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# Urinary Tract Infection: The Prevalence of Microorganisms in Paediatric Age Group and Antibiotics Susceptibility

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**Abstract:** ***Background: Urinary tract infections are highly prevalent and cause significant morbidity and they are one of the most common causes for antibiotic use worldwide. Objective: The aim of the study was to determine the bacterial microorganisms causing UTI in the paediatric age group and their susceptibility to antibiotics. Materials and Methods: Data was collected from 137 patients with positive urine culture from January 2017 to December 2018. Both inpatients and outpatients ,aged 0-12 years from Al-Numan Teaching Hospital were included in the study, urine was collected by mid stream clean catch urine and by urine bag. Results: The prevalence of UTI was nearly equal in the first year of life to be followed by female predominance in the later age groups. ln the females the most common microorganism was Escherichia coli (70%) followed by Proteus (9.67%) then Klebsiella (6.45%). In males ,Escherichia coli was also the most common (44.4%) followed by Klebsiella (16.6%) then Staphylococcus Saprophytics (11.1%). Regarding susceptibility to antibiotics Imepenem was the most effective antibiotic Followed by Nitrofurantoin, Amikacin and Gentamycin. Conclusion: Like other studies UTI is nearly equal in both sexes in neonatal age group and infancy then to be more in girls in childhood, .E.Coli is the most common microorganism in both sexes .Regarding the antibiotics susceptibility Imepenem was the most effective one followed by Nitrofurantoin then Amikacin and Gentamycin.***

**Keywords:** Urinary tract infection, microorganism, antibiotics, *Escherichia Coli*

## 1. Introduction

Urinary tract infection is common in the paediatric age group, it occurs in 1% of males and 1-3% of females. The prevalence of UTI varies with age ,during the first year of life male:female ratio is 2.8-5.4 : 1 .Beyond 1-2 years of age ,there is a female preponderance with a male to female ratio of 1 : 10 . (1)

Urinary tract infections are caused primarily by colonic bacteria. In females 75-90% of all infections are caused by *Escherichia Coli* followed by *Klebsiella* and *Proteus.* Although *Escherichia Coli* is also the most common organism in males, some series report that in males older than one year of age *Proteus* is as common a Cause as is *Escherichia Coli,* others report a preponderance of gram positive organisms.(1)

UTI in childhood is important because

- Up to half of the patients have a structural abnormality of their urinary tract.
- Pyelonephritis may damage the growing kidney by forming a scar predisposing to hypertension and chronic renal failure if scarring is bilateral.(2)

Therefore proper diagnosis and prompt treatment will prevent the chances of developing further complications and will help to reduce the suffering of the patient, hospital stay and economic losses of health care system.(3)

Because the prevalence of microorganisms and their susceptibility to antibiotics is different in different communities, the knowledge of their prevalence and susceptibility in the local community is very important for the proper management of these infections.(4)

## 2. Method and Materials

This was a retrospective/ prospective study done at Al-Numan Teaching Hospital from January 2017 to December 2018 including both inpatients and outpatients aged 0-12 years. Urine sample was collected either by bag or midstream clean catch. Only positive urine cultures were included in the study. Cultures were considered positive if they had a growth of equal or more than 10,000 colony forming unit /ml of a single potential pathogen or for each of two potential pathogens.(5)

The media used for culture was blood agar and macConkey agar.

## 3. Results

The total number of patients included in the study was 137, 17 males (12.4%) and 120 females (87.59%) .Their age ranged from 0 – 12 years. The age and sex distribution are shown in table 1.

**Table1:** Age and sex distribution

| Age group | Males | Females | Total |
|---|---|---|---|
| 0-2 months | 3 (2.18%) | 3 (2.18%) | 6 (4.36%) |
| 2 months- 2 years | 7 (5.1%) | 9 (6.56%) | 16 (11.66%) |
| 2 - 6 years | 5 (3.64%) | 56 (40.87%) | 61 (44.5%) |
| 6 - 12 years | 2 (1.45%) | 52 (37.95%) | 54 (39.4%) |
| Total | 17 (12.99%) | 120 (87.5%) | 137 (100%) |

Table 2 shows the prevalence of microorganisms causing UTI , *Escherichia coli* was the most common microorganism (66.9%) followed by *Proteus* (8.45%) and *Klebsiella* (7.74%)

**Table 2:** Prevalence of microorganisms

| Microorganism | Total no. | % | Male | % | Female | % |
|---|---|---|---|---|---|---|
| *Escherichia coli* | 95 | 66.90% | 8 | 44.40% | 87 | 70% |
| *Proteus* | 12 | 8.45% | 0 | 0% | 12 | 9.67% |
| *Klebsiella* | 11 | 7.74% | 3 | 16.60% | 8 | 6.45% |
| *Staph saprophyticus* | 6 | 4.22% | 1 | 5.55% | 5 | 4% |
| *Pseudomonas* | 4 | 2.80% | 2 | 11.10% | 2 | 1.60% |
| *Enterobacter* | 4 | 2.80% | 1 | 5.55% | 3 | 2.40% |
| *Acinobacter* | 3 | 2.40% | 1 | 5.55% | 2 | 1.60% |
| *Morgonella* | 1 | 0.77% | 0 | 0% | 1 | 0.80% |
| Total | 142* | 100% | 18 | 100% | 124 | 100% |

*****5 patients had more than one microorganism causing the infection.

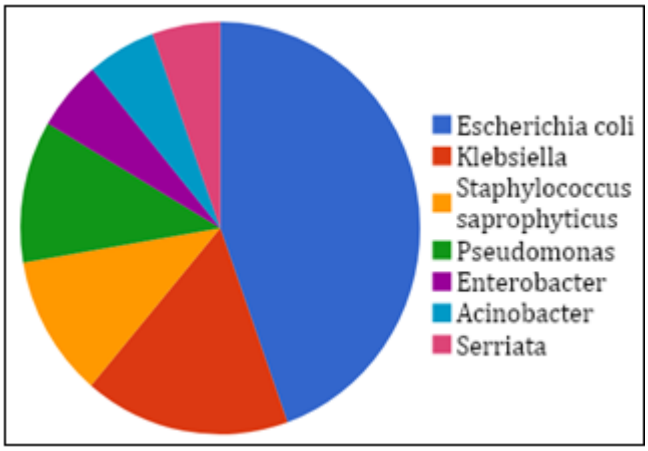


**Figure 1:** Prevalence of microorganisms in urinary tract infection in males

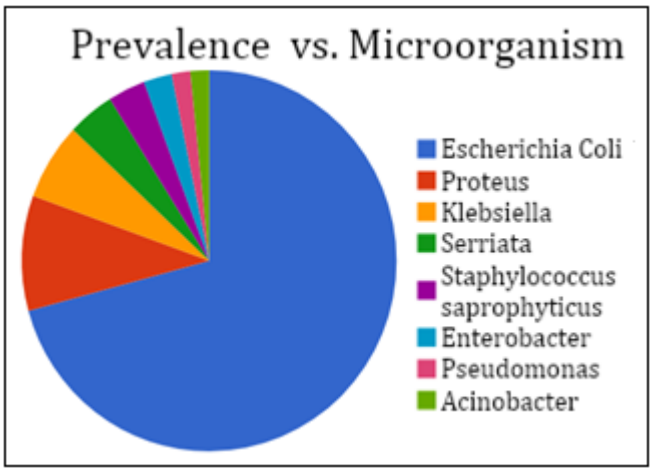


**Figure 2:** Prevalence of microorganisms in urinary tract infection in females

Results of sensitivity of microorganisms to antibiotics was as follows

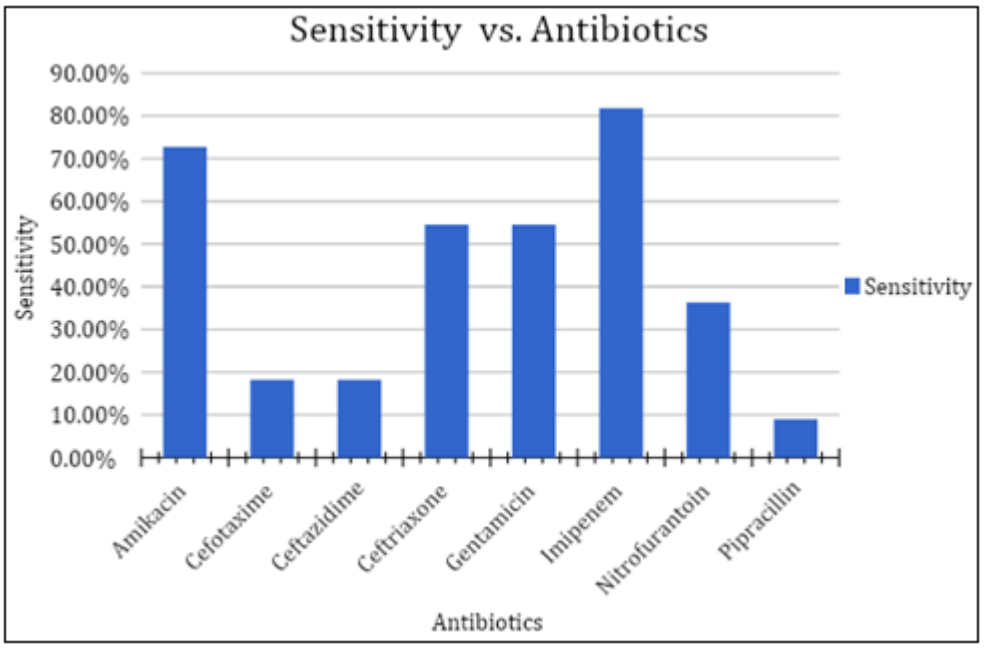


**Figure 3:** Sensitivity of *Escherichia coli*

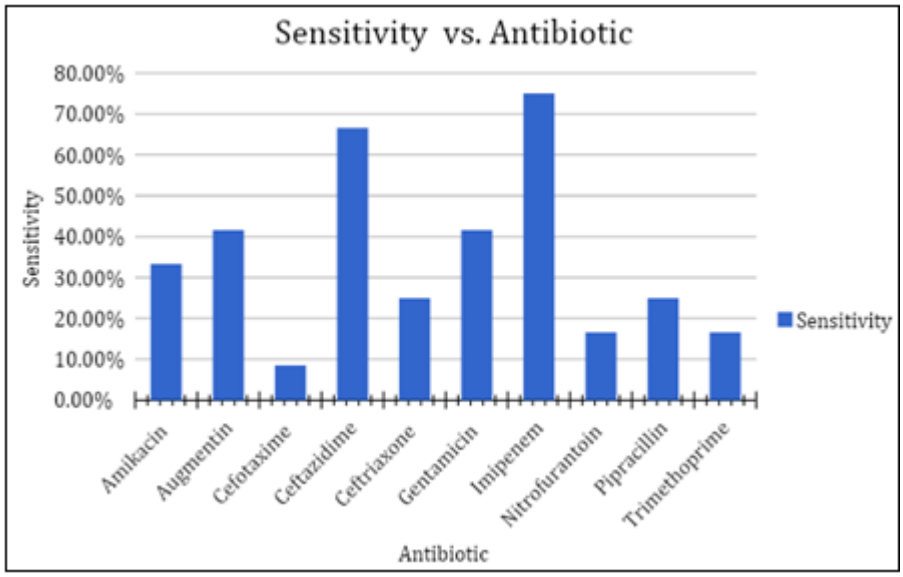


**Figure 4:** Sensitivity of *Proteus*

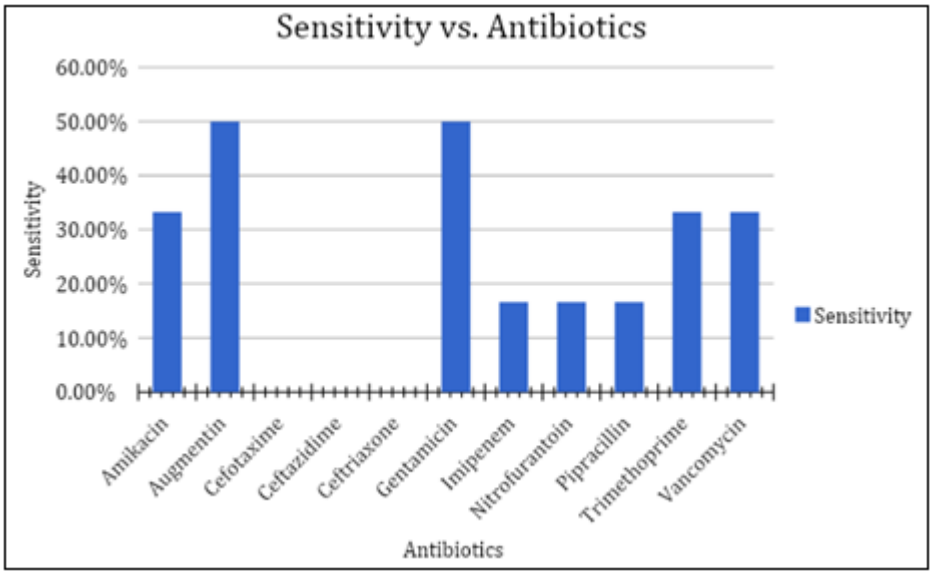


**Figure 5:** Sensitivity of *Staphylococcus Saprophyticus*

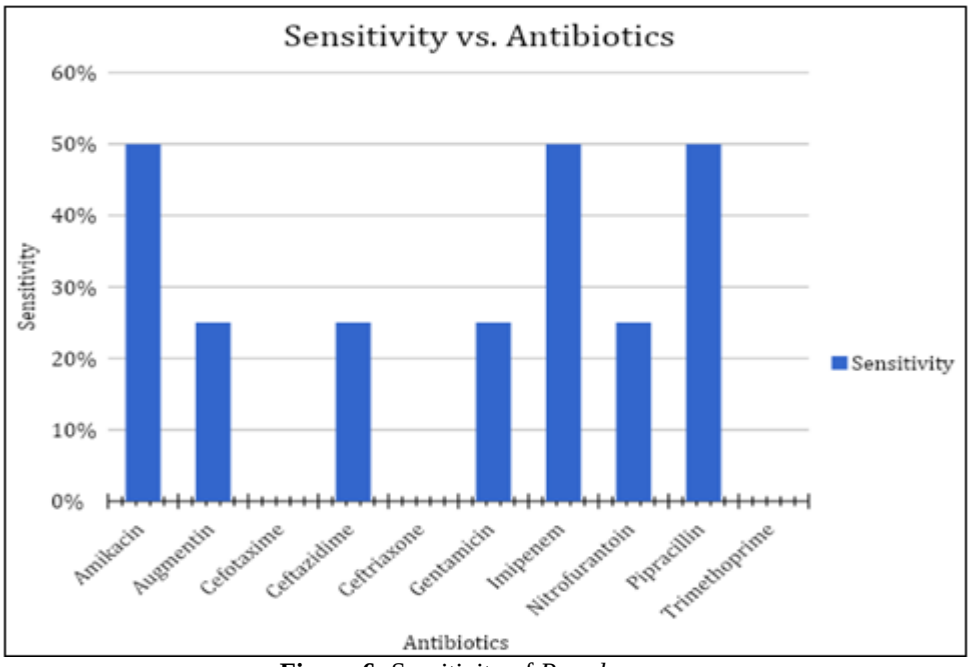


**Figure 6:** Sensitivity of *Pseudomonas*

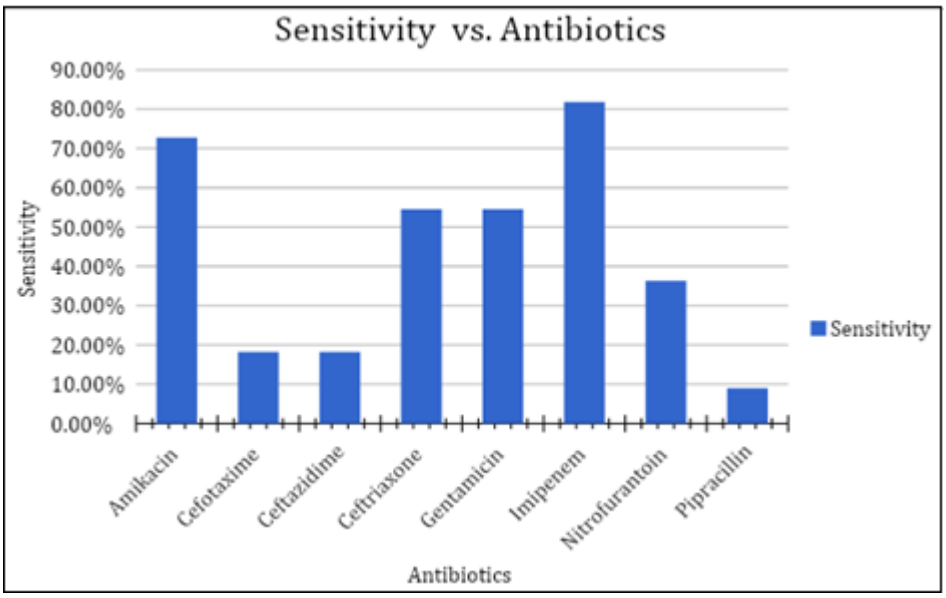


**Figure 7:** Sensitivity of *Klebsiella*

## 4. Discussion

Urinary tract infection is a common infection in the paediatric age group with a prevalence of 1% in boys and 3% in girls with a peak between 2-4 years coinciding with the age of toilet training. The male to female ratio in infancy is about 2:1 but the ratio rises rapidly in females after infancy reaching as high as 1:10 this is mainly attributed to the short female urethra and male circumsicion.(6)

In our study the male to female ratio in infancy was about 1:1 followed by a rapid rise in females after infancy with a ratio reaching 1:15.

The peak age in both sexes was between 2-6 years as shown in table 1.

Our study showed that *Escherichia Coli* was the most prevalent causative microorganism in both males and females in all age groups (table 2) .This was followed by *Klebsiella* and *Staphylococcus Saprophyticus* in males and *Proteus* and *Klebsiella* in females ( figure 1 and 2) .These findings are consistent with published literature of causative microorganisms of urinary tract infections.(1)

Imipenem was found to be the most effective antibiotic against *Escherichia Coli* followed by Nitrofurantoin and Amikacin (figure 3).

Abuhada et al established similar results in their 2013 study with Imipenem being the most effective.(7)

Imipenem was also the most effective antibiotic against both *Klebsiella* and *Proteus* followed by Amikacin,Gentamicin and Ceftriaxone for *Klebsiella* (figure 7) and Augmentin,Gentamicin and Amikacin for *Proteus* (figure 4).

Abdalla FE et al in their study regarding *Klebsiella* sensitivity showed Imipenem to be the most effective followed by Pipracillin and Amikacin. (8)

## 5. Conclusion

1) Urinary tract infection is nearly equal in both sexes in infancy to be followed by a rapid rise in females during childhood.
2) *Escherichia coli* is the most common microorganism in all age groups.
3) In females *Escherichia coli* are followed by *Proteus* and *Klebsiella*.
4) In males *Escherichia coli* are followed by *Klebsiella* and *Staphylococcus Saprophyticus.*
5) Imipenem was found to be the most effective antibiotic against *Escherichia coli* followed by Nitrofurantoin and Amikacin.

## 6. Recommendation

It is important to know the prevalence of microorganisms causing urinary tract infection in our local community and their sensitivity to antibiotics for the sake of proper management of the infection to reduce morbidity and complications in children and to be able to choose the proper antibiotic with out using unnecessary or multiple antibiotics which will only decrease their effect on the microorganisms in our community.

## References

[1] Robert M.Kligman,MD,"Nelson Textbook of Paediatrics & quot; ,20th edition, 2016urinary tract infection, p 2556-2557.
[2] Dr. Tom Lissauer, Dr. Graham Clayden; Illustrated Textbook of Paediatrics ,4th edition, 2012 .urinary tract infection, p 330-335
[3] World Health Organization, urinary tract infections, 2018.
[4] Gary M.Lum,MD "Current Diagnosis and Treatment Pediatrics",19th edition ,2009 urinary tract infection, p 670-672.

[5] Betty A.Forbes ,Daniel F.Sahm ,Alice S.Weissfeld ;Diagnostic Microbiology 12th edition ,2007,urinary tract infection p:852-853.
[6] Geoffrey A.weinberg,MD,"MAD Manual/professional version ",urinary tract infection in children
[7] Mahout Abuhandan,Bulent Guzel and Hali Cifrei.Turkish journal of urology "Antibiotic sensitivity and resistance in children UTI", in Sanlivrfa,2013,Jan:39 (2):106-110.
**[8]** Abdullah FE, Mushtaq A, Irshad M,Rauf H, Afzal N, Rasheed A,Pakistan J Pharm Sci. 2013,Jan,26(1):11-15.