

Could Urinary Tract Infection Cause Female Stress Urinary Incontinence? A Clinical Study

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Abstract

Background: Stress urinary incontinence (SUI), the most common type of urinary incontinence (UI), is usually defined as leakage of urine during movement or activity which puts pressure on the bladder, such as coughing, sneezing, running or heavy lifting. It is reported in most countries that 15% to 40% of women struggle with SUI and its severe implications for daily life, including social interactions, sexuality, and psychological wellbeing.

Objectives: The aim of our study was to assess the relationship between urinary tract infection and the severity of stress urinary incontinence (SUI).

Patients and Methods: This research was a cross-sectional study conducted in a public urology clinic in Tehran. The study population was all females with complaints of SUI who visited the clinic during 2014. We compared Valsalva leak point pressure (VLPP) in two groups of patients, with and without history of urinary tract infection (UTI).

Results: According to the findings of our study, the mean VLPP was 83.10 cm H₂O in the group with UTI history, and 81.29 cm H₂O in those without history of UTI. The difference in VLPP between the two groups was not significant ($P < 0.05$), even after controlling for confounding variables including age, body mass index, history of hysterectomy and number of deliveries.

Conclusions: Our study did not confirm a significant relationship between UTI and severity of SUI as measured by VLPP. A decisive opinion would require extensive future studies by prospective methods.

Keywords: Urinary Tract Infections, Urinary Incontinence, Stress, Valsalva Leak Point Pressure

1. Background

Stress urinary incontinence (SUI), the most common type of urinary incontinence (UI), is usually defined as leakage of urine during movement or activity which puts pressure on the bladder, such as coughing, sneezing, running or heavy lifting (1, 2). It is reported in most countries that 15% to 40% of women struggle with SUI and its severe implications for daily life, including social interactions, sexuality, and psychological wellbeing. Therefore, the identification and possible reduction of risk factors for SUI is important, and could also decrease health care costs (3). Weight is a modifiable risk factor for SUI. Many non-modifiable risk factors for SUI have been identified, such as age, delivery, and pelvic surgery, but urinary tract infections (UTIs) need more study (2). Urinary tract infections are common and occur at all ages. Women are particularly at risk of UTI, and more than 50% will experience at least one episode during their lifetime (3). The majority of UTIs cause a short acute illness and may be treated with a course of antibiotics, but occasionally, depending on the site and type of infection, they can develop into a serious, even life-threatening condition (3, 4).

2. Objectives

Although many factors such as nutrition and smoking have been researched in relation to SUI, urinary tract infection was not one of them. Our study is a first step in this field. The aim of our study was to assess the relationship between urinary tract infection and SUI severity.

3. Patients and Methods

This investigation was a cross-sectional study conducted in a public urology clinic in Tehran. The study population were all females with complaints of SUI who visited the clinic during 2014. We compared Valsalva leak point pressure (VLPP) in two groups of female SUI patients with and without UTI history. History of UTI was defined as a self-reported UTI having occurred at least once in the previous year.

According to our preliminary results, the mean and standard deviation of VLPP were 80 ± 17 cm H₂O in patients with history of UTI, and 88 ± 16 cm H₂O in those without history of UTI. Therefore, according to the following equation, with 95% assurance, 136 patients (68 in each group) was an appropriate sample size to compare the mean of the quantitative dependent variable (VLPP)

between the two groups. Type I and Type II errors were considered as 0.05 and 0.20, respectively.

300 patients were selected randomly from clinic patients to be asked to participate in our study. Of these, 140 patients showed interest and were qualified through filling out an informed consent form. The selection criteria were absence of anticholinergic or alpha-blocker drugs during the two weeks prior to the urodynamic test and no history of pelvic surgery, hysterectomy or cesarean delivery. The mean of the VLPP was compared between the two groups of patients using a t-test and a Mann-Whitney test, and after controlling for confounding variables including age, body mass index (BMI), history of hysterectomy and delivery status. All data were entered and analyzed using SPSS 6 and Excel 2007 software.

$$(1) \quad n = \frac{(S_1^2 + S_2^2) \left(z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)}{(\bar{X}_1 - \bar{X}_2)^2}$$

$$(2) \quad n = \frac{(16^2 + 17^2)(1.96 + 0.85)^2}{(88 - 80)^2} = \frac{4303.3745}{64} = 67.24$$

4. Results

The mean of the Valsalva leak point pressure was 83.10 cm H₂O and 81.29 cm H₂O, respectively in patients with UTI history and without UTI history. The difference in VLPP between the two groups was not significant (P = 0.61) (Table 1).

In order to control the effect of delivery status, we compared the mean of VLPP in the study groups according to delivery numbers. As shown in Table 2, in each delivery status, the mean of VLPP was higher for patients with UTI history but the difference was significant only in patients with 1 to 4 deliveries (P < 0.05).

Similarly, in order to control the effect of age, we compared the mean of VLPP in the study group according to age. As shown in Table 3, the mean of VLPP in all age groups was higher for patients with UTI history, but the difference was not significant (P > 0.05).

To control the effect of BMI, the mean of the Valsalva leak point pressure was compared according to BMI. As shown in Table 4, the mean of the Valsalva leak point pressure in overweight and obese patients was higher for patients with UTI history, but the difference was not significant (P > 0.05).

Table 1. Mean of Valsalva Leak Point Pressure in Patients With and Without UTI History

Patients	No.	Mean of Valsalva Leak Point Pressure (cm H ₂ O)	SD	SE	Equality of Means T-Test	
					P Value	T
With UTI history	70	83.10	± 18.60	2.21	.611	-0.510
Without UTI history	70	81.29	± 19.93	2.85	.611	-0.510

Abbreviations: SD, standard deviation; SE, standard error deviation.

Table 2. Mean of Valsalva Leak Point Pressure After Controlling for Delivery Numbers

Delivery history	UTI History	Patients	Mean of VLPP (cm H ₂ O)	SD	SE	Test for Equality of Means		
						P Value	T	Z
						NA	NA	NA
No	Yes	0	NA	NA	NA			
	No	0	NA	NA	NA			
Yes								
1-4 deliveries	Yes	47	83	± 18.71	2.65	0.02	2.378	NA
	No	56	72.33	± 18.91	3.64			
5 or more deliveries	Yes	23	77.5	± 18.15	5.24	0.359	NA	-0.916
	No	14	66	± 10.84	4.85			

Abbreviations: SD, standard deviation; SE, standard error deviation.

Table 3. Mean of Valsalva Leak Point Pressure After Controlling for Age

Age, y	UTI History	Patients	Mean of Valsalva Leak Point Pressure (cm H ₂ O)	SD	SE	Test for Equality of Means		
						P	T	Z
0-40						NA	NA	NA
	Yes	10	100	0	0			
	No	20	100	0	0			
40-60						0.908	-0.116	NA
	Yes	38	82.44	± 19	2.9			
	No	33	81.89	± 20.04	3.79			
60 and above						0.206	NA	-1.263
	Yes	22	73.82	± 16.63	4.03			
	No	17	65.83	± 14.11	4.07			

Abbreviations: SD, standard deviation; SE, standard error deviation.

Table 4. Mean of Valsalva Leak Point Pressure in Two Groups of Patients After Controlling for BMI

BMI Status, kg/m ²	UTI History	Patients	Mean of VLPP (cm H ₂ O)	SD	SE	Test for Equality of Means		
						P	T	Z
< 18.5 (low weight)						NA	NA	NA
	Yes	6	100	0	0			
	No	5	100	0	0			
18.5 - 25 (natural weight)						NA	NA	NA
	Yes	4	100	0	0			
	No	14	100	0	0			
25 - 30 (overweight)						0.479	NA	-0.709
	Yes	15	86.32	± 18.92	4.34			
	No	18	82.14	± 21.81	5.83			
30 and above (obese)						0.514	0.655	NA
	Yes	45	79.11	± 18.38	2.74			
	No	33	76.18	± 18.93	3.58			

Abbreviations: SD, standard deviation; SE, standard error deviation.

5. Discussion

According to our study results, there was no statistically significant relationship between urinary tract infection and severity of female stress urinary incontinence, as measured by Valsalva leak point pressure. Of course, a decisive opinion would require more extensive studies by prospective methods. However, our study found that urine leakage occurred with higher bladder pressure in patients with history of UTI, although the result was not significant, and therefore they were suffering from milder SUI. Future investigations could clarify the relationship, if any. Finally, we suggest future studies to analyze the relationship between different types of urinary tract infections and SUI. Also, the confounding variables which were not considered in our study, such as lifestyle factors including nutrition and smoking, should be studied.

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Footnotes

Authors' Contribution: Study concept and design: Dr. Fatemeh Heydari; Acquisition of data: Zahra Motaghed, Dr. Fatemeh Heydari; Analysis and interpretation of data: Zahra Motaghed; Drafting of the manuscript: Zahra Motaghed; Critical revision of the manuscript for important intellectual content: Dr. Fatemeh Heydari, Dr. Fatemeh Abbaszadeh; Statistical analysis: Zahra Motaghed; Administrative, technical, and material support: Dr. Fatemeh Heydari, Dr. Fatemeh Abbaszadeh; Study supervision: Dr. Fatemeh Heydari.

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