million men will have BPH in 2018 [12] because prostatic enlargement is believed to begin at 30 years of age. The prostate gland enlarges in most males as they grow older. In the Boston Health Community Survey, prevalence of urinary symptoms heightened from 8% of males in 30-39 years age group to 35% of males in 60-69 years age group [13]. In Rancho Bernado Cohort Studies, 56% of males in 50-79 years of age, 70% of males in 80-89 years of age and 90% of males in 90 years of age have lower urinary tract symptoms [14,15]. Proscar Safety Plus Efficacy Canadian Trial (PROSPECT) and Proscar Worldwide Efficacy and Safety Study (PROWESS) found out that males having enlarged prostate glands have the potential of developing acute urinary retention over 2 years [16].

Benign prostatic hyperplasia produces chronic and progressive symptoms of the lower urinary tract [17]. In order to evaluate the severity of

symptoms, several scoring symptoms have been devised and among these International Prostatic Symptom Score is accepted worldwide by urologists [18].

## 2. BENIGN PROSTATIC ENLARGEMENT (BPE)

Benign prostatic enlargement is the most common etiology of lower urinary tract symptoms (LUTS) [19]. LUTS represent a collection of chronic urinary symptoms affecting 15 to 60% of men beyond 40 years of age [20]. The term 'benign prostatic hyperplasia' (BPH) describes the histological pattern of the gland [21]. Benign prostatic enlargement (BPE) signifies glandular and stromal enlargement based on the volume of the prostate [22]. Currently LUTS is the preferred terminology which describes complex symptoms of BPE through two different mechanisms. i.e. 1) Static component and 2) Dynamic component. Static component (structural) refers to increased prostate volume or the anatomic enlargement of prostate gland that finally encroaches prostatic urethra. Dynamic component (reversible and physiological) refers to increased smooth muscle tone of bladder neck, prostatic capsule or increased tone of prostatic stroma, therefore narrowing urethral lumen [23].

## 3. OBJECTIVE AND SUBJECTIVE PARAMETERS OF BPH

Benign Prostatic Hyperplasia is diagnosed on the basis of objective and subjective parameters<sup>(24)</sup>. Objective parameters are: 1) Prostate volume 2) Urinary flow rate 3) Determination of post void residue. Subjective parameters are: 1) Incomplete emptying 2) Frequency 3) Intermittency 4) Urgency 5) Weak Stream 6) Straining 7) Nocturia [25].

#### 4. ASSESSMENT OF BPH SYMPTOMS USING SYMPTOM SCORES

The severity of symptoms can be assessed by a number of validated questionnaires like Boyarksky score, Madsen Iverson score, Danish prostatic symptom score, Maine medical assessment score and International Prostatic Symptom Score (IPSS) [24]. These questionnaires help in assessing the symptoms of BPH [25].

American Urological Association Symptom Index (AUASI) is the seven item based symptom score formed and validated by American Urological Association Measurement Committee in 1992, which authentically evaluates Lower Urinary Tract Symptoms. The IPSS uses the equivalent seven questions for assessing the severity of LUTS as the American Urological Association Symptom Index (AUASI) plus an eighth question which is a disease specific quality of life (QoL) question [26]. International Consensus Committee under patronage of WHO in 1993, has agreed to use IPSS worldwide to assess the symptom index of benign prostatic hyperplasia [20].

#### 5. INTERNATIONAL PROSTATIC SYMPTOM SCORE (IPSS)

International Prostatic Symptom Score (IPSS) is a questionnaire designed to provide a symptom score for prostatic diseases such as prostatic cancer, prostatitis, benign prostatic hyperplasia [27]. IPSS is used universally in clinical research and practice as a measure of severity of symptoms of the lower urinary tract in males [28]. The IPSS Index combines the AUASI score with

a single separately scored question addressing bother due to LUTS affecting the quality of life(IPSS QoL) [27].

IPSS is devised on the answers to seven questions (Frequency, Urgency, Nocturia, Incomplete emptying, Intermittency, Weak stream and Straining) [29].

The answers are assigned points ranging from 0 to 5, indicating the increased severity of a particular symptom. The score ranges from 0 to 35 (asymptomatic to symptomatic) [30]. The Symptom index is categorized as mild ( $\leq 7$ ), moderate (8-19) and severe ( $\geq 20$ ). For symptomatic score classification, IPSS divides the symptoms into obstructive and irritative symptoms as assessed by questionnaire. [31]. Among these irritative symptoms are Frequency, Urgency, Nocturia and obstructive symptoms are Incomplete emptying, Intermittency, Weak stream and Straining. LUTS has been used to depict a group of storage, voiding and postmicturition symptoms [26]. Benign Prostatic Hyperplasia has been used to explain a group of obstructive and irritative voiding symptoms [1].

#### 6. IPSS QUALITY OF LIFE (QoL) OR BOTHER QUESTION (BQ)

One additional quality of life (QoL) question which is the eighth question of IPSS has scores from 0-6. QoL question states that : "If you were to spend the rest of your life with your urinary condition just the way it is now, how you would feel about this condition?". The scores range 0(delighted), 1 (pleased), 2 mostly satisfied), 3(mixed), 4 (mostly dissatisfied), 5 (unhappy),6 (terrible) [32].

Table 1. IPSS questionnaire form

| Patient Name:<br>Past 1 month | Date of Birth:         |                            |                                 |                    |                            |                 |          |
|-------------------------------|------------------------|----------------------------|---------------------------------|--------------------|----------------------------|-----------------|----------|
|                               | NO<br>symptom<br>(0/5) | Atleast 1<br>time<br>(1/5) | Less than<br>half time<br>(2/5) | Half time<br>(3/5) | More<br>than half<br>(4/5) | Always<br>(5/5) |          |
| 1 Incomplete emptying         |                        |                            |                                 |                    |                            |                 |          |
| 2 Frequency                   |                        |                            |                                 |                    |                            |                 |          |
| 3 Intermittency               |                        |                            |                                 |                    |                            |                 |          |
| 4 Urgency                     |                        |                            |                                 |                    |                            |                 |          |
| 5 Weak stream                 |                        |                            |                                 |                    |                            |                 |          |
| 6 Straining                   |                        |                            |                                 |                    |                            |                 |          |
| 7 Nocturia                    |                        |                            |                                 |                    |                            |                 |          |
| total IPSS                    |                        |                            |                                 |                    |                            |                 |          |
| quality of life (QoL)         | Delighted              | Pleased                    | Satisfied                       | Mixed              | Not satisfied              | Not delighted   | Terrible |
|                               | 0                      | 1                          | 2                               | 3                  | 4                          | 5               | 6        |

The IPSS bother question can readily assess quality of life in patients with benign prostatic hyperplasia [33].

IPSS BQ score has shown reliability, efficacy and precision in various studies conducted in different countries with varying cultural and ethnic backgrounds [34]. WHO International Consultation on BPH has approved IPSS and single disease, explicit QoL question to assess patients feelings about their bothering symptom [35]. The questionnaire inclusive of the bother question used for evaluating patients quality of life and different treatment options available is more readily interpretable on an individual basis.[36]. IPSS bother question(BQ) or (IPSS QoL) is an uncomplicated and decisive tool for evaluating treatment options for symptomatic LUTS/BPH [37].

## 7. VISUAL PROSTATE SYMPTOM SCORE (VPSS)

Van der walt et al. formulated visual prostate symptom score which consists of pictorial diagram of nocturia, frequency and weakstream [27]. The fourth pictogram represents quality of life(QoL).VPSS is simpler, easier to interpret and takes less time to complete ,especially in case of elderly men [38].

In populations with lower literacy rate, varying language and cultural diversity ,VPSS may be preferred .Studies conducted in Korea and Africa found out that patients can complete VPSS without any assistance[39]. A study conducted in Indonesia showed that VPSS significantly correlated with IPSS [40].

## 8. APPLICABILITY OF IPSS

The symptoms of BPH interfere with quality of life and affect patient's health status. Therefore, a reliable and consistent measure is a key factor for evaluation of these patients.

1. IPSS can be used as a reliable tool for patient's initial assessment and for categorization of patients having LUTS [41].
2. IPSS can be used for detecting and monitoring post treatment change of symptoms [42].
3. It can be used as a tool for selection of treatment modalities, evaluation of treatment response and follow up [41].

4. IPSS can also be used for following a patient's treatment response after pre-implant brachytherapy [43].
5. IPSS can be used routinely in management of patients of BPH [44].

## 9. DISCUSSION

BPH is a common and major health problem in males worldwide. The incidence and prevalence of BPH increases with age. Therefore, it is expected that the incidence and prevalence of BPH will increase with the aging world population.

Increasing cost of treatment and morbidity related to frequent prostatectomies have lead to a search for tools for better evaluation of LUTS.

A review of the literature shows that the IPSS is a simple, practical and reliable method to both diagnose BPH, assess its severity and select the appropriate treatment in a given patient. This is supported by numerous studies performed worldwide.

A study was done in Nigeria [41] to determine the value of IPSS in the management of patients with BPH. Using pretreatment IPSS, patients were divided into 3 groups: mild, moderate and severe symptom groups. Patients with mild symptoms were treated with watchful waiting as a mode of management. The moderate symptom group received doxazosin ( $\alpha$ -blocker) & antimuscuranics, while the severe symptom group were treated by prostatectomy .A post treatment IPSS/QoL questionnaire was administered 3 months later. There was major improvement in IPSS score in moderate and severe symptom patient groups at 3 months posttreatment. Positive predictive value (PPV) of post treatment symptom improvement was found out to be 87% for severe group and 52% for moderate group as measured by IPSS/QoL [41]. The study concluded that IPSS is a valuable tool in management of patients with BPH. The treatment modalities used in this study have been studied with similar results in other studies.

Review of the literature suggests that emphasis should be given to the presence of severe symptoms as assessed by IPSS, poor quality of life and a large prostate and then appropriate therapy should be designed to treat patients medically or surgically .Therefore this should lead to a decrease in surgical intervention and related morbidity and cost. A large number of

patients with mild or moderate disease will be managed successfully by medical treatment.

The study of Tsukamoto T et al. [31] emphasizes the dynamic component of BPH with a focus on symptoms rather than on enlargement of the prostate gland itself which has led to a shift from surgery to medical treatment. Similarly, a Chinese survey<sup>(30)</sup> found positive correlation of IPSS with BPH related objective parameters such as peak flow rate, prostate volume and PSA.

It is suggested by numerous studies that IPSS can be used for the interpretation of symptoms of BPH. Recently a study conducted in the Shanghai population [1] found that Transitional zone volume and length in BPH patients aged 40-70 years correlated positively with IPSS indicating the usefulness of IPSS in the evaluation of BPH. Another study done in Finland [45] using IPSS as the evaluating tool found that nocturia, a symptom of BPH, is the most prevalent symptom in the IPSS questionnaire and has the greatest negative impact on QoL in Finlanders. The Taiwanese study of Chute et al. [46] found that incomplete emptying, intermittency, urgency, weak stream and nocturia are strongly correlated with prostate volume and age. Lee et al. [46] from Korea concluded in their study that nocturia and weak stream were the most prevalent BPH related symptoms and urgency had lowest prevalence. A Turkish study [47] suggests that nocturia and incomplete emptying significantly increases with age. Nacey et al. [48] report that the prevalence of BPH in Newzealanders and Canadians using IPSS was 23%. Prevalence of BPH in USA, Japan and UK as determined by IPSS was 44% in their population. It follows therefore, that IPSS can be used to both detect and determine severity of BPH in order to select the most appropriate treatment.

Another aspect of BPH needs consideration. A study done in Nepal demonstrated no correlation between IPSS and prostate volume [18]. The small (fibrous) prostate or trapped prostate is simply the end result of double obstruction i.e dyssnergic bladder neck obstruction and with minor degrees of prostate enlargement. When the middle lobe of prostate enlarges it expands and gets trap by a tight bladder neck with high probability of dssynergic bladder neck which burrows under it [49]. Therefore, some patients with long standing severe obstructing and voiding symptoms usually have a small prostate volume

and the lower urinary tract obstruction may co-exist with a small prostate [18]. It must also be added that symptoms and bladder outlet obstruction are determined by many of such factors and not only by prostate volume alone. Other researchers have found that prostate volume should not be considered alone, it is the symptoms of poor quality of life that should be treated along with large prostate volume. In other words both symptoms and prostate volume are important. Prostate volume can be determined easily by non-invasive methods such as transabdominal sonography. Determination of prostate volume is helpful in several ways. It helps to decide upon appropriate therapy and may assist in the interpretation of serum PSA levels for the presence of prostate cancer or BPH. A number of treatment options, medical or surgical are available to rectify lower urinary tract symptoms in the BPH patient [50].

It is pertinent to add that the prevalence of BPH in men aged 65 and over was found to be higher after assessment from IPSS score. The reason could be that elderly men suffering from BPH related symptoms never consulted urologists or other clinicians for their complaints and thought that these symptoms were age related and part of normal aging process and were untreatable [46]. Nevertheless, this factor underscores the fact that IPSS is a valuable tool in the evaluation of LUTS.

Majority of men aged 60 to 80 years with BPH have cognitive impairment, therefore VPSS may be preferred in these patients. The only drawback of VPSS questionnaire is that it does not cover all the symptoms of LUTS as are assessed by IPSS. [40]

A Multinational survey of the aging male<sup>(51)</sup> by IPSS bother question (BQ) found positive association between LUTS and bothersomeness as a result of urinary complaints. In a study conducted in 6439 men who completed the IPSS bother questionnaire, it was reported that IPSS BQ disease specific QoL question strongly correlated with IPSS [28] Similarly, statistically significant and good correlation was found between IPSS and QoL score by Lui et al. Bosch et al and Waldie et al. Another study conducted in the US concluded that IPSS BQ can be used in concomitance with IPSS when evaluating treatment options in men with LUTS/BPH and determining treatment strategies [52]. Additionally, Bosch et al. [51] in their study concluded statistically significant and positive correlation between IPSS and QoL score.

## 10. CONCLUSION

From the review of literature, it can be confidently summarized that IPSS may be used as a diagnostic tool for interpretation of symptoms of BPH. It can also be used to formulate treatment strategies in men with LUTS/BPH [53].

Various studies have shown a strong positive correlation of IPSS, IPSS BQ (bother question) with BPH [33].

IPSS questionnaire can clearly identify the symptoms and their severity due to BPH [54]. It has also been shown that the correlation of prostate volume with IPSS plays a significant role in diagnosing benign prostatic hyperplasia (BPH).

The bothersomeness of symptoms and impact of benign prostatic hyperplasia on the essence of life is the essential inference of patients seeking treatment for BPH [55]. Therefore, there exists a strong relationship between BPH and IPSS.

## 11. FUTURE RECOMMENDATIONS

Language is one of the main obstacle in completing IPSS. In a country with limited education and low literacy rate, it is recommended that translation of IPSS in mother tongue of the population is essential. This will enable clinicians and patients to take advantage and benefits from IPSS,

1. IPSS should be translated into major language spoken by the population and the questionnaire should also be validated by research work done in this perspective.
2. IPSS should be used for further improving patient management with BPH.
3. IPSS should be considered for comparing different management modalities.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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