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Correlation of Subjective Symptoms in Patients with Benign Prostatic Hyperplasia and Erectile Dysfunction

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ABSTRACT

Introduction. Epidemiological studies suggest a link between the symptoms of lower urinary tract (LUTS) caused by benign prostatic hyperplasia (BPH) and erectile dysfunction (ED). Increasing expected period of life, justify the interest of establishing correlations LUTS / BPH and ED in order to find more efficient ways of treating these pathologies. **Goal:** The objective was to evaluate the correlation of symptoms in LUTS/BPH with the degree of ED. **Patients and Methods:** The study was conducted as a prospective study which involved males aged 40-60 yr with present symptoms of LUTS/BPH. All study subjects underwent quantification of subjective symptoms through the International Prostate Symptom Score-IPSS and International Index of Erectile Dysfunction- IIEF-5. The first group of respondents had IPSS 0-8, second group IPSS 9-19 and the third group IPSS 20 to 35. **Results:** The results of ANOVA ($F = 112.492, p = 0.000$) showed that there was a statistically significant difference ($p < 0.05$) between groups in degree of erectile function (IIEF). Tukey test showed that there was a statistically significant difference between the first and second group ($p = 0.000 < 0.05$), the first and third group ($p = 0.000 < 0.05$) and the second and third group ($p = 0.000 < 0.05$). Mean degree of ED correlates with IPSS. The results of Fisher's exact test ($p = 0.000$) confirmed that there was a statistically significant relationship ($p < 0.05$) between the IPSS score and degree of erectile dysfunction (IIEF). **Conclusion.** Elderly patients have a significantly higher value of IPSS score compared to younger patients. The degree of erectile dysfunction is correlated with symptoms of IPSS score. Severity of symptoms of LUTS/BPH and higher IPSS score, worsens the ED. Results of IIEF-5 score are inversely proportional with symptoms of IPSS score, and increase in IPSS score comes to a decline in IIEF score.

Keywords: lower urinary tract symptoms, benign prostate hyperplasia, International Prostate Symptom Score, erectile dysfunction, International Index of Erectile Function.

1. INTRODUCTION

Data from epidemiological studies suggest a link between the symptoms of lower urinary tract (LUTS) caused by benign prostatic hyperplasia (BPH) and erectile dysfunction (ED) in older men, regardless of the impact of age, co-morbidity or differences in lifestyle (1). According to the MMAS study, 90% percent of respondents with LUTS symptoms has a 49% prevalence of ED, of which 10% of patients reported a complete absence of erection (2). French study that examined the connection of ED

with prostatic disease has led the rate of ED in patients with LUTS/BPH from 30% to 70% (3). One of the most common complications of diabetes mellitus type 2 is the ED and under these circumstances it occurs at a relatively young then, in the general population (4). The incidence of LUTS/BPH and ED in older men increases with age (5). There is great interest in the study of common pathophysiological mechanisms between LUTS/BPH and ED, primarily due to the high prevalence of both conditions, their frequent as-

sociation with the same age group and their significant impact on quality of life. Benign prostatic hyperplasia is a progressive disease and in its evolution, leads to a number of complications (6). Clinical studies on selected populations have allowed a better understanding of epidemiological aspects of this comorbidity, therefore more effective diagnosis and management of both conditions (7). Although the connection of LUTS/BPH and ED is indisputable, precise mechanisms of integration are still under examination (8). Literature data show the four major hypotheses about biological connections of ED and LUTS and the way they interact with each other: the level of nitric oxide synthase/nitric oxide (NOS/NO) to change or decrease in prostate or penile smooth muscle; Hyperactivity of the autonomic nervous system (ANS) which affect LUTS, prostate growth and ED; Increase of Rho kinase activity of endothelial cells; and prostatic and penile ischemia (9-17).

Due to the frequent interconnectedness, recent studies suggest that all men with symptoms of LUTS/BPH should be evaluated on the existence of ED and vice versa (18). Erectile dysfunction represents significant public health problem, and requires a urological, but also multidisciplinary evaluation (19).

2. GOAL

The goal was to evaluate the correlation of symptoms in the lower urinary tract caused by benign prostatic hyperplasia, with the degree of present erectile (dis) functions.

3. MATERIAL AND METHODS

The study was conducted as a prospective study in which were involved males aged 40-60 years with present symptoms of lower urinary tract caused by benign prostate enlargement. Survey included respondents who were first contacted the doctor for symptoms of LUTS/BPH, or newly discovered patients with LUTS/BPH, where considered initially, the situation existing prior initiation of therapies that may affect sexual function, or dysfunction. Clinical sample was collected during the six-month Period. The study was conducted at the Cantonal hospital "Dr. Irfan Ljubijankić" Bihac. The study included 150 patients with symptoms of LUTS/BPH.

All respondents underwent quantification of subjective symptoms (LUTS/BPE) by the International Prostate Symptom Score-IPSS, individual examination on two occasions, on the basis of whose values are scoring the arithmetic mean of the same, subjects were classified into three groups (group 1, 2 and 3). IPSS score consists of seven questions. The first question refers to the feeling of insufficient discharge of the bladder. The second question estimated frequency of urination (e.g. Number of urinating in a period of 2h). With answers to the third and fourth questions the patient describes his dysuric complaints (intermittent stream during urination, urgency of urination). The fifth question relates to the presence of a weak urine stream. Sixth question evaluates the patient's strain when urinating. The seventh question relates to nocturia (urination number of

going to bed to get up). Responses to IPSS questions are expressed in six categories, depending on the level of present symptoms and quantitatively expressed value from 0 to 5 points. Patients with the lowest score were the least severe symptoms, while those with the highest scores had the patients with the most severe symptoms.

The first group of respondents (IPSS 0-8) consisted of patients with mild symptoms, the second group of respondents with a score of 9-19 (medium-severe symptoms) and the third group of respondents with the score of 20 to 35 (serious or severe symptoms).

After that, all the respondents completed the International Index of Erectile Function-IIEF-fifth IIEF-5 questionnaire related to ED, which is composed of five questions. The first question relates to the safety of achieving and maintaining erections. Second question is assessing the erection-sufficient for the sexual act. The third and fourth questions relate to the success of maintaining erections after immission of sexual organs and to the completion of sexual activity. The answer to the fifth question describes the pleasure of sexual intercourse. The maximum score is 25 points. Score 1-7 points indicates severe erectile dysfunction, 8-11 points a moderate ED, 12-16 points mild to moderate ED, 17-21 points mild ED, and 22-25 points normal erectile function.

From the study are excluded patients with symptoms of lower urinary tract caused by non-benign prostatic hyperplasia (prostate cancer, urethral strictures, neurological diseases, calculi in the distal ureter, bladder cancer, prostatitis, foreign bodies and urinary tract infections ...), BPH patients are treated medically or surgically due to benign prostatic enlargement, and those with diabetes mellitus, generalized or peripheral vascular disease and/or depression.

4. RESULTS

According to the IPSS score values, the patients are divided into three groups as shown in Table 1.

IPSS mean value	GROUP 1 No. of patients	GROUP 2 No. of patients	GROUP 3 No. of patients
0-8 points	50	0	0
9-19 points	0	50	0
20-35 points	0	0	50

Table 1. Respondents according to the values of IPSS score

The average age of the patients in the first group was 49.56 years with a standard deviation of 6.92 years. The oldest patient was 60 years old and the youngest 40 years. In the second group the average age of the patients was 53.70 years, with a standard deviation of 5.85 years. The oldest patient was 60 years old, and the youngest is 41 years of age. The average age in the third group was 55.06 years with a standard deviation of 5.40 years. The youngest patient was 40 years old and the oldest 60 years.

Based on the results of Levin's test of homogeneity of variance ($F=3.142$; $p=0.046$), it was concluded that the variance of the first, second and third groups are not equal ($p<0.05$). The results of ANOVA ($F=11.076$, $p=0.000$) showed that there was a statistically significant difference ($p<0.05$) between groups in the average

age of the patients. Additional analysis by Tamhane test showed that was present statistically significant difference in average age between the first and second group ($p=0.005 < 0.05$), and between the first and third group ($p=0.000 < 0.05$). A statistically significant difference ($p=0.543 > 0.05$) in the average age was not present between the second and third group.

After examining the displayed statistical analysis, correlation of the obtained results, it can be seen that the first group (patients with mild symptoms) had the lowest, and the third group (patients with the most severe symptoms), the highest average age (Table 2).

Group	N	Mean	Standard deviation
1	50	49.56	6.92
2	50	53.70	5.85
3	50	55.06	5.40

Table 2. Correlation of the average age of respondents of all three groups

The average degree of erectile dysfunction in Group 1 (patients with mild symptoms of LUTS/BPH) was 21.6 with a standard deviation of 2.03. The minimum degree of erectile dysfunction in group 1 was 15 and maximum 25. In Group 2 (patients with moderate symptoms of LUTS/BPH) average degree of erectile dysfunction was 17 with a standard deviation of 3.61. The minimum or maximum value of the degree of erectile dysfunction in Group 2 was 8 or 25. The mean value of ED score in Group 3 (patients with severe symptoms of LUTS/BPH) was 11.38 with a standard deviation of 4.22 while the minimum or maximum value of the degree of erectile dysfunction of 5 and 23 (Table 3).

	No. of patients	Minimum	Maximum	Mean	Standard deviation
Group 1	50	15	25	21.60	2.03
Group 2	50	8	25	17	3.61
Group 3	50	5	23	11.38	4.22

Table 3. Average ED in patients by IIEF

Based on the results of statistical analysis, and correlation of ED symptoms in all three groups, it is observed that the Group 1 had the highest and group 3 the lowest mean IIEF (Table 3).

The results of ANOVA test ($F=112.492$, $p=0.000$) showed that there was a statistically significant difference ($p < 0.05$) between groups in values of the degree of erectile function (IIEF). Additional analysis by Tahmane test lead to conclusion that there was a statistically significant difference between the first and second group ($p=0.000 < 0.05$), the first and third group ($p=0.000 < 0.05$) and the second and third group ($p=0.000 < 0.05$), and that the mean degree of erectile dysfunction correlates with the IPSS, or as the symptoms of LUTS/BPH are more severe, the more severe is also the degree of erectile dysfunction. When we performed additional analysis, it was assumed that the variance of the first, second and third groups were not the same as confirmed by Levin's test ($p=0.001 < 0.05$).

The results of Fisher's exact test ($p=0.000$) confirmed that there was a statistically significant relationship

($p < 0.05$) between the IPSS score and degree of erectile dysfunction (IIEF) (Table 4).

		IIEF score					Total	
		Severe erectile dysfunction	Moderate erectile dysfunction	Mild to moderate erectile dysfunction	Mild erectile dysfunction	Normal erectile function		
Group	1	N	0	0	1	20	29	50
		%	0.0	0.0	2.0	40.0	58.0	100.0
	2	N	0	5	14	27	4	50
		%	0.0	10.0	28.0	54.0	8.0	100.0
	3	N	7	23	15	3	2	50
		%	14.0	46.0	30.0	6.0	4.0	100.0
Total	N	7	28	30	50	35	150	
	%	4.7	18.7	20.0	33.3	23.3	100.0	

Table 4. Correlation of LUTS/BPH and ED symptoms

Based on the results of Spearman correlation ($\rho = -0.760$; $p=0.000$) was reached the conclusion that the IPSS is negatively correlated with IIEF-5 score with the reliability of 99% ($p < 0.05$), and that increase in IPSS score leads to a decrease of IIEF score.

5. DISCUSSION

MSAM -7 study evaluated the results of 12,815 men in the United States and in 6 European countries, between the ages of 50-80 years. The study examined the association of age with symptoms of LUTS and with ED associated diseases. The prevalence of LUTS any severity of LUTS was 90%. The association of moderate to severe symptoms with age was significant(2). Noticed is a growing percentage of ED with age.

According to the Massachusetts Male Aging Study (MMAS) data, the incidence of ED is 26 newly discovered in 1,000 men per year (20). ED is present in all age groups, although there is an evident correlation with age. The prevalence of ED in data standardized by international index of erectile function-5 (IIEF-5) between the ages of 20-50 years amounted to 26-29%. Over 50 years, this percentage is slightly higher at 37.5%, while in the age of 71-80 years the percentage was 71.2% (21).

The results of our study showed that there is a significant statistical difference in average age of the respondents in relation to the severity of LUTS/BPH evaluated by IPSS. In the group with the mildest symptoms the mean age was the youngest, while in the group with the most severe symptoms were patients at highest average age.

Approximately 70% of patients with LUTS/BPH and have co-existent ED (22). According to the National Health and Social Life Study (NHSL), in a sample of men aged 18-59 years, was demonstrated the growing incidence of ED correlated with age. The same study showed that the LUTS is a significant predictor for the occurrence of ED (23).

It is evident that the severity of urinary symptoms correlated with the degree of ED. Patients with LUTS/BPH show a loss of sexual desire, have fewer sexual intercourses, lower quality of erection and ejaculation problems(24). Although BPH is not life threatening, however, through its clinical manifestations, such as LUTS, con-

tributes significantly to the declining quality of life of these patients (25).

This heavily implies the need to take sexuality into consideration in the initial evaluation of patients with BPH and provide adequate therapeutic choice. Given the potential impact of the same on sexual function, it is essential to evaluate the presence of ED patients before starting treatment of BPH (26).

According to one study, in patients with moderate symptoms of LUTS the ED was present in 36% of the respondents, and 96% of patients with severe LUTS also had ED. This study indicates the degree of LUTS as a risk factor for the development of ED, regardless of age (27).

Data from prospective randomized European PROSPECTs study indicate that compared with patients who had IPSS score lower than 14 (mild to moderate LUTS), men with a higher IPSS score, with more than 19 points (severe LUTS), showed significantly decreased interest in sexual act. Equally also have problems with maintaining an erection or reaching a satisfactory sexual activity (28).

Also, studies of other authors with the topic of correlation of symptoms LUTS/BPH with the degree of ED, indicating that the IPSS score was significantly correlated with the values of IIEF-5, or to the quality of erectile function (29).

Results of this study showed a positive correlation of IPSS with an average score of ED. Specifically, as are the symptoms of LUTS/BPH are more pronounced, more severely is affected the erectile function.

In our group of patients with the mildest symptoms of LUTS/BPH, the average IIEF score was 21.6 (SD 2.03), which is indicated as normal erectile function. In second group of patients (IPSS 9-19) average IIEF score was 17 points with SD of 3.61, or patients with moderately severe symptoms of LUTS/BPH which had mild to moderate ED. Patients with the highest score IPSS (20-35), and the most severe symptoms of LUTS/BPH had averaged ED score of 11.38 points with SD of 4.22, or symptoms of moderate to severe ED.

6. CONCLUSIONS

The age of the patients correlates with the value of IPSS score. Elderly patients have a significantly higher value of IPSS score compared to younger patients. The symptoms of the lower urinary tract correlate with erectile dysfunction, or erectile dysfunction is present in patients with symptoms of lower urinary tract caused by benign prostatic hyperplasia. The degree of erectile dysfunction is correlated with symptoms IPSS score, or as symptoms of lower urinary tract severity and the higher the IPSS, the severity and erectile dysfunction increases. Results of IIEF-5 score are inversely proportional with symptoms by IPSS score, that is, increase in IPSS score lead to decline in IIEF score.

• **Authors contribution:** Amel Kardasevic contributed in all phases of preparing this article (concept, design, data collection, research, drafting etc.). Snjezana Milicevic contribut-

ed to concept and design of the study, including final editing and critical revision of the scientific content.

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