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A Retrospective Comparative Study of Asymptomatic and Symptomatic Bacteriuria in Children

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Abstract

Background: Bacteriuria in children may occur either as asymptomatic bacteriuria (ASB) or as symptomatic urinary tract infection (SUTI). Differentiating these entities is essential to prevent unnecessary antimicrobial therapy and to reduce the risk of long-term renal sequelae.

Objectives: To compare the demographic profile, clinical features, microbiological spectrum, and antimicrobial susceptibility patterns in children with asymptomatic and symptomatic bacteriuria.

Materials and Methods: This retrospective observational study included 50 children, comprising 25 cases of asymptomatic bacteriuria and 25 cases of symptomatic bacteriuria, evaluated in a tertiary care hospital. Clinical records and laboratory data including urine microscopy, culture, and antimicrobial susceptibility reports were analyzed.

Results: Female predominance was observed in both groups. Escherichia coli was the most common isolate in asymptomatic as well as symptomatic bacteriuria. Symptomatic cases demonstrated higher colony counts,

significant pyuria, and increased antimicrobial resistance compared to asymptomatic cases.

Conclusion: Asymptomatic and symptomatic bacteriuria in children differ significantly in clinical presentation and laboratory parameters. Culture-based diagnosis and rational antibiotic use are essential to prevent overtreatment and antimicrobial resistance.

Keywords: Asymptomatic bacteriuria, Symptomatic bacteriuria, Children, Urinary tract infection, Urine culture

Introduction-

Urinary tract infection (UTI) is one of the most common bacterial infections in the paediatric population and constitutes a major cause of morbidity in infancy and childhood [1]. Bacteriuria in children may be categorized as asymptomatic bacteriuria (ASB) or symptomatic bacteriuria based on the presence or absence of clinical features.

Asymptomatic bacteriuria is defined as the presence of significant bacterial growth in urine without signs or symptoms of urinary tract infection [2]. In contrast, symptomatic bacteriuria is associated with fever, dysuria, abdominal pain, frequency, urgency, and systemic manifestations [3]. While symptomatic infections warrant prompt treatment, the management of asymptomatic bacteriuria remains controversial, as unnecessary antimicrobial therapy may promote resistance without improving outcomes [4].

Early differentiation between these two entities is crucial to prevent renal scarring, recurrent infections, and long-term complications such as hypertension and chronic kidney disease [5]. This study aims to compare asymptomatic and symptomatic bacteriuria in children with respect to clinical and microbiological characteristics.

Objectives

1. To study the demographic distribution of asymptomatic and symptomatic bacteriuria in children.
2. To analyze urine microscopy and culture findings in both groups.
3. To identify the common bacterial isolates causing bacteriuria.
4. To compare antimicrobial susceptibility patterns of isolated organisms.

Materials and Methods

Study Design-Retrospective observational study.

Study Setting-Department of Paediatrics and Department of Microbiology of a tertiary care teaching hospital.

Study Population

A total of 50 children, divided into:

- Group A: 25 children with asymptomatic bacteriuria
- Group B: 25 children with symptomatic bacteriuria

Inclusion Criteria

- Children aged ≤14 years
- Positive urine culture with significant bacteriuria ($\geq 10^5$ CFU/mL)
- Complete clinical and laboratory records available

Exclusion Criteria

- Children receiving antibiotics prior to urine sample collection
- Known congenital anomalies of the urinary tract
- Incomplete medical records

Laboratory Methods

Urine samples were collected using clean-catch midstream technique or catheterization in younger children. Samples were processed as per standard microbiological guidelines [6].

- Microscopy for pus cells and bacteria
- Culture on appropriate media

- Identification of organisms by standard biochemical tests
- Antimicrobial susceptibility testing using Kirby–Bauer disc diffusion method, interpreted as per CLSI guidelines

Results

Demographic Profile

Characteristic	Asymptomatic Bacteriuria (n=25)	Symptomatic Bacteriuria (n=25)	Total (n=50)
Male	8 (32%)	7 (28%)	15 (30%)
Female	17 (68%)	18 (72%)	35 (70%)
Age <1 yr	3 (12%)	4 (16%)	7 (14%)
Age 1–5 yr	10 (40%)	12 (48%)	22 (44%)
Age 6–10 yr	7 (28%)	6 (24%)	13 (26%)
Age 11–14 yr	5 (20%)	3 (12%)	8 (16%)

Female children constituted a higher proportion in both asymptomatic and symptomatic groups, consistent with known epidemiological patterns [7]. Most cases belonged to the 1–10 year age group.

Clinical Presentation

Symptom / Finding	Asymptomatic Bacteriuria (n=25)	Symptomatic Bacteriuria (n=25)
Fever	0 (0%)	18 (72%)
Dysuria / Painful micturition	0 (0%)	20 (80%)
Abdominal / Flank pain	0 (0%)	15 (60%)
Urinary frequency / urgency	0 (0%)	12 (48%)
Hematuria	0 (0%)	3 (12%)

- Children with asymptomatic bacteriuria had no urinary or systemic symptoms.
- Symptomatic bacteriuria cases commonly presented with fever, dysuria, abdominal pain, and increased frequency of micturition.

Urine Microscopy

Finding	Asymptomatic (n=25)	Symptomatic (n=25)
Pyuria (>5 WBCs/HPF)	2 (8%)	20 (80%)
Bacteriuria (visible)	5 (20%)	22 (88%)
Casts / Crystals	1 (4%)	3 (12%)

Significant pyuria was observed predominantly in symptomatic bacteriuria cases, whereas asymptomatic cases showed minimal or absent inflammatory response.

Bacterial Isolates

Organism	Asymptomatic (n=25)	Symptomatic (n=25)	Total (n=50)
Escherichia coli	15 (60%)	18 (72%)	33 (66%)

Klebsiella pneumoniae	5 (20%)	4 (16%)	9 (18%)
Proteus species	3 (12%)	2 (8%)	5 (10%)
Enterococcus species	2 (8%)	1 (4%)	3 (6%)

The organisms isolated included:

- Escherichia coli
- Klebsiella pneumoniae
- Proteus species
- Enterococcus species

E. coli was the most frequent isolate in both groups, with a higher prevalence in symptomatic bacteriuria.

Antimicrobial Susceptibility Pattern-

Antibiotic	Asymptomatic Bacteriuria	Symptomatic Bacteriuria
Ampicillin	40%	68%
Ciprofloxacin	20%	44%
Trimethoprim-Sulfamethoxazole	28%	60%
Amikacin	8%	20%
Nitrofurantoin	4%	12%

Isolates from symptomatic bacteriuria cases demonstrated higher resistance to commonly used oral antibiotics. Better sensitivity was noted to aminoglycosides and nitrofurantoin. Asymptomatic bacteriuria isolates showed comparatively lower resistance rates.

Discussion

The present study demonstrates clear clinical and microbiological differences between asymptomatic and symptomatic bacteriuria in children. Female predominance and *E. coli* as the principal pathogen observed in this study are consistent with earlier reports [8,9].

Symptomatic bacteriuria was associated with significant pyuria and higher antimicrobial resistance, emphasizing the need for culture-guided therapy [10]. In contrast, asymptomatic bacteriuria showed minimal inflammatory response and lower resistance rates, supporting current recommendations against routine antimicrobial treatment in such cases [2,4].

Unnecessary treatment of asymptomatic bacteriuria may increase the risk of antimicrobial resistance and alter normal urinary microbiota without clinical benefit [11].

Conclusion

Asymptomatic bacteriuria is a distinct clinical entity and should be differentiated from symptomatic bacteriuria in children. Routine treatment of asymptomatic cases is not recommended, whereas symptomatic bacteriuria requires timely, culture-based antimicrobial therapy. Rational diagnostic and therapeutic strategies are essential to reduce resistance and improve paediatric urinary health outcomes.

Limitations

- Retrospective study design
- Limited sample size
- Single-centre data

Recommendations

- Urine culture should be reserved for clinically indicated cases.

- Antibiotic therapy must be guided by culture and sensitivity reports.
- Larger multicentric prospective studies are needed to strengthen evidence.

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