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Proportion of UTI and Associated Risk Factors Among Young Female Medical Students in the Age Group 17-25 Years in an Educational Institution in South Kerala

Maria Thomas Tressa
Final Year Student, Dr. SMCSI Medical College, Karakonam, Trivandrum, Kerala, India

Prasanand S
Professor, Department of Pharmacology, Dr. SMCSI Medical College, Karakonam, Trivandrum, Kerala, India

Ajas SN
Assistant Professor, Department of Community Medicine, Mount Zion Medical College, Adoor, Pathanamthitta, Kerala, India, shihabajas@gmail.com

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Proportion of UTI and Associated Risk Factors Among Young Female Medical Students in the Age Group 17-25 Years in an Educational Institution in South Kerala

Maria Thomas Tressa [a], Prasanand S [b], Ajas SN [c,*]

[a] Final Year Student, Dr. SMCSI Medical College, Karakonam, Trivandrum, Kerala, India
[b] Professor, Department of Pharmacology, Dr. SMCSI Medical College, Karakonam, Trivandrum, Kerala, India
[c] Assistant Professor, Department of Community Medicine, Mount Zion Medical College, Adoor, Pathanamthitta, Kerala, India

Abstract

Background: Urinary tract infections (UTIs) are the second most common infection in women and frequently recur in young hostel-dwelling females. This study aims to estimate the Proportion of UTI and identify associated behavioural and hygiene-related risk factors among female medical students aged 17–25 years. Methods: An institution-based cross-sectional analytical study was conducted from August to October 2024 at Dr. Somervell Memorial C.S.I. Medical College, Karakonam. Sample size of 139 was calculated using Proportion of 40.8% with 8% precision. All eligible female students were included after written informed consent. A pre-tested, semi-structured questionnaire was used. Data were analysed using SPSS version 26; χ^2 test and Fisher's exact test were applied ($p < 0.05$ significant). Results: Lifetime Proportion of UTI was 41.7% (58/139) and one-year Proportion was 28.1% (39/139). Burning micturition (68.9%), lower abdominal pain (55.2%), and urgency (46.6%) were the most common symptoms. Significant risk factors were: changing undergarments less than once daily ($p = 0.024$), holding urine for prolonged periods ($p = 0.047$), occurrence predominantly in summer ($p < 0.001$), and adoption of preventive lifestyle changes after previous UTI ($p = 0.022$). Conclusion: More than two-fifths of female medical students experienced UTI. Modifiable risk factors related to voiding behaviour and genital hygiene were identified. Targeted interventions in medical colleges are recommended.

Keywords: Urinary tract infection, Medical students, Hostel, Genital hygiene, Urine holding behaviour, Kerala

1. Introduction

Urinary tract infection (UTI) is one of the most common bacterial infections encountered in clinical practice, particularly among females.[1] Globally, approximately 150 million people develop UTI each year, resulting in more than 6 billion USD in healthcare expenditure. Women are 30–50 times more prone than men due to a shorter urethra (3–4 cm vs 20 cm), proximity of the urethral meatus to the anus, and absence of prostatic antibacterial secretions.[2,3]

In India, community-based studies report lifetime Proportion of 20–40% among young women, with recurrence rates as high as 27–44% within one year. Medical and nursing students constitute a unique high-risk group because of prolonged academic hours, limited access to clean toilets during classes and clinical postings, high stress levels, and hostel living with shared sanitary facilities.[4,5] Kerala, despite high literacy and health indicators, has a hot and humid climate that promotes dehydration and bacterial growth, further aggravating risk.

Several studies worldwide have documented poor toileting behaviours among female healthcare trainees: voluntary urine retention ("teacher's bladder" or "nurse's bladder"), premature voiding, and inadequate perineal hygiene due to time constraints. These maladaptive behaviours have been directly linked to lower urinary tract symptoms and recurrent UTI.[6–10]

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* Corresponding author.
E-mail address: shihabajas@gmail.com (A. SN).

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Despite the burden, there are very few published studies from medical colleges in South India, and none specifically from Kerala focusing on female medical students. The present study was therefore undertaken to estimate the proportion of UTI in female medical students in the age group 17 – 25 years in an educational institution in South Kerala and to assess the risk factors associated with UTI among young female medical students.

2. Methodology

2.1. Study design

Institution-based analytical cross-sectional study.

2.2. Study setting

Dr. Somervell Memorial C.S.I. Medical College & Hospital, Karakonam, Thiruvananthapuram, Kerala – a tertiary-care teaching institution with attached girls' hostel.

2.3. Study period

August–October 2024.

2.4. Study population

Female MBBS students aged 17–25 years residing in or regularly attending the college.

2.5. Sample size calculation

Using the formula $n = Z\alpha^2\, p(1-p)/d^2$

Where $Z\alpha = 1.96$, $p = 40.8\%$ (Ozcan & Beji, 2022),[11] $d = 8\%$ (20% of p)

$n = (1.96)^2 \times 0.408 \times 0.592 \,/\, (0.0816)^2 \approx 139$

2.6. Sampling technique

Universal sampling – all eligible and consenting female students present during the data collection period were included. (response rate 98.6%)

2.7. Inclusion criteria

Female MBBS students aged 17–25 years willing to provide written informed consent.

2.8. Exclusion criteria

History of urinary catheterisation, known anatomical urinary tract abnormality, current pregnancy.

Pregnancy was excluded as it independently increases susceptibility to UTI due to physiological and immunological changes, which could confound behavioural risk assessment.[12]

2.9. Data collection tool

A pre-tested, semi-structured, self-administered questionnaire in English containing 48 items divided into four sections:

- A. Sociodemographic profile
- B. Lifestyle and toileting behaviour
- C. Genital hygiene practices
- D. Detailed UTI history and symptoms

The questionnaire was developed after extensive literature review, expert consultation (Department of Community Medicine & Urology), and pilot testing on 15 students (Cronbach's $\alpha = 0.82$).

2.9.1. Operational definition of UTI

Self-reported episode of physician-diagnosed UTI or presence of at least two typical symptoms (dysuria, frequency, urgency, suprapubic pain, fever) with or without antibiotic treatment in the past.[12]

2.10. Data collection procedure

After obtaining Institutional Ethics Committee approval (IEC No:SMCSIMCH/EC(PHARM)05/04/26) and permission from the principal, investigators approached students' batch-wise during free hours. Purpose was explained, participant information sheet provided, and written informed consent obtained. Anonymity and confidentiality were assured.

3. Data analysis

Data were entered in Microsoft Excel 2010 and analysed using IBM SPSS version 26.0. Categorical variables expressed as frequencies and percentages. Associations tested using Pearson χ^2 test or Fisher's exact test. p-value < 0.05 (two-tailed) considered statistically significant.

4. Ethical considerations

Approved by Institutional Ethics Committee (IEC No: SMCSIMCH/EC(PHARM)05/04/26). Written informed consent obtained; anonymity and confidentiality ensured

5. Results

5.1. Sociodemographic and behavioural profile of participants (n = 139)

Total participants: 139 (response rate 98.6%),Mean age: 21.4 ± 1.3 years

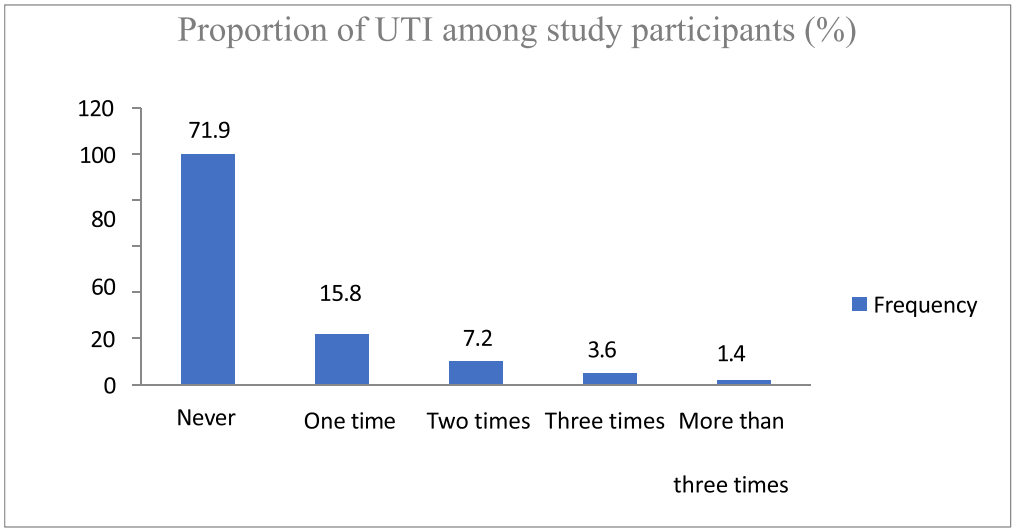

Fig. 1. Proportion of UTI (lifetime and last one year).

Table 1. Sociodemographic and behavioural profile of participants (n = 139).

Variable	Frequency (%)
Age 20–21 years	51 (36.7)
Age 22–23 years	73 (52.5)
Hostel stay = 2 years	100 (71.9)
Uses Western toilet predominantly	86 (61.9)
Daily water intake = 6 glasses	90 (64.7)
Holds urine for long periods (often)	56 (40.3)
Changes undergarments once daily or more	110 (79.1)
Dries undergarments in sunlight	100 (71.9)

Most participants were aged 22–23 years and had prolonged hostel stay. While personal hygiene practices such as daily undergarment change and sun-drying were common, a substantial proportion reported risk-prone behaviours including holding urine for long periods and suboptimal hydration, which may predispose to UTI (Table 1).

5.2. Proportion of UTI among study participants

Out of 139 participants, **58 (41.7%)** reported a lifetime history of UTI, and **39 (28.1%)** experienced UTI in the past 12 months, indicating a substantial burden of UTI among young adult female students (Fig. 1).

5.3. Clinical symptoms among students who ever had UTI (n = 58)

Burning micturition was the most frequently reported symptom n = 40 (68.9) followed by lower abdominal pain and urgency, reflecting a typical clinical presentation of uncomplicated UTI among affected students (Table 2).

Table 2. Distribution of UTI symptoms among study participants.

Symptom (Multiple responses)	n (%)
Burning micturition	40 (68.9)
Lower abdominal pain	32 (55.2)
Urgency	27 (46.6)
Increased frequency	22 (37.9)
Fever	24 (41.4)
Incomplete emptying sensation	23 (39.7)

UTI episodes were most frequently reported during summer (**54; 93.1%**), followed by the rainy season (**27; 46.6%**), with the lowest occurrence in winter (**8; 13.8%**), indicating a clear seasonal variation in UTI episodes (Fig. 2).

5.4. Risk factor analysis :Association of selected risk factors with history of UTI

Among participants with a history of UTI (n = 58), 29 (50.0%) changed undergarments less than once daily compared to 25 (30.9%) without UTI (p = 0.024), and 30 (51.7%) reported habitual urine holding versus 26 (32.1%) among those without UTI (p = 0.047). UTI episodes occurring predominantly in summer were reported by 54 (93.1%) participants with UTI compared to 35 (43.2%) without UTI (p < 0.001). Adoption of preventive lifestyle changes was significantly higher among those with prior UTI (48; 82.8%) than those without (51; 63.0%, p = 0.022) (Table 3).

6. Discussion

The lifetime Proportion of UTI was 41.7%, higher than general female college students in India (10.05–

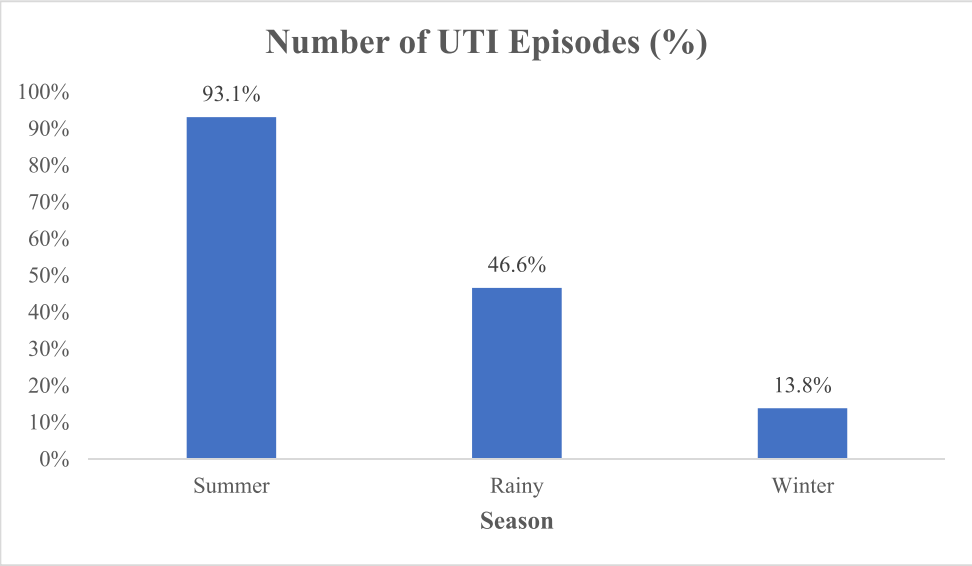

Fig. 2. Seasonal distribution of UTI episodes (among those who ever had UTI, n = 58).

Table 3. Association of selected risk factors with history of UTI.

Risk factor (Multiple responses)	Ever UTI (n = 58)	Never UTI (n = 81)	χ^2	p-value
Changes undergarments < once daily	29 (50.0%)	25 (30.9%)	5.08	0.024*
Holds urine for long periods	30 (51.7%)	26 (32.1%)	3.94	0.047*
UTI episodes predominantly in summer	54 (93.1%)	35 (43.2%)	21.17	<0.001**
Adopted preventive lifestyle changes post-UTI	48 (82.8%)	51 (63.0%)	5.27	0.022*
Uses common toilet without proper hygiene	20 (34.5%)	16 (19.8%)	3.09	0.079

*Statistically significant at $p < 0.05$.

**Highly significant at $p < 0.001$.

32%) but comparable to nursing/medical trainees (30–38.6%)[4,13] and lower than the 94% lower urinary tract symptoms reported among Turkish nurses due to restricted toilet access.[10]

Prolonged urine holding (40.3%) was significantly associated with UTI ($p = 0.047$), corroborating Jagtap et al. (India, $p < 0.001$),[10] Wan et al. (China),[14] Reynolds et al. (USA),[8], and Perlow et al. (female physicians/students).[6]

Summer predominance was striking (93.1% of episodes, $p < 0.001$), consistent with Simmering et al., who documented 20–30% higher UTI incidence at ~30°C versus cooler months, mediated by dehydration, reduced urine output, and enhanced bacterial growth.[15]

Infrequent undergarment change (<once daily) was significantly associated ($p = 0.024$), mirroring Jelly et al. ($p = 0.05$);[4] conversely, sun-drying of undergarments (71.9%) probably conferred protection through natural disinfection.

Adoption of preventive measures post-UTI was significantly higher among affected students (82.8% vs 63.0%, $p = 0.022$), highlighting the benefit of experiential learning in this health-literate group.

Variables such as hostel duration, toilet type, daily water intake, bladder-irritant fluids, smoking/alcohol, menstrual hygiene, and common toilet use ($p = 0.079$) showed no significant association, differing from some Indian studies that found significance for shared toilet hygiene.[16]

Comparison with published literature

Our findings align closely with:

Jelly et al. (2022) – North India nursing students: 30% Proportion, significant association with western toilet use,[4] Dash et al. (2019) – Odisha medical students: 38.6%,[13] Kol et al. (Turkey) – 94% LUTS among nurses due to inadequate toilet time[7] & Wan et al. (China 2017) – delayed voiding strongly linked to LUTS.[14]

6.1. Strenghts and limitations

6.1.1. Strengths

- First study from Kerala medical college focusing exclusively on female MBBS students
- Large sample with near-complete response
- Detailed behavioural and hygiene assessment

- High internal validity due to health-literate population

6.2. *Limitations*

- Self-reported diagnosis without microbiological confirmation – potential recall & diagnostic bias
- Single-centre study limits generalizability
- Cross-sectional design - cannot establish causality
- Wide confidence intervals for adjusted ORs due to modest sample size for multivariable analysis despite good internal coverage

7. Conclusion

More than 40% of female medical students in this South Kerala college have suffered from UTI, with strong associations with delayed voiding, poor genital hygiene, and summer season. These are entirely modifiable risk factors. Medical colleges must incorporate structured awareness sessions, ensure adequate clean toilet access during classes/clinical postings, and promote simple behavioural changes (timely voiding, daily undergarment change, sun-drying of intimate clothes, adequate hydration especially in summer).

Ethical approval

Approved by Institutional Ethics Committee of Dr SMCSI Medical College Karakonam, Trivandrum, Kerala (IEC No: SMC-SIMCH/EC(PHARM)05/04/26).

Funding statement

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Conflicts of interest

None of the authors have any relevant conflicts of interest to declare.

Author contributions

MTT contributed to the conception of the study, literature review, tool development, data collection, data entry, and drafting of the initial manuscript. **PS** provided overall supervision, methodological guidance, critical revision of the study design, and reviewed the manuscript for important intellectual content. **ASN** contributed to study conceptualization, statistical analysis and interpretation of data, manuscript writing and editing and revision, and also served as the corresponding author.All authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

Data availability

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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