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ORIGINAL ARTICLE

# Frequency of urinary tract infection in children with constipation.

**Muhammad Sohaib[1], Ameena Saba[2], Taqi Hasan Zaidi[3], Sohail Shehzad[4], Wajeeha Amber[5], Sohail Aslam[6]**

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**ABSTRACT... Objective:** To determine the frequency of urinary tract infection in children with constipation. **Study Design:** Cross Sectional Study. **Setting:** Department of Pediatrics PNS Hafeez Hospital Islamabad. **Period:** 1st November 2023 to 30th April 2024. **Methods:** A total of 141 male and female children with constipation were enrolled in the study. Urine analysis of all enrolled patients was performed on a centrifuged sample of urine. Urinary tract infection as per operational definition was noted. **Results:** Age range in this study was from 1 to 12 years with mean age of 5.354±2.39 years and mean duration of constipation was 5.709±1.46 months. Male patients were 44.7% and females were 55.3%. Urinary tract infection was observed in 31.9% patients. **Conclusion:** In conclusion, this study demonstrates an association between chronic constipation, especially functional constipation beginning in childhood and the risk of developing urinary tract infection.

**Key words:** Children, Constipation, Frequency, Urinary Tract Infection.

## INTRODUCTION

One of the commonest childhood bacterial infection is urinary Tract Infection (UTI).[1] Two different terminologies come under the umbrella of UTI. When only renal parenchyma is involved, the infection is called pyelonephritis. While infection of urinary bladder is termed as cystitis. Although differences do exist between the two clinical conditions, presentation overlaps sometimes in terms of signs and symptoms. Fever and lumber pain is more common in pyelonephritis, and irritative symptoms of the bladder like frequency, urgency dysuria etc. are more of the characteristics of cystitis.[2,3] From the practical point of view, the management is sometimes challenging because of ambiguity of symptoms, relapsing tendency, associated morbidity, difficulty is proper and reliable sample collection particularly in female children and emerging antimicrobial resistance.[4]

Frequency of UTIs vary with age among genders in pediatric age group. It is approximately 0.7% in girls and 2.7% in uncircumcised boys at less than six months of age.[5] During infantile period uncircumcised boys have a 10 to 12-fold increased risk of developing UTI.[6] Prematurity also poses significant risk of developing UTIs. After one year of age, girls are much more prone to develop UTI due to short urethra and anatomy of female genitalia.[7] UTIs contribute to significant morbidity affecting daily life of patients and care-givers and create adverse psychosocial impacts causing enuresis, vesico-ureteric reflux and then recurrent UTIs through a positive feedback. Upper urinary tract infections may cause renal scarring which when multiple can lead to chronic renal failure and thus can cause mortality.

Constipation is another common pediatric problem bothering parents and children. Overall its worldwide prevalence is about 29.6%.[8] Although a few children with constipation do have underlying anatomical or physiological etiology, most children do not have any specific reason so their constipation is labeled as functional constipation and their problem persist beyond pediatric age group. If not treated, this poses many behavioral problems. Fecal incontinence is also associated with functional constipation affecting almost 84% of the cases which adds to parent`s agony and

1. MBBS, FCPS Trainee Pediatrics, PNS Hafeez Hospital, Islamabad.
2. MBBS, MCPS, FCPS (Pediatrics), Associate Professor, HBS General Hospital/HBS Medical and Dental College, Islamabad.
3. MBBS, FCPS (Pediatrics), Associate Professor Pediatrics, PNS Hafeez, Islamabad.
4. MBBS, FCPS (Pediatrics), Associate Professor Pediatrics, PNS Hafeez, Islamabad.
5. MBBS, FCPS (Pediatrics), Assistant Professor Pediatrics, IMDC/ANTH.
6. MBBS, FCPS (Pediatrics), Associate Professor, IMDC/ANTH.

**Correspondence Address:**
Dr. Ameena Saba
HBS General Hospital/
HBS Medical and Dental College, Islamabad.
sadiaahmed383@gmail.com

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leaves adverse psychological consequences on affected children.[9] Pathophysiological basis of functional constipation are poorly understood. Some suggested mechanisms are pain, fever, dehydration, improper dietary and fluid intake, psychological issues, delayed and wrongly done toilet training, medicines, and family history of constipation.[10]

Studies have shown significant association of the two highlighted medical problems. Children having constipation are likely to develop urinary tract problems including infection, urinary incontinence, vesicoureteral reflux, and urinary tract obstruction. Pathophysiological basis of this association is still not well understood. Many researches have evaluated this association with positive results. Gondim R, et al. the frequency of urinary tract infection as high as 76.5% in children with constipation.[11] Considering the significant morbidities related to the two conditions and the magnitude of the problem we planned to determine the frequency of urinary tract infection in children with constipation. By understanding this connection locally, we can better estimate the scope of the problem, educate healthcare providers on preventive care and screening for these children, and motivate parents to manage constipation proactively. Our community would benefit greatly from targeted efforts to address this major child health issue.

## OBJECTIVE

To determine the frequency of urinary tract infection in children with constipation presenting to CMH Abbottabad.

## METHODS

This cross sectional study was carried out in pediatric outpatient department and pediatric ward of PNS Hafeez Hospital Islamabad from 1st November 2023 to 30th April 2024. Calculated sample size using WHO sample size software with 95% confidence interval, 7% margin of error and expected frequency of urinary tract infection by 76.5% in children with constipation[11] turned out to be 141. Study was started after taking study approval from institutional ethical review committee (491/12/20-10-23). Total 141 children (both males and females) of age 1-12 years having constipation defined as stool frequency of less than three per week on history for more than three months were enrolled after taking informed consent from parents using non-probability consecutive sampling method. Those having history of dysfunctional voiding, and those having staccato urinary flow curve pattern were excluded from study. Basic demographics like age, gender, duration of complaints and family socioeconomic status was noted on a predesigned Performa.

Urine analysis of all recruited cases was performed taking centrifuged urine sample. Suprapubic aspiration was done in children aged <3 years to collect the sample while midstream sample of urine was collected after thoroughly cleaning the genitalia in older children.

Urinary tract infection defined as presence of bacterial growth (any one or more of Pseudomonas, E.coli and Klebsiella)) of $>10^5$ colony-forming units/ml was noted and recorded. Data analysis was done using statistical analysis program (IBM-SPSS-version-25). Frequencies and percentages were calculated for qualitative variables like gender, family socioeconomic status and urinary tract infection. Mean ±SD was computed for quantitative variables like age and duration of complaints. Urinary tract infection was stratified to age, gender, duration of complaints and family socioeconomic status. Post stratification chi square test was applied. Significance level was set at $p \leq 0.05$.

## RESULTS

Presenting children had age range from 1 to 12 years with mean age of 5.354±2.39 years and mean duration of constipation was 5.709±1.46 months. Male patients were 63 (44.7%) and females were 78 (55.3%).

Most of the patients 81(57.4%) belonged to middle class family. While 42(29.8%) were poor and 18(12.8%) were from rich families. Urinary tract infection was observed in 45 (31.9%) patients. While specifically asking about symptoms related to UTIs, most (81%) had no history of fever while rest had history of fever although it was

undocumented. Dysuria was found in 50(35.4%) and urinary frequency was observed in 53(37.5%) Patients. (Table I)Stratification of urinary tract infection with respect to age, gender, duration of complaints and family socioeconomic status is shown in Tables-II showing that frequency of UTI in the study population was significantly higher among females as compared to males (p-value <0.01). Additionally UTIs frequency was significantly more in children who had chronic constipation of >6 months as compared to shorter duration of constipation (<6 months) (p-value 0.02).

| Parameter | Distribution | UTI | | P-Value |
|---|---|---|---|---|
| | | Yes | No | |
| Age | 1-6 | 34 (30.9%) | 76 (69.1%) | 0.629 |
| | 7-12 | 11 (35.5%) | 20 (64.5%) | |
| | Total | 45 (31.9%) | 96 (68.1%) | |
| gender | Male | 6 (9.5%) | 57 (90.5%) | 0.000 |
| | Female | 39 (50%) | 39 (50%) | |
| | Total | 45 (31.9%) | 96 (68.1%) | |
| Duration of constipation | 3-6 months | 29 (26.9%) | 79 (73.1%) | 0.020 |
| | >6 months | 16 (48.5%) | 17 (71.5%) | |
| | Total | 45 (31.9%) | 96 (68.1%) | |
| Family socioeconomic status | Poor | 9 (21.4%) | 33 (78.6%) | 0.210 |
| | Middle | 30 (37%) | 51 (63%) | |
| | Rich | 6 (33.3%) | 12 (66.7%) | |
| | Total | 45 (31.9%) | 96 (68.1%) | |

**Table-I. Presence of different UTI related symptoms in study population**

| Symptoms | Frequency | Percentage |
|---|---|---|
| Fever | 27 | 19.1% |
| Urinary Frequency | 53 | 37.5% |
| Dysuria | 50 | 35.4% |
| Abdominal pain | 72 | 51% |
| Flank pain | 45 | 32% |

**Table-II. Stratification of UTI with respect to different parametres**

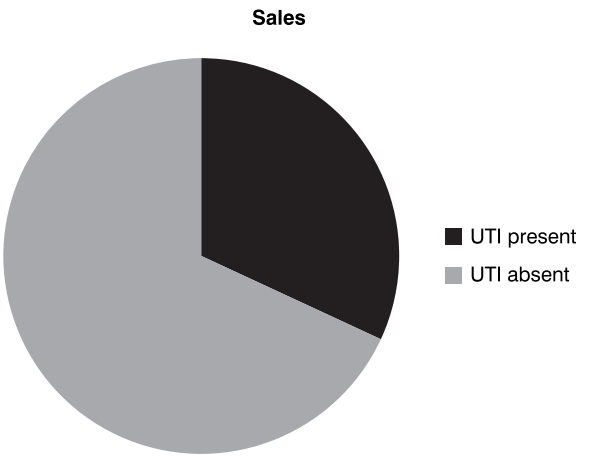


**Figure-1. Frequency of UTI in study population (N=141)**

## DISCUSSION

Chronic constipation, whether caused by functional issues or organic disorders, has become a major health concern today and is considered a significant risk factor for developing urinary tract infections (UTIs).[12] Functional constipation is more prevalent among pediatric patients, and if left untreated in children, it can lead to numerous adverse health consequences later in life. In the past, only a limited number of studies examined these long-term consequences of chronic constipation starting in childhood.

Multiple research studies have found that functional constipation significantly increases the risk of UTIs in children compared to their non-constipated peers. One study found the risk increases by 6.8 times compared to children without constipation issues.[12] In our current study, we aimed to further investigate the relationship between constipation and urinary problems, specifically UTIs, in order to add to the understanding of this connection. Our findings were consistent with some prior published studies though frequency figures found in different studies vary considerably. For instance, our study results are supported by research conducted by Hoque et al., which also found higher rates of UTIs among constipated children versus non-constipated children.[13] In another relevant study, Edan examined 165 constipated children and found a UTI prevalence rate of 34.5% in this population[14], which is in

agreement with our study's findings. Additionally, previous studies by Hakimzadeh and Sarvari et al. had results that were largely consistent with the findings from our current research.[15,16]

On the other hand, Sofie and his colleagues found this association in reverse manner finding a significant prevalence of constipation in children having pyelonephritis indicating this is an area requiring further research to understand the nuances of this relationship.[17] Pedram and his colleagues conducted a research to find the impact of duration of constipation with frequency of urinary tract infections. They found a positive association between the two diseases however the chronicity of constipation was not found to have a significant impact on increasing frequency of UTIs.[18] This was contradictory to the finding of our research in which UTIs were more prevalent in those who had constipation of >6 months. So different researchers have addressed this issue in different manners and all of them found constipation to be a significant risk factor for UTIs. Some possible explanations that have been proposed for why constipation may increase susceptibility to UTIs. It has been seen that during functional constipation, children voluntarily contract the sphincter muscles, affecting both urinary and anal sphincter control. This can lead to increased residual urine remaining in the bladder after voiding, which provides an environment prone to microbial overgrowth and infection and this phenomena has been proved in different studies.[19]

Additionally, chronic constipation may result in encopresis (involuntary fecal incontinence), which can contaminate the perineum area and allow for ascending spread of bacteria from the anus to the urethra, resulting in urinary infection.[20] Altered gastrointestinal flora from chronic constipation could also play a role by increasing the severity and frequency of UTIs.[20]

An interesting finding from our research was that UTI prevalence was significantly higher among females (50%) compared to males (9.5%). This may be partially attributed to the higher percentage of females included in our study sample. However, physiological and anatomical differences between genders may also play a role. Our finding contrasts with the Reck-Burneo study which found no association between gender and UTI risk[21] while consistent with some others.[16,17] Further research into the influence of gender could shed more light on this discrepancy. In our study constipation and UTIs were more common in age group 1-6 years and same findings were observed in some other studies.[16,18]

Looking at patient symptoms, most subjects in our study were afebrile (81%), but over half had abdominal pain (51%), with flank pain specifically reported in 32% of patients. In terms of urinary symptoms, only 35% had dysuria (painful urination), while approximately 37% had increased frequency of urination. This symptom profile is fairly consistent with other published studies examining pediatric patients with UTIs and a history of chronic constipation.[21,22]

In summary, chronic constipation, particularly functional constipation starting in childhood, appears closely tied to higher susceptibility for developing UTIs and other urinary problems later in life. While more research is still needed to fully understand this connection, several mechanisms have been proposed for how constipation could lead to increased UTI risk. Our study aimed to add to the growing body of evidence linking these two conditions. We found a considerably higher UTI prevalence in constipated females versus males, a potential gender difference that warrants further investigation. Moving forward, research should continue to probe the pathophysiological links between constipation and UTIs in order to improve prevention and treatment approaches.

## CONCLUSION

In conclusion, this study demonstrates an association between chronic constipation, especially functional constipation beginning in childhood, and an increased risk for developing urinary tract infections and other urinary problems later in life. Proposed mechanisms for this relationship include increased residual urine and urinary stasis resulting from voluntary contraction of urinary and anal sphincters during

constipation, contamination from encopresis, and changes in gastrointestinal flora. Our research found a considerably higher UTI prevalence in constipated females versus males, contrasting with some prior studies. Further investigation into the pathophysiological links between constipation and UTIs through additional studies is warranted to improve prevention and treatment approaches. Overall, the evidence suggests chronic functional constipation starting in childhood can have profound impacts on the urinary tract and infection risk. Addressing constipation and related factors may be an important target for reducing susceptibility to UTIs among pediatric patients.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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| AUTHORSHIP AND CONTRIBUTION DECLARATION | |
|---|---|
| 1 | **Muhammad Sohaib:** Study concept, data collection. |
| 2 | **Ameena Saba:** Manuscript writing, methodology. |
| 3 | **Taqi Hasan Zaidi:** Methodology, results, interpretation. |
| 4 | **Sohail Shehzad:** Final approval. |
| 5 | **Wajeeha Amber:** Data analysis. |
| 6 | **Sohail Aslam:** Proof reading before submission. |