

Original Research Article

Urinary incontinence, UTI and its associated health problems among female athletes- an interventional approach

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ABSTRACT

Background: Research over recent decades has shown that lower urinary tract dysfunction such as urinary incontinence (UI) and UTI is common among physically active women, including those in high-impact sports. It is essential to study the rate of prevalence and risk factors in order to prevent and treat the problem among female athletes.

Methods: This cross-sectional study assessed the prevalence of UI, UTI, and the effect of an intervention on 138 female athletes aged 17-23 using a self developed questionnaire and follow-up intervention program.

Results: UI was reported by 29%, UTI by 48.6%, and both by 35%. Intervention significantly improved awareness and practices.

Conclusions: Increased awareness and education can help female athletes overcome UI/UTI-related limitations in performance and quality of life.

Keywords: Female athletes, Intervention programme, Lower urinary tract dysfunction, Urinary incontinence, Urinary tract infections

INTRODUCTION

Lower urinary tract dysfunction (LUTD) refers to a range of conditions that affect the normal storage and emptying of urine from the bladder. It includes symptoms such as urinary incontinence, urgency, frequency, incomplete emptying, and recurrent urinary tract infections. Urinary incontinence (UI), the unintentional loss of urine, is categorized into stress, urge, or mixed types. It occurs more frequently in women due to inherent anatomical and physiological differences. Among female athletes, UI is a notable health issue that can hinder physical performance, impact emotional well-being, and limit social engagement.¹ Despite being in excellent physical condition, many of these women experience urine leakage during exercise or competitions, often as a result of pelvic

floor dysfunction.² High-impact sports can exert excessive pressure on the pelvic floor muscles, contributing to stress incontinence even in otherwise healthy individuals.³ The pelvic floor muscles and connective tissues (fascia) function separately, and weakness in either structure may result in pelvic floor disorders.⁴

A systematic review and found that stress urinary incontinence (SUI) is the most prevalent form of UI. SUI is characterized by the unintentional leakage of urine during physical effort or exertion. Studies indicate that between 20% and 80% of female athletes especially those participating in high-impact sports such as gymnastics, basketball, and running experience UI symptoms due to the significant gravitational and downward forces involved in these activities. Experiencing UI during training or competition can be distressing and may hinder

athletic performance.⁵ Many female athletes with UI feel too embarrassed to discuss the issue with their coaches, which contributes to a lack of awareness and delays appropriate treatment. Ultimately, UI can diminish an athlete's quality of life, interfere with performance, and may even lead to withdrawal from sports.⁶

A urinary tract infection (UTI) is caused by microbial invasion of the normally sterile urinary system and is among the most common bacterial infections globally. Women face a 60% lifetime risk of developing a UTI, compared to 13% in men, due to anatomical factors like a shorter urethra, absence of protective prostatic secretions, pregnancy, and increased risk of contamination from fecal flora.⁷ UTIs, often triggered by bacteria such as *E. coli*, commonly cause symptoms like painful urination (dysuria), frequent urges to urinate, and sometimes incontinence. In adolescent girls, poor hygiene, malnutrition, myths, and low socioeconomic status are major risk factors.⁸

Intense physical activity may temporarily weaken the immune system, increasing infection risk. For instance, a study on basketball players showed that during the first month of training, 69% experienced changes in urinary pH, 33% had bacterial presence in urine, and 23% showed proteinuria. Athletes with spinal cord injuries are particularly vulnerable to UTIs due to impaired bladder function. UTIs in athletes can result in lost training time and reduced performance.⁹

METHODS

This descriptive cross-sectional study included 138 female college athletes.

Inclusion criteria were female athletes with a minimum of two years of continuous participation in sports, aged between 17 and 23 years, willing to take part in the study, provided informed consent.

Exclusion criteria included male athletes, female athletes with less than two years of sports experience, those unwilling to participate.

Sample selection

Participants who fulfilled the inclusion criteria were recruited from various colleges in Chennai. Prior approval was obtained from the respective institutions and sports coaches. The study's objective was explained to the athletes, and informed consent was secured.

Data collection tools

Data were gathered using a self-constructed and pre-tested questionnaire (reliability score: 0.78), which included sections on demographic details, urinary incontinence (UI), and urinary tract infections (UTIs).

Data collection process

The questionnaire was administered to the selected participants; the doubts were clarified during administration. Completed questionnaires were reviewed for indications of UI, UTI, or both conditions.

Intervention program

For the intervention phase, 60 participants were purposively chosen 20 each experiencing UI, UTI, or both. They attended four educational sessions conducted by a gynecologist over two months at an interval of 15 days, conducted by a gynecologist. These sessions covered the causes, symptoms, and management of UI and UTI, including pelvic floor exercises, bladder training, and the importance of adequate hydration. Informational pamphlets were also provided. A follow-up survey was conducted two months later to evaluate improvements in knowledge and practices. The study was conducted over a period of seven months, from June 2024 to January 2025.

The data collected was analysed using frequency, mean, standard deviation, Chi square test to study the association and t test for comparison before and after intervention.

RESULTS

Among the 138 female athletes surveyed, the majority (54%) were between 17 and 19 years old, while the remaining 46% were aged 20 to 23. A large proportion (89%) participated in team sports, with 12% and 5.8% engaged in high-intensity sports like basketball and tennis, respectively. Additionally, 10.8% were involved in individual high-intensity disciplines such as athletics and swimming. Most participants (78%) were day scholars.

Table 1: Demographic details of the respondents.

Details	Responses	Frequency	%
Age (in years)	17-19	74	53.6
	20-23	64	46.4
Type of sports	Volleyball	36	26.1
	Cricket	30	21.7
	Basket ball	16	11.6
	Tennis	8	5.8
	Kho-Kho	24	17.4
	Kabaddi	9	6.5
	Athletics	10	7.2
	Swimming	5	3.6
Place of stay	Day scholar	138	77.5
	Hosteler	40	22.5

The Figure 1 illustrates the percentage distribution of female athletes reporting symptoms of urinary incontinence (UI), urinary tract infections (UTI), and both

conditions combined (UI and UTI). Each category is divided into responses marked “yes” and “no” to indicate the presence or absence of the respective condition. Notably, 48.6% reported UTI symptoms, while 29% reported UI alone, and 34.8% experienced both conditions simultaneously. The visualization underscores the significant overlap and burden of LUTD among young female athletes, emphasizing the need for targeted interventions in this population.

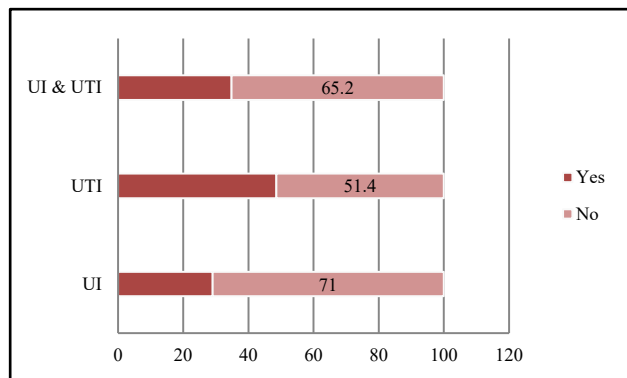


Figure 1: Prevalence of LUTD among female athletes.

Urinary incontinence among female athletes

The majority of participants (71%) reported never experiencing urinary incontinence (UI). However, 12.3% experienced it once a week, 8% two to three times per week, 6.5% once daily, and 2.2% had multiple episodes per day.

Table 2: Details regarding urinary incontinence.

Details	Responses	N	%
Frequency of UI	Never	98	71.0
	Once a week	17	12.3
	2-3 times a week	11	8.0
	Once a day	9	6.5
	Several times a day	3	2.2
Amount of leakage	None	98	71.0
	Small amount	18	13.0
	Moderate amount	16	11.6
	Large amount	6	4.3
When does urine leak?	Never	98	71.0
	When cough/sneeze	9	6.5
	While exercising	27	19.6
	While asleep	4	2.9
Overall impact of UI	0	98	71.0
	1	0	0
	2	5	3.6
	3	18	13.0
	4	7	5.1
	5	10	7.2

Among the 40 individuals who reported UI, 13% experienced a small amount of leakage, 11.6% a

moderate amount, and 4.3% a large amount. The leakage most commonly occurred during exercise (19.6%), followed by coughing or sneezing (6.5%), and while sleeping (2.9%). The impact of UI on a five-point scale, 7.2% rated it as 5 (severe), 5.1% as 4, and 13% as 3, suggesting that a notable portion of participants experienced a moderate to severe impact, particularly during physical exertion (Table 2).

Urinary tract infections among female athletes

Table 3 shows that out of the 67 participants who reported urinary tract infections (48.6%), 18% had experienced their first episode between 6 and 12 months prior, while 13.8% had encountered one within the past 6 months. The most frequently reported symptoms were a burning sensation during urination (21%), abdominal pain (16.7%), and back pain (16%), with many individuals experiencing more than one symptom. Additionally, 32% of participants avoided urinating when necessary due to fear of pain, and 41.3% refrained from doing so altogether, 2.7% wash their panties regularly with disinfectants (37.7%).

Table 3: Details regarding urinary tract infections.

Details	Responses	N	%
When did you first start getting UTI?	<6 months ago	19	13.8
	6-12 months ago	25	18.1
	1-2 years ago	17	12.3
	>4 years ago	6	4.3
Symptoms of UTI	burning/stinging while passing urine	29	21.0
	burning/stinging after passing urine	16	11.6
	frequent urination	21	15.2
	abdominal pain	23	16.7
	back pain	22	15.9
	fever	4	2.9
	blood in urine	3	2.2
Control Urination	Yes	44	31.9
	No	23	16.7
Fear of using public toilets	Yes	57	41.3
	No	10	7.2
Regularity of washing panties	Yes	59	42.7
	No	8	5.8
Usage of disinfectants	Yes	9	6.5
	Sometimes	6	4.3
	No	52	37.7

Causes of LUTD among female athletes

Figure 2 displays the percentage of female athletes identifying specific causes contributing to urinary incontinence (UI) and urinary tract infections (UTI). The most common factors were high-intensity sports (77.1%) and prolonged training sessions (66.7%), followed by inadequate water intake (54.2%) and poor nutritional

intake (39.6%). Other reported factors include poor menstrual hygiene, vaginal discharge, improper perineal washing, muscle fatigue, and constipation. The chart highlights the multifactorial nature of LUTD, emphasizing the importance of awareness, hygiene education, and lifestyle modifications in preventive strategies. Among the 48 participants, the leading reported causes of urinary issues were high-intensity sports (77.1%) and prolonged training (66.7%), followed by low water intake (54.2%), poor nutrition (39.6%), menstrual hygiene (31.3%), and vaginal discharge (22.9%). Less common factors included improper perineal hygiene and injuries (16.7% each), muscle fatigue (10.4%), and constipation (8.3%).

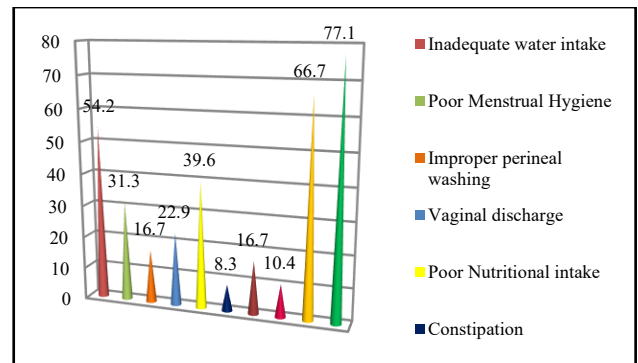


Figure 2: Contributing factors of LUTD among female athletes.

Table 4: Associated problems of the samples with LUTD.

Category	Response	UI (54)		UTI (67)		UI and UTI (48)		Chi square value	P value
		N	%	N	%	N	%		
Sleep disturbances	Yes	40	74.1	33	49.3	35	72.9	1.693	0.193 NS
	No	14	25.9	34	50.7	13	27.1		
Poor appetite	Yes	15	27.8	46	68.7	24	50	4.711	0.095 NS
	No	39	72.2	21	31.3	24	50		
Academics	Yes	20	37.0	29	43.3	26	54.2	2.14	0.052 NS
	No	34	62.9	36	53.7	22	45.8		
Fear to use public toilets	Yes	48	88.9	53	79.1	46	95.8	0.756	0.685 NS
	No	6	11.1	14	20.9	2	4.2		
Affects physical health	Yes	32	59.3	41	61.2	36	75.0	2.887	0.089 NS
	No	22	40.7	26	38.8	12	25.0		
Mental health	Yes	52	96.3	41	61.2	28	58.3	3.992	0.046*
	No	12	22.2	26	38.8	20	41.7		
Affects sports performance	Yes	33	61.1	27	40.3	35	72.9	11.281	0.001**
	No	21	38.9	40	59.7	13	27.1		

**Significant at 1% level of Significance; *Significant at 5% level of Significance, NS- Not significant.

Table 5: Impact of Intervention on knowledge and practices of UI, UTI, and both.

Intervention	N	Mean±SD	t value	P value
Before	60	3.445±1.73	6.37	0.0001 **
After	60	5.51±1.82		

A significant improvement in knowledge and practices with regard to lower urinary tract diseases was noticed as an effect of intervention programme among the respondents.

DISCUSSION

Urinary incontinence (UI) is the most prevalent dysfunction among female athletes, affecting 15-17% of women daily.¹⁰ This study's findings indicate a significant overlap and burden of both UI and urinary tract infections (UTIs) in this population. These results are consistent with earlier studies, which reported stress urinary incontinence (SUI) in 33.7% of female athletes compared to 24.4% in non-athletic controls and a 14.3%

prevalence of SUI among 503 adult female athletes in high-impact sports.^{11,12} Additionally, 44% of athletes reported at least one UTI in the past year.¹³ The elevated rates may be attributed to intense physical activity, which increases intra-abdominal pressure and may weaken or overstretch pelvic floor muscles, contributing to UI.³

These findings also align with previous research highlighting poor toileting habits, increased urgency, stress incontinence, and reduced fluid intake among both athletic and non-athletic female students.¹⁴ Related studies further support the link between these issues and lifestyle factors.^{15,16} Notably, educational interventions have proven effective, similar to the prevention scores for UTIs in one study improved significantly from 2.85±0.51

to 3.74 ± 0.29 out of 4 following awareness training ($p=0.001$).¹⁷

One of the primary limitations of this study is the relatively small sample size, which may limit the generalizability of the findings. A larger and more diverse sample would provide more robust and representative results. Additionally, comparisons based on geographic location (urban versus rural settings) or between different types of sports (e.g., endurance versus strength-based disciplines) could have offered deeper insights into variations in health outcomes among female athletes. Furthermore, the number of intervention sessions conducted was limited; incorporating more sessions over an extended period could have potentially enhanced the effectiveness and sustainability of the educational program.

CONCLUSION

Urinary incontinence is a common yet often overlooked problem among female athletes. This study highlights the high occurrence of both urinary incontinence (UI) and urinary tract infections (UTIs) in this group, which negatively affect athletic performance, mental well-being, and daily activities. Contributing factors include intense training, extended practice hours, and inadequate hydration. Despite the prevalence, many athletes are unaware of these issues or hesitant to seek help, leading to poor management. Early recognition, understanding the causes, and timely interventions supported by greater awareness among athletes, coaches, and healthcare professionals can enhance performance, improve quality of life, and help athletes thrive without being held back by UI.

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