Research Article

Urinary Incontinence: Prevalence and Severity in Female University Athletes Across Different Sports

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Abstract

Background: Urinary incontinence (UI) is increasingly recognized among young female athletes, including nulliparous athletes, and may be particularly relevant in sports involving repetitive impact and rapid increases in intra-abdominal pressure. Despite this, urinary leakage may remain underreported in athletic populations.

Objective: To determine the prevalence and severity of urinary incontinence among national-level female university athletes and to describe its distribution across different sports.

Methods: A quantitative cross-sectional observational study was conducted among female university athletes aged 18–25 years at Chandigarh University. Participants were recruited by purposive sampling. A total of 173 athletes participated initially; six participants reporting urinary tract infection were excluded, leaving 167 athletes for final analysis. Urinary symptoms were assessed using the International Consultation on Incontinence Questionnaire–Urinary Incontinence Short Form (ICIQ-UI SF), and symptom type was classified using the Questionnaire for Urinary Incontinence Diagnosis (QUID). Descriptive statistics were used to summarize participant characteristics and urinary symptoms. The Kruskal–Wallis H test was used to compare ICIQ-UI SF total scores across sports, and Pearson's chi-square test was used to assess the association between urgency and leakage frequency. Statistical significance was set at $p<0.05$.

Results: Urinary incontinence was identified in 69 of 167 athletes, a prevalence of 41.3% (95% CI 34.1%–48.9%, Wilson interval). Among athletes with UI, 58 (84.1%) had slight severity (ICIQ-UI SF total score 1–5), 11 (15.9%) had moderate severity (6–12), and none had severe or very severe scores. On the QUID, 5 of the 69 (7.2%) met the stress-type cut-off and none met the urge or mixed criteria. Rugby had the highest descriptive prevalence (66.7%), followed by badminton (52.6%). The Kruskal–Wallis test showed no statistically significant difference in ICIQ-UI SF total scores across the eight sports represented among UI-positive athletes ($H=11.668$, $df=7$, $p=0.112$). Urgency was not significantly associated with leakage frequency ($\chi^2=11.621$, $df=6$, $p=0.071$).

Conclusion: UI was common among young, nulliparous female university athletes, although symptom severity was mostly slight. Sport-specific descriptive differences were observed, but severity did not differ significantly across sports. Routine, confidential screening and pelvic-floor health education should be considered within sports physiotherapy practice.

Keywords: urinary incontinence; female athletes; university athletes; ICIQ-UI SF; pelvic floor; sports physiotherapy; prevalence; severity.

Introduction

Urinary incontinence (UI), defined as involuntary leakage of urine, is an important pelvic-floor health concern in women. Although traditionally associated with ageing, pregnancy, childbirth and other pelvic-floor risk factors, UI is also reported among young and physically active women [3]. Female athletes may be exposed to repeated increases in intra-abdominal pressure, impact loading, jumping, sprinting, landing and strenuous exercise, which may challenge the continence mechanism [13].

Evidence from athletic populations suggests that urinary leakage is not uncommon. Previous studies have reported prevalence estimates ranging from approximately 14% to more than 50%, depending on the sport, population, definition of UI and assessment instrument [3–12,14,15]. Jácome et al. [7] reported UI in 41.5% of female athletes participating in athletics, basketball and indoor football, while Velázquez-Saornil et al. [9] reported a prevalence of 44.4% among female athletes. Reports now span track and field [8], volleyball [11], weightlifting [10], endurance sport [14] and nulliparous Indian sportswomen [15], and studies of high-impact sports have identified stress urinary incontinence as an important symptom pattern [5,6,12].

The issue is clinically relevant because athletes may not voluntarily disclose urinary leakage because of embarrassment, limited awareness or the belief that leakage is a normal consequence of sport [4]. Early identification may therefore provide an opportunity for education, pelvic-floor assessment and appropriate

physiotherapy referral.
The present study focused on young, nulliparous, national-level female university athletes. The primary objectives were to determine the prevalence of UI, describe symptom severity using the ICIQ-UI SF, and compare severity across sports.

Methods

Study design and setting. This was a quantitative cross-sectional observational study conducted among female university athletes at Chandigarh University, Gharuan, Mohali, Punjab, India.
Participants and sampling. Participants were recruited using purposive sampling. The study included female athletes aged 18–25 years who were competing at national level and had at least three years of professional sports participation. Participants were nulliparous and willing to provide informed consent. Athletes with a history of gynecological or urological surgery or a diagnosed urinary tract infection (UTI) in the preceding four weeks were excluded. The study initially included 173 athletes; six participants reporting a UTI were excluded from the final analysis, resulting in an analytical sample of 167 athletes.
Sample-size estimation. An a priori G*Power 3.1 calculation based on a chi-square goodness-of-fit/contingency-table approach (effect size 0.30, alpha 0.05, power 0.80, 7 degrees of freedom) gave an estimated requirement of approximately 160 participants. Recruitment was increased to approximately 170 to account for unusable questionnaires.
Outcome measures. The ICIQ-UI SF [1] was used to assess urinary leakage frequency, amount, interference with daily life and overall symptom severity. The total score is the sum of the frequency (0–5), amount (0, 2, 4 or 6) and interference (0–10) items, giving a range of 0 to 21, with higher scores indicating greater symptom burden. A total score greater than zero was treated as UI, and severity was categorized as slight (1–5), moderate (6–12), severe (13–18) and very severe (19–21). The QUID [2] comprises six items scored 0 (none of the time) to 5 (all of the time); items 1–3 form the stress subscale and items 4–6 the urge subscale. Using the published cut-offs, symptoms were classified as stress-type (stress subscale ≥4 only), urge-type (urge subscale ≥6 only), mixed (both cut-offs met) or below threshold.
Data collection. Data were collected through a structured online questionnaire comprising demographic information, the ICIQ-UI SF and the QUID. Participants completed the form independently after receiving study information and providing informed consent. Responses were exported to Microsoft Excel, screened for completeness and subsequently analyzed using IBM SPSS Statistics.
Statistical analysis. Frequencies and percentages were calculated for categorical variables, and means and standard deviations or medians for continuous variables where appropriate. The 95% confidence interval for prevalence was calculated using the Wilson method. Because ICIQ-UI SF total scores were non-normally distributed and sport groups were unequal, the Kruskal–Wallis H test was used to compare scores across sports among UI-positive athletes. Pearson's chi-square test was used to examine the association between urgency (the QUID item on rushing to the bathroom because of a sudden, strong need to urinate) and leakage frequency; because of small expected counts, a Monte Carlo permutation test was also performed. A sensitivity analysis excluded records with internally inconsistent ICIQ-UI SF responses (leakage frequency "never" with non-zero amount or interference). A two-sided p value <0.05 was considered statistically significant. The study was observational and therefore no causal inferences were made.
Ethics. Institutional ethics approval was obtained before participant recruitment and data collection (approval number: [INSERT COMMITTEE NAME AND APPROVAL NUMBER]). Participants provided informed consent, participation was voluntary, and responses were coded and kept confidential. No invasive procedure or intervention was performed.

Results

Participant characteristics. The final analytical sample consisted of 167 female national-level athletes aged 18–25 years. All participants were nulliparous and had no history of gynecological or urological surgery. Sporting experience was 3–5 years in 76 participants (45.5%) and more than five years in 91 (54.5%). Body mass index is not reported because one height/weight entry was implausible.

Overall prevalence. UI was present in 69 of 167 athletes, giving an overall prevalence of 41.3% (95% CI 34.1%–48.9%, Wilson interval). The remaining 98 athletes (58.7%) had an ICIQ-UI SF score of zero. Sport-wise distribution and prevalence are shown in Table 1.

Table 1. Sport-wise distribution and prevalence of urinary incontinence

Sport	Total n	UI n	UI prevalence (%)
Badminton	19	10	52.6
Basketball	36	15	41.7
Kabaddi	20	7	35.0
Karate	17	7	41.2
Rugby	9	6	66.7
Table tennis	1	0	0.0
Volleyball	41	16	39.0
Wrestling	11	4	36.4
Wushu	13	4	30.8
Total	167	69	41.3

UI = urinary incontinence (ICIQ-UI SF total score >0).

Frequency of leakage. During the four-week recall period, 103 athletes (61.7%) reported no leakage, 63 (37.7%) reported leakage once a week or less often, and 1 (0.6%) reported leakage once a day. Five participant records had the response “never” accompanied by non-zero ICIQ amount and/or interference responses; these raw responses were retained as recorded.

Severity. Among the 69 athletes with UI, 58 (84.1%) had slight symptoms (ICIQ-UI SF total score 1–5) and 11 (15.9%) had moderate symptoms (6–12) (Table 2). No participant had severe (13–18) or very severe (19–21) scores; the highest observed total score was 11.

Table 2. Severity of urinary incontinence among UI-positive athletes (n=69)

Severity category	ICIQ-UI SF total score	n	% of UI-positive athletes
Slight	1–5	58	84.1
Moderate	6–12	11	15.9
Severe	13–18	0	0.0
Very severe	19–21	0	0.0

Sport-wise severity. Among UI-positive athletes, mean ICIQ-UI SF total scores ranged from 4.20 in basketball to

6.75 in wushu (Table 3). The Kruskal–Wallis test did not show a statistically significant difference in total scores across the eight sports represented among UI-positive athletes (H=11.668, df=7, p=0.112); table tennis had no UI-positive athletes. Sport-wise descriptive prevalence was highest in rugby (66.7%) and badminton (52.6%).

Table 3. ICIQ-UI SF total score by sport among UI-positive athletes

Sport	UI-positive n	Mean score	Median score	Moderate severity, n
Badminton	10	5.40	5.0	4
Basketball	15	4.20	4.0	0
Kabaddi	7	6.00	5.0	3
Karate	7	4.43	4.0	0
Rugby	6	4.50	4.0	1
Volleyball	16	4.38	4.5	1
Wrestling	4	4.50	4.5	0
Wushu	4	6.75	7.0	2

Symptom type (QUID). Among the 69 UI-positive athletes, mean QUID subscale scores were 2.23 (SD 0.83) for stress items and 0.71 (SD 1.18) for urge items. Five athletes (7.2%) met the stress-type cut-off (kabaddi n=3, volleyball n=1, wushu n=1); none met the urge-type or mixed criteria, and 64 (92.8%) scored below both cut-offs. One athlete had a missing response on one urge item.

Urgency and leakage frequency. The association between urgency and frequency of urinary leakage was not statistically significant (χ^2=11.621, df=6, p=0.071). Because 8 of 12 expected cell counts were below 5, this result should be interpreted cautiously; a Monte Carlo permutation test on the same table gave a similar conclusion (p≈0.12). It should not be treated as definitive evidence of no association.

Sensitivity analysis. After excluding the five records with internally inconsistent ICIQ-UI SF responses (n=162), prevalence was 39.5% (64/162) and 10 of 64 UI-positive athletes had moderate scores. The sport comparison remained non-significant but was closer to the threshold (H=13.624, df=7, p=0.058).

Discussion

The present study found that 41.3% of young, nulliparous female university athletes had urinary incontinence based on an ICIQ-UI SF score greater than zero. This finding indicates that UI is a relevant pelvic-floor health concern even in a relatively young athletic population without pregnancy or childbirth exposure. The prevalence is broadly comparable with previous studies of female athletes, including the 41.5% reported by Jácome et al. [7] and the 44.4% reported by Velázquez-Saornil et al. [9].

The predominance of slight symptoms is an important finding. Of the 69 athletes classified as UI-positive, 58 (84.1%) had ICIQ-UI SF total scores between 1 and 5, 11 (15.9%) had moderate scores (6–12), and none had severe or very severe scores. Thus, the questionnaire-defined symptom burden was generally low in this sample, but the presence of symptoms in more than two out of five athletes, and of moderate symptoms in about one in six of those affected, should not be interpreted as clinically irrelevant. Consistent with the low leakage frequency, most UI-positive athletes scored below the QUID stress and urge cut-offs, and where a cut-off was met it was for stress-type symptoms, in line with reports linking high-impact sport to stress urinary incontinence [5,6,12].

The descriptive sport-wise prevalence was highest in rugby (66.7%) and badminton (52.6%), followed by basketball (41.7%), karate (41.2%), volleyball (39.0%), wrestling (36.4%), kabaddi (35.0%), wushu (30.8%) and table tennis (0%; n=1). Because the number of athletes in each sport varied substantially, including only one participant in table tennis, these percentages should be interpreted as descriptive rather than evidence that a particular sport causes UI. The inferential comparison of ICIQ-UI SF total scores also did not demonstrate a statistically significant

difference across the eight sports represented among UI-positive athletes (H=11.668, p=0.112).

The observed prevalence is consistent with the proposed multifactorial relationship between sport participation and pelvic-floor symptoms [13]. Repetitive impact, jumping, landing, sprinting, rapid changes of direction, lifting and increases in intra-abdominal pressure may challenge continence mechanisms. Nevertheless, the present cross-sectional design cannot establish these mechanisms as causal explanations for the observed symptoms.

Urgency was not significantly associated with leakage frequency in this sample (p=0.071). The result was close to, but above, the prespecified significance threshold and should be interpreted cautiously because 8 of 12 expected cell counts were below 5. A larger sample with more balanced sport groups would provide a stronger assessment of this relationship.

The study has practical implications for sports physiotherapy. Confidential screening for urinary symptoms may be incorporated into women's sports-health assessment, particularly because athletes may be reluctant to disclose leakage. Identification of symptoms can facilitate education, pelvic-floor muscle assessment, individualized pelvic-floor muscle training where indicated, load management and referral to appropriate medical or pelvic-floor specialists.

Strengths and limitations

Strengths included the focus on young, nulliparous female university athletes, inclusion of multiple sports and use of the established ICIQ-UI SF and QUID. Exclusion of participants reporting UTI reduced one potential source of urinary symptoms.

Several limitations should be considered. First, the cross-sectional design prevents conclusions about causality. Second, purposive sampling from a single university limits generalizability. Third, sport groups were unequal and some were very small (table tennis, n=1), limiting the precision of sport-specific estimates and excluding table tennis from the severity comparison. Fourth, urinary symptoms were self-reported rather than confirmed by clinical pelvic-floor assessment or urodynamic testing. Fifth, training volume, intensity and competition exposure were not sufficiently controlled. Sixth, five ICIQ-UI SF records were internally inconsistent; they were retained as recorded, and excluding them lowered prevalence to 39.5% without changing the main conclusions. Finally, one implausible height/weight entry meant that BMI-based analyses were not undertaken.

Conclusion

Urinary incontinence was present in 41.3% of the 167 female university athletes included in the final analysis. Most affected athletes (58 of 69; 84.1%) had slight ICIQ-UI SF severity, 11 (15.9%) had moderate severity, and none had severe or very severe scores. Rugby and badminton showed the highest descriptive prevalence, but severity did not differ significantly across sports (H=11.668, p=0.112). These findings support the importance of routine awareness and confidential screening for urinary symptoms within sports physiotherapy services. Larger multicentre studies with balanced sport representation, detailed training-exposure measures and objective pelvic-floor assessment are warranted.

Declarations

Ethics approval and consent to participate: Institutional ethics approval was obtained before data collection (committee name and approval number: [INSERT COMMITTEE NAME AND APPROVAL NUMBER]), and informed consent was obtained from all participants.

Consent for publication: Not applicable; no identifiable individual data are presented.

Competing interests: The authors declare that they have no competing interests.

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1. Data availability: The datasets analysed during the current study are available from the corresponding author on reasonable request.