

Impact of smoking on Lower Urinary Tract Symptoms (LUTS) - Single tertiary centre experience

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Abstract- Lower urinary tract symptoms (LUTS) are substantially prevalent in the elderly population. Although some studies find that there is a negative impact of smoking on LUTS. The association between LUTS and smoking is still not quantified in an accurate manner. The objective of this study was to evaluate the impact of smoking on LUTS among patients referred to the Faculty of Medicine, University of Peradeniya for uroflowmetry. LUTS were assessed by the International Prostate Symptom Score (IPSS). Smoking status and other information was collected using an interview based questionnaire. The results of this study suggested that there is an adverse impact of current and past cigarette smoking on LUTS. Therefore abstinence from smoking is beneficial to reduce the occurrence of LUTS later in life.

Index Terms- Lower Urinary Tract Symptoms (LUTS), uroflowmetry, pack years, International prostate symptoms score (IPSS)

I. INTRODUCTION

Lower urinary tract symptoms (LUTS) are mainly prevalent in the elderly population. LUTS has many possible causes including supravescical causes such as the spinal cord diseases and other neurological dysfunctions; intravesical causes such as smooth muscle dysfunction of the bladder, tumours and urethral causes such as benign prostatic hyperplasia (BPH), prostatic infections and urethral strictures.(1). Although BPH is one common cause of these symptoms, some men with LUTS have no prostate enlargement (2).

Despite the high prevalence of LUTS, not much is known about their causes. The negative effect of LUTS is apparent across several domains of health-related quality of life (HRQL) measures and it worsens with the increasing severity of urinary symptoms (3, 4). Epidemiological evidence indicates that lifestyle behaviours may be important in the etiology of LUTS (5-13). In particular, behaviours that may affect metabolism and inflammatory processes have been linked to the prevalence of LUTS in numerous studies. Smoking can cause hormonal and nutrient imbalances causing metabolic derangements and inflammatory processes inside the body. However, the association between LUTS and smoking is still unclear. Some studies (5, 6, 7) have found that there is an association between smoking on LUTS while some studies (8-13) found no association.

In 2001 Prezioso et al, revealed that there was no major influence of smoking on lower urinary tract symptoms. Another

study conducted in 1994 by Roberts et al. found that compared to people who never smoked, smokers were less likely to have moderate to severe urinary symptoms (age-adjusted odds ratio 0.82; 95% confidence interval [CI] 0.61 to 1.08). This varied by smoking intensity. Smokers were less likely to have peak flow rates less than 15 ml/sec compared with never-smokers (age- and voided volume-adjusted odds ratio 0.48; 95% CI 0.35 to 0.66), or prostatic volume greater than 40 ml (odds ratio 0.54; 95% CI 0.19 to 1.55).

In the year 2000, in Austria, Haidinger et al, conducted a study to confirm previous studies with respect to risk factors for lower urinary tract symptoms. It was found that, in all life decades there was no significant difference of the international prostate symptom score, its obstructive and irritative components in current smokers and non-smokers, but the irritative score, correlated significantly ($P=0.001$; $r = 0.158$) with the number of cigarettes smoked per day.

One other study conducted in 2003, in African-American men by Joseph et al. found that current and former smokers were at increased risk of moderate to severe LUTS, including obstructive symptoms.

Age is the primary risk factor for LUTS, with prevalence, number of symptoms and severity of symptoms all increasing with age (14). Unfortunately aging cannot be prevented. It is important to identify preventive measures for reducing the burden of LUTS by identifying risk factors associated with these symptoms, especially those that are potentially modifiable. As smoking is a modifiable factor, it is important to find out any association between smoking and LUTS to take precautions for reduce the chance of developing LUTS in later life.

The main objective of this study was to evaluate the impact of smoking on lower urinary tract symptoms (LUTS) among patients who were referred to the Faculty of Medicine, University of Peradeniya for uroflowmetry. Specific objectives were to evaluate the impact of ongoing smoking and previous exposure on the IPSS and urine flow rate, the impact of smoking on different lower urinary tract symptoms including incomplete emptying, frequency, poor stream, intermittency, urgency, hesitancy and nocturia.

II. PATIENTS AND METHOD

The study was conducted as a descriptive cross sectional study by the Department of Surgery, Faculty of Medicine, University of Peradeniya from June 2014 and May 2015. The study population consisted of the patients referred to faculty of Medicine for uroflowmetry, during this period. Patients referred

to the faculty of Medicine Peradeniya for uroflowmetry were informed about the study and informed written consent was taken from patients who were willing to participate in this study. A total of 406 patients aged 10-90 years were included in this analysis. LUTS were assessed by the International Prostate Symptom Score (IPSS) (15), smoking status and other information was collected using an interviewer questionnaire by a MBBS qualified doctor. During the interview, patients were asked following questions which are parts of the IPSS: the frequency of sensation of not emptying your bladder completely after you finish urinating (incomplete empty), the frequency of urinating again less than two hours after you finished urinating frequency), The frequency you found you stopped and started again several times when you urinated (intermittency), difficulty of you postponing urination (urgency), the frequency of weak urinary stream (weak stream), The frequency of pushing or straining to begin urination (Straining), the frequency you most typically get up to urinate from the time you went to bed until the time you got up in the morning (nocturia). According to their frequency total IPSS was calculated. Using an additional questionnaire, we inquired about smoking and calculated pack-years of smoking. A pack-year being defined as 20 cigarettes /day for 1 year.

Analysis was carried out using 20.0 version of the statistical package for the social sciences (SPSS). The total population was categorized in to three groups as smokers, non-smokers and ex-smokers. Mean IPSS (out of 35) was calculated for each category. One way ANOVA test was used to detect any statistically significant difference between groups and as the above test showed a statistically significant difference between groups. We have performed Tukey post-hoc test to do find out the exact difference.

Then we calculated mean scores for each lower urinary tract symptoms including incomplete emptying, frequency, poor stream, intermittency, urgency, hesitation and nocturia (out of 5) in each category. One way ANOVA test and Tukey post-hoc test

were used to detect any statistically significant difference between groups.

Spearman’s rank correlation coefficient was used to detect any correlation between the number of pack years smoked and the total IPSS. The same test was used to detect any correlation between the number of pack years smoked and mean score for each lower urinary tract symptom including incomplete emptying, frequency, poor stream, intermittency, urgency, hesitation and nocturia to detect any association between smoking and storage symptoms of LUTS or smoking and voiding symptoms of LUTS.

III. RESULTS

The study sample of 406 patients with mean age was 61.75 ±13.49 years. There were 92.9% (n=377) male patients and 7.1% (n=29) female patients.

Out of the sample 31.68 % (n=129) patients were current smokers. Their mean age was 61.83 ±12.13 years and mean IPSS was 17.46 ± 8.05. 47.04 % (n=191) patients have never smoked. Their mean age was 59.06 ±14.93 years and mean IPSS was 15.05 ±7.99. Altogether 21.18 % (n=86) patients were ex-smokers and their mean age was 67.25 ±9.67 years and mean IPSS was 17.79 ±7.88.

There was a statistically significant difference between groups as determined by one-way ANOVA (P=0.006). Tukey post-hoc test revealed that mean IPSS was significantly higher in smokers (17.4574, P=0.023) and ex smokers (17.7907, P=0.023) compared to non-smokers (15.0524). There were no statistically significant differences between smokers and ex-smokers (P=0.952). The difference between mean IPSS value of current smokers and non smokers was 2.33 and it is significant at the 0.05 level (P= 0.011). The difference between mean IPSS value of Ex smokers and non smokers was 2.7383 and it is also significant at the 0.05 level (P= 0.009). The difference between mean IPSS value of current smokers and Ex smokers was 1.1106 and it was not significant (P= 0.715).

Table 1 - Description of the study population by gender, age and smoking status

Age group	Male		Female		Total	
	Smoking status	N	Smoking status	N	Smoking status	N
<30years	Current smokers	1	Current smokers	-	Current smokers	1
	Ex- smokers	-	Ex- smokers	-	Ex- smokers	-
	Non smokers	9	Non smokers	2	Non smokers	11
30-40years	Current smokers	7	Current smokers	-	Current smokers	7
	Ex- smokers	-	Ex- smokers	-	Ex- smokers	-
	Non smokers	12	Non smokers	2	Non smokers	14
40-50years	Current smokers	14	Current smokers	-	Current smokers	14
	Ex- smokers	6	Ex- smokers	-	Ex- smokers	6
	Non smokers	9	Non smokers	6	Non smokers	15
50-60years	Current smokers	31	Current smokers	-	Current smokers	31
	Ex- smokers	13	Ex- smokers	-	Ex- smokers	13
	Non smokers	38	Non smokers	8	Non smokers	46
60-70years	Current smokers	46	Current smokers	-	Current smokers	46
	Ex- smokers	36	Ex- smokers	-	Ex- smokers	36
	Non smokers	54	Non smokers	7	Non smokers	61

70-80years	Current smokers	26	Current smokers	-	Current smokers	26
	Ex- smokers	24	Ex- smokers	-	Ex- smokers	24
	Non smokers	34	Non smokers	4	Non smokers	38
>80years	Current smokers	4	Current smokers	-	Current smokers	4
	Ex- smokers	7	Ex- smokers	-	Ex- smokers	7
	Non smokers	6	Non smokers	-	Non smokers	6
Total		377		29		406

N= Number

Table 2 – Description of the study population by smoking status and IPSS values

Group	Number	Mean IPSS	Standard deviation	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
Current smokers	129	17.3846	8.06215	15.9856	18.7836
Non smokers	86	15.0524	7.99127	13.9118	16.1929
Ex smokers	191	17.7907	7.87717	16.1018	19.4796
Total	406	16.3759	8.06859	15.5897	17.1621

Poor stream was the commonest symptom in all three groups, but mean score for that, is significantly higher in ex-smokers (3.4070, P=0.009). Even though current smokers have higher mean score for that (3.0543), it is not statistically significant. Likewise mean scores for each and every symptom including incomplete emptying, frequency of micturition,

intermittency, urgency, hesitancy, and nocturia were higher in both smokers and ex-smokers than non-smokers but only some of those differences are statistically significant. (Summary table 3,4 and 5)

Table 3 – Comparison of mean values of different types of lower urinary tract symptoms between current smokers and non-smokers

Symptom	Mean IPSS of current smokers	Mean IPSS of non smokers	Difference of mean values	Significance*
Incomplete empty	2.6172	2.4188	0.1983	0.640
Frequency	2.6797	2.0576	0.6221	0.009
Intermittency	2.6512	2.2094	0.4417	0.114
Urgency	2.6744	2.0684	0.6060	0.016
Weak stream	3.0543	2.6492	0.4050	0.172
Straining	1.4219	1.3508	0.0710	0.940
Nocturia	2.3211	2.5930	0.0898	0.891

* Tukey post- hoc test

Table 4 – Comparison of mean values of different types of lower urinary tract symptoms between ex-smokers and non-smokers

Symptom	Mean IPSS of Ex smokers	Mean IPSS of non smokers	Difference of mean values	Significance
Incomplete empty	3.0000	2.4188	0.5811	0.055
Frequency	1.9302	2.0576	-0.1273	0.855
Intermittency	2.6279	2.2094	0.4184	0.222
Urgency	2.7093	2.0684	0.6408	0.028
Weak stream	3.4070	2.6492	0.7577	0.009
Straining	1.5581	1.3508	0.2073	0.668
Nocturia	2.5930	2.3211	0.2719	0.444

Table 5 – Comparison of mean values of different types of lower urinary tract symptoms between current smokers and ex-smokers

Symptom	Mean IPSS of current smokers	Mean IPSS of ex-smokers	Difference of mean values	Significance
Incomplete empty	2.6172	3.0000	-0.3828	0.332
Frequency	2.6797	1.9302	0.7494	0.010
Intermittency	2.6512	2.6279	0.0232	0.996
Urgency	2.6744	2.7093	-0.0348	0.991
Weak stream	3.0543	3.4070	-0.3527	0.406
Straining	1.4219	1.5581	-0.1362	0.859
Nocturia	2.4109	2.5930	-0.1821	0.727

IV. DISCUSSION

This study revealed that current smoking and ex-smoking status were significantly associated with the intensity of LUTS. The mean total IPSS was higher in current smokers and ex-smokers compared to non-smokers. Several studies carried out previously showed an adverse effect of smoking on LUTS (5-7). Smoking can cause hormonal and nutrient imbalances affecting the bladder and collagen synthesis, thus smoking can affect bladder wall strength and detrusor instability, becoming an etiology for LUTS. Nicotine increases sympathetic nervous system activity (16) and might contribute to LUTS via an increase in the tone of the prostate and bladder smooth muscle and by this mechanism it may exacerbate storage (irritative) urinary symptoms (7). Haidinger et al. (12) demonstrated that irritative symptoms correlated positively with the number of cigarettes smoked per day. However, Platz et al. (7) noted that obstructive symptoms were more strongly associated than irritative symptoms with current smoking. However the present study did not suggest any specific association between smoking and either of obstructive or irritative symptoms, but it showed that mean scores for each and every lower urinary tract symptom is higher in smokers and ex-smokers than non-smokers even though only some are statistically significant. Smoking is thought to be associated with higher concentrations of testosterone (17). A higher testosterone concentration is associated with higher intraprostatic dihydrotestosterone levels, which is thought to be important in the development of BPH and LUTS (18). Alteration in levels of serum androgenic and estrogenic steroid hormones among smokers has been hypothesized as a potential mechanism in the induction and maintenance of BPH (19-21), and Platz et al. (7) hypothesized that elevations in intraprostatic androgens, mainly dihydrotestosterone, resulting from a history of sustained smoking, may be associated with prostate enlargement. Smokers pass several toxins which are in cigarettes, in their urine (22). Those toxins can cause irritation of the bladder causing LUTS. As the exact etiology is still not established those will be points for future studies.

There is no significant difference between the mean total IPSS values of current smokers and ex-smokers.

V. CONCLUSION

Current smoking and past smoking status are significantly associated with the intensity of LUTS. Both irritative lower urinary tract symptoms and obstructive lower urinary tract symptoms were found to be worse in current and ex-smokers compared to non-smokers.

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