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Original Research / Özgün Araştırma

Is There an Association Between Urinary Tract Infection and Toilet Type?

İdrar Yolu Enfeksiyonu ile Tuvalet Tipi Arasında İlişki Var mı?

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ABSTRACT

Aim: Many metabolic, physiological, and social factors play a role in the formation of infections. The results of the studies investigating the association between toilet type and urinary tract infection (UTI) are contradictory. This study aims to investigate the relationship between UTI and toilet habits and toilet type used. **Methods:** A cross-sectional study, including 344 participants between the ages of 18-60, was conducted. Sociodemographic information, toilet preferences, toilet habits, diagnosed chronic diseases, and histories of UTI were questioned with a structured questionnaire. **Results:** Front-to-back wiping, use of urinals in public places, and use of toilet paper were associated with a history of UTI in some genders. No significant relationship was observed between the parameters of general toilet preference, type of toilet preferred at home, and the frequency of water closet use, and UTI history in both genders. **Conclusion:** The toilet preference and some toileting habits may play a role in UTI. Further studies are required to reveal the real significance of this association.

Keywords: Urinary tract infection, toilet type, water closet, squatting toilet, toileting behaviors.

ÖZET

Giriş: Enfeksiyonların oluşumunda birçok metabolik, fizyolojik ve sosyal faktör rol oynar. Tuvalet tipi ile idrar yolu enfeksiyonu (İYE) arasındaki ilişkiyi araştıran çalışmaların sonuçları çelişkilidir. Bu çalışmanın amacı, İYE ile tuvalet alışkanlıkları ve kullanılan tuvalet türü arasındaki ilişkiyi incelemektir. **Yöntem:** 18-60 yaş arası 344 katılımcının yer aldığı kesitsel bir çalışma gerçekleştirildi. Sosyodemografik bilgiler, tuvalet tercihleri, tuvalet alışkanlıkları, teşhis edilen kronik hastalıklar ve İYE öyküleri yapılandırılmış bir anket ile sorgulandı. **Bulgular:** Önden arkaya temizlik, umumi yerlerde pisuar kullanımı ve tuvalet kâğıdı kullanımı bazı cinsiyetlerde İYE öyküsü ile ilişkili bulundu. Her iki cinsiyette de genel tuvalet tercihi, evde tercih edilen tuvalet türü ve klozet kullanım sıklığı parametreleri ile İYE öyküsü arasında anlamlı bir ilişki saptanmadı. **Sonuç:** Tuvalet tercihi ve bazı tuvalet alışkanlıkları İYE' de rol oynayabilir. Bu ilişkinin gerçek önemini ortaya çıkarmak için daha fazla çalışmaya ihtiyaç vardır.

Anahtar kelimeler: İdrar yolu enfeksiyonu, tuvalet tipi, klozet, alaturka tuvalet, tuvalet alışkanlıkları.

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INTRODUCTION

Infection of the urine and urinary tract, which are normally sterile, with various microorganisms (bacteria, fungi, viruses) is called urinary tract infection (UTI).[1] It is the most common bacterial infection in all age groups, both in and outside the hospital.[2] Since UTIs can show an asymptomatic course, their frequency is not clearly known and may vary with factors such as age and gender. The lifetime prevalence has been reported as 3.3-8.4% in women and 1.1-1.8% in men, and it is 3-5 times more common in women than men.[3] This is thought to be caused by the difference in urinary system anatomy.[3] Many metabolic, physiological, and social factors play a role in the formation of infections. Some conditions that predispose to the development of UTIs described in the literature are urological anomalies, uncircumcision, female gender, wrong-insufficient toilet training, bubble bath, inadequate and incorrect perianal hygiene, pinworm infections, constipation, not taking an age-appropriate amount of fluid, and toilet postponement habit.[3,4] Additionally, nutritional disorders, metabolic diseases such as diabetes, long-term use of antibiotics, low socioeconomic status, multiple and frequent pregnancies, births and miscarriages, impairment of the hormonal system, and conditions that reduce body resistance may predispose to infections.[5]

Among the agents isolated in UTI, gram-negative bacilli are the most common, and among these, Escherichia coli is the most frequently isolated agent. A significant number of microorganisms pass from the fecal reservoir to the urethra and from there to the bladder, causing UTI through the ascending route. Some behavioral measures like increasing fluid intake, not delaying urination, avoiding douching, and wiping front to back after defecation are recommended to avoid UTI.[6] There are some studies on whether the type of toilet used (water closet, squatting, urinal), contact history and toileting habits (early and late urination, urge to urinate, and personal cleaning style) play a role in ascendant transmission. There are studies linking western type (water closet) toilet use with contamination, as well as the studies linking eastern type (squatting) toilet use.[7-11] There are also studies stating that there is no relationship between toilet type and UTI.[12] Besides, some high-quality studies emphasize the link between squatting with consequent pelvic floor relaxation and widening of the genital hiatus seen on 3D/4D scans can point toward a more effective evacuation of the bladder.[13] In our country, the common use of squatting toilets is gradually being replaced by the water closet. This study aims to investigate the relationship between UTI and toilet habits and toilet type used.

METHODS

This cross-sectional study comprised 344 participants between the ages of 18-60. Participants were selected from volunteers who applied to the family medicine outpatient clinic between January and June 2018 and did not have any active complaints. Sociodemographic information, toilet preferences, toilet habits, diagnosed chronic diseases, and histories of UTI were questioned with a structured questionnaire after obtaining an informed consent form from the participants.

Statistical Analysis

The data obtained from the surveys were transferred to the SPSS v.20 package program. Kolmogorov-Smirnov test was used to investigate the normal distribution of the data. Parameters associated with UTI were analyzed by chi-square test and adjusted residual analysis. Odds ratio values were calculated for parameters with significant correlations. A value of $p < 0.05$ was accepted as the statistical significance limit.

Ethical Considerations

Ethics approval dated 25.10.2017 and numbered 198 was obtained from the local ethics committee for the study.

RESULTS

171 (49.7%) women and 173 (50.3%) men were included in our study. The median (95% C.I.) value for the age of the participants was 25 (27.1-29.0) [26 (27.1-29.8) in women, 24 (26.2-29.1) in men]. While the educational status of the participants was predominantly at the university level (n = 235, 68.3%), 13 (3.8%) had primary education or lower education. Participants were mostly single (n = 214, 62.2%). Those who declared to have any chronic disease were found as 25 (14.6%) in women and 15 (8.7%) in men. It was observed that there was no difference between genders in terms of having a chronic disease ($p = 0.085$; $X^2 = 2.962$).

It was observed that there were 191 (55.5%) [121 (70.8) women, 70 (40.5) men] who performed personal cleaning from front to back after toilet. Toilet type preferences of the participants according to gender are shown in Table 1.

Table 1. Toilet type preferences of the participants by gender

		Gender		Total
		Women n (%)	Men n (%)	n
Overall toilet preference	Squatting	81 (46.6)	93 (53.5)	174
	Sitting (WC)	90 (52.9)	80 (47.1)	170
Preferred toilet type at home	Squatting	65 (42.8)	87 (57.2)	152
	Sitting (WC)	105 (55.0)	86 (45.0)	191
Preferred toilet type at public places	Squatting	156 (56.9)	118 (43.1)	274
	Sitting (WC)	15 (37.5)	25 (62.5)	40
	Urinal (standing)	0 (0)	30 (100)	30

No significant relationship was observed between the parameters of general toilet preference, type of toilet preferred at home, and the frequency of water closet use, and urinary tract passage history in both genders (Table 2). While there was no difference between the type of toilet preferred in common areas and the history of UTI on women, it was observed that men who preferred squatting toilets had more common UTI history than those who preferred a urinal (Table 2). It was observed that there was a relationship between performing personal cleaning from front to back after toilet and having UTI in men (Table 2).

All of the participants stated that they used at least one of water, toilet paper, wet wipes, or soap for personal cleaning after the toilet. It was observed that UTI history was more common in women who used toilet paper for personal hygiene (Table 2).

Table 2. The relationship between UTI history and various toilet preferences by gender

Gender			UTI history		p	X^2
			Yes n(%)	No n(%)		
Women	Overall toilet preference	Squatting	42(51.9)	39(48.1)	0.923	0.009
		Sitting (WC)	46(51.1)	44(48.9)		
	Total		88(51.5)	83(48.5)		
Men	Overall toilet preference	Squatting	23(24.7)	70(75.3)	0.437	0.603
		Sitting (WC)	24(30.0)	56(70.0)		
	Total		47(27.2)	126(72.8)		
Women	Preferred toilet type at home	Squatting	31(47.7)	34(52.3)	0.403	0.699
		Sitting (WC)	57(54.3)	48(45.7)		
	Total		88(51.8)	82(48.2)		
Men	Preferred toilet type at home	Squatting	23(26.4)	64(73.6)	0.828	0.047
		Sitting (WC)	24(27.9)	62(72.1)		
	Total		47(27.2)	126(72.8)		
Women	Preferred toilet type at public places	Squatting	81(51.9)	75(48.1)	0.697	0.151
		Sitting (WC)	7(46.7)	8(53.3)		
	Total		88(51.5)	83(48.5)		
Men	Preferred toilet type at public places	Squatting	38(32.2)	80(67.8)	**0.019**	7.893
		Sitting (WC)	7(28.0)	18(72.0)		
		Urinal (standing)	2(6.7)	28(93.3)		
	Total		47(27.2)	126(72.8)		
Women		Never or rarely	35(49.3)	36(50.7)	0.633	0.228

	Frequency of using water closet	Often or always	53(53.0)	47(47.0)		
	Total		88(51.5)	83(48.5)		
Men	Frequency of using water closet	Never or rarely	25(27.8)	65(72.2)	0.851	0.035
		Often or always	22(26.5)	61(73.5)		
	Total		47(27.2)	126(72.8)		
Women	Personal cleaning style after toilet	Front to back	67(55.4)	54(44.6)	0.112	2.533
		Other	21(42.0)	29(58.0)		
	Total		88(51.5)	83(48.5)		
Men	Personal cleaning style after toilet	Front to back	29(41.4)	41(58.6)	**0.001**	12.084
		Other	18(17.5)	85(82.5)		
	Total		47(27.2)	126(72.8)		
Women	Using toilet paper after toilet	Yes	80(56.7)	61(43.3)	**0.003**	8.955
		No	8(26.7)	22(73.3)		
	Total		88(51.5)	83(48.5)		
Men	Using toilet paper after toilet	Yes	38(28.8)	94(71.2)	0.429	0.739
		No	9(22.0)	32(78.0)		
	Total		47(27.2)	126(72.8)		

* Chi-square test was performed.

Odds ratio values of the parameters with statistically significant relationships are shown in Table 3.

Table 3. Odds ratios for some toilet preference parameters

Gender			UTI history		p	X^2	OR	95% CI	
			Yes n(%)	No n(%)				Lower	Upper
Women	Using toilet paper after toilet	Yes	80(56.7)	61(43.3)	**0.003**	**8.955**	**3.61**	**1.50**	**8.65**
		No	8(26.7)	22(73.3)					
Men	Preferred toilet in public	Squatting	38(32.2)	80(67.8)	**0.005**	**7.909**	**6.65**	**1.51**	**29.38**
		Urinal	2(6.7)	28(93.3)					
Men	Personal cleaning style after toilet	Front to back	29(41.4)	41(58.6)	**0.001**	**12.084**	**3.34**	**1.66**	**6.70**
		Other	18(17.5)	85(82.5)					

* Chi-square test with risk analysis was performed. (OR: Odds Ratio, CI: Confidence Interval)

DISCUSSION

In our study, which examined the relationship between UTI history and toilet type and some toilet habits, some remarkable results were found. Since it is known that gender plays an important role in UTIs, separate analyzes were made for both genders in terms of the relationships examined in our study. Especially, due to the structure of the external genital system anatomy of women and the urethra being more open to microorganisms, it is thought that the type of toilet used and personal cleaning methods after the toilet may be more important in women. In particular, the bidet nozzle for water, which is widely used typically in Turkey and some eastern countries but lacking in western countries, is thought to increase the fecal contamination back to front. However, there are not a sufficient number of studies comparing the effects of these two toilet types on UTIs. It is interesting that in our study, there was no

relationship between water closet use and the history of UTI in both genders. In literature, contradictory results have been asserted about the effects of voiding positions on urinary symptoms.[14,15]. Nevertheless, some studies show a negative impact of hovering over the toilet on bladder health.[16] In light of the current information, it does not yet seem possible to reach a final decision on this issue.

It was observed that the use of toilet paper was common in our study group. A medical manuscript written in 1978 mentioned a probable association between the use of soft toilet paper and the decline in dysentery.[17] Many other studies assert a protective effect of using disposable toilet paper on many contagious diseases.[18,19] However, the fact that the use of toilet paper was more common in women with a history of UTI in our study may be related to women with UTI pay more attention to cleaning after the toilet.

Wiping front to back after defecation is among the recommended behavioral measures in women who experience ≥ 3 UTIs per year.[6] There is research suggesting that although front-to-back wiping is logical at first glance and a method that is commonly explained to young girls, it does not make a difference in the frequency of UTIs compared to those who wipe from back to front.[20] Interestingly, the relationship between cleaning style and UTI was observed only in men, and we saw that the men who stated that they cleaned from front to back were mostly in the group without a history of UTI in our study. We believe that more studies are needed to reveal the true clinical significance of this situation. It is also interesting that in our study, male participants who used urinals in common areas mostly did not have a history of UTI. A comprehensive study held in the USA shows that most of the women sit to void at home but away from home women commonly use other voiding positions. This was more prevalent in women with a bladder condition as well.[21] The studies focused on the toileting behaviors of men are lacking in the literature, although some evidence from the reviewed studies confirms significant associations between the overall score of toileting behaviors and UTI.[22] In the background of this relationship that emerged in our study, it may be assumed that those with UTI preferred a squatting toilet or that the use of urinals is protective in terms of UTI. Unfortunately, it is not possible to reveal such a causal relationship due to the design of our study.

Limitations

Examining the history of UTI depending on the statements of the participants is a limitation due to the type of our study, and the answers given by the participants may not exactly match the facts. Besides, it is thought that the answers given to uncomfortable questions such as personal cleaning after the toilet may not always reflect the truth. What is more, children and elderly individuals were not included in our study, as observed in many studies in the literature, which can be seen as another limitation. To overcome all these limitations, prospective studies including lifelong follow-up data of the participants may provide a clearer demonstration of the relationship between toilet type and UTIs.

Conflict of interest

The authors declare no conflict of interest. No funding is obtained for this study.

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