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Asymptomatic Urinary Tract Infection in School Going Female Children Attending to a Teritiary Care Hospital

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Abstract: ***Introduction: Urinary tract infection (UTI) in school going children remains one of the commonest medical disorders in the developing world. Objectives: To know the prevalence of asymptomatic UTI in school going female and male children, and to find out the predisposing factors. Methods: Two samples of urine was collected on the first day of admission before administration of any antibiotics using midstream clean catch method. Urine samples were sent for urine pus cells, urine culture and sensitivity within one hour of collection. All the subjects underwent micturiting cystourethrogram, culture, ultrasonogram abdomen, blood pressure measurement, blood urea and serum creatinine estimation. Results: Asymptomatic UTI is higher in girls and it may follow previous urinary tract infection. All those who are having asymptomatic bacteriuria (14.29%) were found to be having abnormal ultrasonogram study and abnormal micturating cystourethrogram. Overall 28.57% had abnormal radiological findings. In the study 28.6% of asymptomatic bacteriuric patients had history of voiding dysfunction. Asymptomatic bacteriuria if left untreated may undergo spontaneous resolution and if treated may develop symptomatic urinary tract infection. Hypertension and elevated renal parameters were not associated with asymptomatic bacteriuria. Conclusion: It proves that asymptomatic urinary tract Infection is significantly higher in female children and it may follow a previous UTI. School going children should therefore be screened for asymptomatic bacteriuria to prevent progression to either recurrent UTI or other complications.***

Keywords: micturating cystourethrogram, ultrasonogram, blood urea, serum creatinine, asymptomatic bacteriuria

1. Introduction

- URINARY TRACT INFECTION in school going children remains one of the commonest medical disorders in the developing world, with the burden of disease Impacting both child and the parent.
- During the first year of life, the male female ratio is 2.8 - 5.4: 1. Beyond 1 - 2years, there is a female preponderance, with a male female ratio of 1: 10.
- UTIs are caused mainly by colonic bacteria. In girls, 75 - 90% of all infections are caused by E. coli, followed by klebsiella spp. and proteus spp. Some series report that in boys of more than 1year of age, proteus is as common as E. coli, others report a preponderance of gram positive organisms in boys. Staphylococcus saprophyticus and enterococcus are pathogens in both sexes. Adenovirus and other viral infections also can occur, especially as a cause of cystitis.
- UTI in children may be symptomatic or asymptomatic infection. Symptomatic infection can be confined to bladder (cystitis), or they may involve the upper collecting stem (ureteritis, pyelitis) or extend into the renal parenchyma (pyelonephritis)
- Age, gender, race, circumcision status, method of detection and presentation influence the prevalence.
- Approximately 20% of schoolgirls with bacteriuria have demonstrable VUR (10). Aggregate risk for symptomatic UTI upto 11years is atleast 3% for girls and 1.1% for boys (13).
- Cumulative incidence rate for symptomatic UTI is 6.6% for girls and 1.8% for boys (14)
- In older girls the risk for recurrence following symptomatic UTI is as high as 40 - 60% within 18 months (15) More than 80% of these recurrences are due to re - infection rather than relapse.
- Long term studies of schoolgirls with previously treated bacteriuria and renal scarring have shown that when they reach adulthood and become pregnant they have a greater that 7 fold risk of preeclampsia and greater than 3 fold increased risk of hypertension. (15).

2. Methodology

Children in the age group of 5 - 12 years without any symptoms suggestive of urinary tract infection within the inclusion criteria were taken up for study. The sample population was recruited from the inpatients wards admitted for complaints other than those of urinary tract infection. The recruitment was completed within 18months of starting.

1) **Study design**: prospective study
2**) Sample size**: 200 children in the age group of 5 - 12 yrs
3) **Duration of study**: 18 months.
4) **Method of collection of data**:

Two samples of urine was collected on the first day of admission before administration of any antibiotics using midstream clean catch method after cleaning the genitalia with soap and water with special advise for girls. Urine samples were sent for urine pus cells, urine culture and sensitivity within one hour of collection. The reports were collected within 3 days, and those who were having growth in culture were randomly given Tab Cotrimoxazole for 2 weeks. All the subjects underwent micturiting

cystourethrogram, culture, ultrasonogram abdomen, blood pressure measurement, blood urea and serum creatinine estimation.

5) **Inclusion criteria**: All children with age between 5 and 12 years admitted at teritiary care center, during the years 2022 and 2023, for complaints other than those of urinary tract infection were taken up for the study.

6) **Exclusion criteria**: Age < 5 years or > 12 years, symptomatic urinary tract infection.

Statistical analysis: Data was collected using pre tested proforma meeting the objectives of the study. The observations and results were tabulated accordingly and data was analysed using the SSPS version 16. All P values <0.05 were considered to be statistically significant.

3. Results

Age and sex distribution:

Sex		5 - 7 years	8 - 10 years	11 - 12 years
Male	Number	33	33	30
	Percentage	34.4%	34.4%	31.3%
Female	Number	46	32	26
	Percentage	44.2%	30.8%	25%

Prevalance of asymptomatic urinary tract infection:

Urine Culture	Number	Percentage
No Growth	193	96.5%
Growth Present	7	3.5%

In the above analysis, out of 200 subjects taken, growth was seen in 7 subjects (3.5%)

Age distribution of asymptomatic bacteriuria:

Urine culture	5 - 7 years	8 - 10 years	11 - 12 years
Number	3	3	1
Percentage	42.9%	42.9%	14.3%

Sex prevalence of asymptomatic urinary tract infection:

Sex	Number of culture positive	Percentage culture positive
Male	0	0%
female	7	6.7%

In the above analysis, the prevalence of asymptomatic bacteriuria in girls s 6.7%

Culture analysis:

	Number of culture	Percentage of culture
E - coli	7	100%

In the above analysis, all cultures were positive for E. coli.

Urine culture and USG abdomen:

	Normal USG	Abnormal USG
Number of culture positive	6	1
Percentage of culture positive	85.7%	14.29%

In the above analysis, all the culture positive cases were subjected to USG abdomenand only one case (14.29%) had an abnormal finding.

Urine culture and micturating cystourethrogram and radiological abnormalities:

	No chemotherapy group	Chemotherapy group
Normal micturating cystourethrogram	3	3
Abnormal micturating cystourethrogram	0	1
Normal radiological investigation	2	3
Abnormal radiological investigation	1	1

In the above analysis, out of the urine positive culture, only one (14.28%) had an abnormal micturating cystourethrogram, 28.57% had abnormal radiological findings.

Voiding dysfunction – urine culture:

Voiding dysfunction	Number of culture positive	Percentage of culture positive
Yes	2	28.6%
No	5	71.4%

In the above analysisi, among those who are having asymptomatic bacteriuria, only 2 (28.6%) had voiding dysfunction.

Urine culture – BP, Blood urea, S. Creatinine:

		positive urine culture
Blood pressure	<95th percentile	7
Blood pressure	>95th percentile	0
Blood urea	Normal	7
Blood urea	Abnormal	0
Serum creatinine	Normal	7
Serum creatinine	Abnormal	0

In the above analysis, there is no association of asymptomatic bacteriuria with hypertension and abnormal renal parameters.

4. Discussion

- The study group include 5 - 12 years aged school going children without any symptoms of urinary tract infection. Among 200 study group, the males and females comprising of 48% and 52% respectively. The age distribution is in such a way that the mean age is 8.4 years.
- Prevalence of asymptomatic urinary tract infection in the study group is 3.5% and it is higher than the incidence reported by Michael Linshaw et al.
- Among those having asymptomatic bacteriuria, 14.29% have abnormal USG findings but p value could not be calculated as the study group is very small.14.28% had abnormal micturiting cystourethrogram. So overall 28.57% had abnormal radiological findings. This finding is comparable to the New Castle Bacteriuria Research Group study and study by Michael Linshaw et al.
- Among those having positive urine culture, none was found to be having abnormal micturiting Cystourethrogram. In those having asymptomatic bacteriuria, 42.85% had past history of urinary tract infection. It may be due to incomplete treatment of previous Infection, relapse or recurrent infection.

- Voiding dysfunction a predisposing factor for urinary tract infection was found to be associated with 28.6% of asymptomatic bacteriuria but p value could not be calculated as the study group is very small.
- Hobermann and ward (1998): Treating asymptomatic bacteriuria increases risk for a symptomatic UTI.
- Verries John et al 1975: Asymptomatic bacteriuria can be intermittent or disappear spontaneously
- Gillenwater et al: Higher morbidity from recurrent infections and symptomatic pyelonephritis when ABU is treated.
- New castle covert bacteriuria research group: when kidneys were radiologically normal, covert bacteriuria did not lead to renal damage or impaired renal growth, even if remain untreated. Consequently it is recommended that school children should not be screened for covert bacteriuria until a non radiological method can be devised to detect those with renal scarring.
- The study has not found out any association of asymptomatic bacteriuria with hypertension and elevated renal parameters. This finding is comparable with New Castle Bacteriuria Research Group Study.

Diagnosis of urinary tract infection: UTI can be reliably diagnosed only by urine culture. Symptoms of dysuria, urgency, frequency and enuresis are nonspecific and may be the result of vulvitis, urethritis, dysfunctional voiding or nonspecific causes such as dehydration associated with febrile illness

Collection of urine: Most informative urine to examine is the first morning specimen as this often will be the most concentrated and acidified and possible increase in urine protein associated with an upright posture will be minimised (17)

- Urine should be examined within 30 - 60minutes of passage because rise in pH, lysis of red cells, dissolution of casts and logarithmic increase in bacterial counts can occur if the urine is unrefrigerated (18)
- Suprapubic bladder puncture and urethral catheterization are the most accurate methods of collecting urine for culture but should almost never be used for routine examination as this procedure can introduce blood (12)
- UTI is defined by 10 leukocytes/mm^3 on wine analysis combined with culture yielding >50000CFU/ml. If there are 10.000 colonies and the child is symptomatic, the child is considered to have UTI

Leukocyte esterase test:

- Demonstrates the presence of pyuria by histochemical methods that specifically detect esterases in neutrophils

Nitrite test: -

- Employs reagent paper impregnated with sulphanilic acid and alpha naphthylamine which form a red azo dye when in contact with nitrite. Positive colourimetric assay Implies the presence of bacteria in urine
- Leukocyte test and nitrite test on a dipstick has improved the accuracy to detect or exclude UTI (22)

Urine culture:

- In pre - toilet trained group, urine specimen after obtained by applying a collection bag. Contamination is directly related to the length of the bag is in place, if specimen has not been obtained within 30minutes of application, reliability begins to reduce (10)
- When information of voided urine or immediate treatment is necessary. bladder catheterization or suprapubic aspiration should be employed. A feeding tube (8 - 10Fr) inserted only few cm into the bladder is ideal for catheterization (10)
- In girls and boys who can void on command, midstream specimen are more reliable than bag collected specimens (10)
- Any number of bacteria obtained by suprapubic aspiration is significant. Two commonly used culture media are mac - conkey and sheep blood agar.
- Circumstances associated with lower of bacteria in the urine when the patient has true infection include acute urethral syndrome, infection with S Saprophyticus and candida species, prior administration of anti microbial therapy, rapid dieresis, extreme acidification of urine, obstruction of urinary tract and extraluminal infection (16)

Asymptomatic bacteriuria:

- Infants with asymptomatic bacteriuria represent a low risk group with a tendency spontaneously to become abacteriuric usually within a few months.
- Considerable variation in uro - radiographic findings has been reported in school aged children to have bacteriuria on screening. Many of these children had a prior history of symptomatic UTI and others undoubtedly have infections during Infancy that are overlooked or misdiagnosed.
- Although recurrent infections following treatment occur in upto 80% the risk for development of associated pyelonephritis in a girl older than 4yrs with untreated asymptomatic bacteriuria is small and seems to be associated with a change in bacteria strain as a result of antibiotic treatment.
- Those who presented initially with a radiographically normal urinary tract remained normal inspite of persistent asymptomatic bacteriuria (11), Only in those children who had previous renal scarring did scars or progression of scarring develops and all of them had VUR.
- Asymptomatic bacteriuria is associated with low virulence bacterial strains lacking the ability to adhere and cause symptoms. There is considerable evidence that these organisms are commensals with the host and may even protect against infection by more virulent strains.
- Organisms present in the urinary tract can be sessile (attached) and part of a complex biofilm that resists elimination or planktonic (free floating) and more easily Treated. While antibiotics often succeed in clearing organisms they do not remove the receptivity of uro - epithelial cells to future attachments by uro - pathogens that can cause subsequent clinical infection or asymptomatic bacteriuria (8).

5. Conclusion

- The present study showed asymptomatic urinary tract infection is higher in girls and it may follow previous urinary tract infection and is absent in males.
- The prevalence of asymptomatic urinary tract infection in this study group is 3.5%. Prevalence of asymptomatic bacteriuria in girls is 6.7%. In this study, all cultures were positive for E. coli.
- All those who are having asymptomatic bacteriuria (14.29%) were found to have abnormal ultrasonogram study and abnormal micturiting cystourethrogram. Overall 28.57% had abnormal radiological findings.
- In this study group, among those with past history of urinary tract infection, 60% had asymptomatic bacteriuria, 28.6% of asymptomatic bacteriuric patients had history of volding dysfunction.
- Hypertension and elevated renal parameters were not associated with asymptomatic bacteriuria.
- Asymptomatic bacteriuria if left untreated may undergo either spontaneous resolution and sometimes may develop symptomatic urinary tract infection or chronic UTI, pyelonephritis or chronic renal failure.
- The study revealed that there is asymptomatic bacteriuria in female children. So it is suggested that evaluation of the health of the children once in a year, particularly a simple test like urinary examination in school age children will go a long way in preventing many diseases particularly UTI in females.

6. Limitations of the Study

This study has limitations as this is not age or sex matched study. It has got very limited number of positive reports making the calculation of p value impossible. The study was not able to evaluate the natural course of the positive cases as it is a time limited study. But many of the results of this study is comparable to those of many reported studies on asymptomatic bacteriuria.

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