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1. Abstract

**Background:**

UTI refers to the presence of infection within the urinary tract including the kidney, the urinary bladder and the urethra**.** UTI is one of the most common paediatric infections where symptoms are often non-specific .Recurring UTIs among children can even lead to permanent kidney damage which may be fatal.

**Aims & Objective:**

To isolate bacteria from pediatric urine sample and to determine the sensitivity pattern of the bacterial isolates.

**Materials & Methods:**

The present study was a prospective longitudinal and conducted in The Department of Microbiology, Calcutta National Medical College, and West Bengal for a period of approximately 3 months from February 2016 to April 2016. Urine samples were collected from patients aged between 1 day-18 years young. Midstream clean catch method was followed for sample collection. Semi-quantitative method was used to inoculate the specimen in MacConkey agar or/and blood agar. The bacterial agents which caused UTI were isolated, characterized, and identified using standard microbiological tests. Antibiogram of all the isolate were performed by the modified Kirby-Bauer technique according to CLSI guidelines.

**Results:**

It was seen that children aged between 6-13 years were most succiptible to Urinary tract infections. It was also noted that most cases were caused by gram –ve *organisms (Klebsiella, E.coli & Acinetobacter*).

**Conclusion:**

As drug resistance among bacterial pathogens is an evolving process, regular surveillance and monitoring is necessary to provide physician’s knowledge on the updated and most effective empirical treatment of UTIs. The appropriate choice of antibiotic for UTI requires an adequate understanding of epidemiology and profiles of local antibiotic resistance of associated uropathogen. Antibiotic sensitivity can change over time.

**Keywords:** UTI, Pediatric, Semi-Quantitative, Antibiogram, CLS

1. **Introduction**

Urinary Tract Infection**(UTI)** is one of the most common bacterial infections in the paediatric age group. UTI refers to the presence of microbial pathogens within the urinary tract. The human urinary tract can be divided into two portions based on the site of involvement: i. The upper portion consisting of the renal pelvis and ureters & ii. The lower portion consisting of the urinary bladder and the urethra [1].The common symptoms of UTIs are urgency and frequency of micturition, with associated discomfort or pain. The commonest condition is cystitis, the infection of the bladder with uropathogenic bacterium**[1].**

UTIs among children can cause distress to the child, concern to the parents and may even lead to permanent kidney failure. Therefore UTI in childhood requires early diagnosis and prompt treatment.During the first year of life, UTIs are less than 2% in both males and females. The incidence of UTIs in males remains relatively low even after the first year of life**[2]** while it is estimated that 20% or more of the female population suffers from some form of UTI throughout their life time.

Bacterial isolates may vary according to geographical region and act as a reference for guiding the empirical theory.

Most common cause of UTI among pediatric patients is ***Escherichia coli****,* followed by other micro-organisms such as ***Staphylococcus aureus****,* ***Klebsiella*** species**, *Pseudomonas*** species, ***Enterobacter*** species, ***Proteus*** species ,***Streptococcus*** species and***Citrobacter*** Species.

In the past 30-50 years the introduction of new antibiotics and significant improvement in healthcare has brought about a change in the natural history of Urinary tract infections (UTIs) among patients in the pediatric age group (1day – 18 years young). Due to the non-specific nature of the symptoms caused due to UTIs in this age group (particularly in infants), it may be difficult to identify UTI in children.

Selection of antibiotics for the treatment should be based on antibiotic susceptibility pattern. Periodic evaluation of effectiveness of a given antibiotic is also necessary as the sensitivity may change over periods [2]. Increased resistance of urinary pathogen like *E.coli* to common and readily available drugs like Cotrimoxazole has become a global reality. Therefore isolation of organisms causing UTI and their antibiotic susceptibility is very essential for accurate treatment and management of Urinary tract infections [3].

The study was carried out with pediatric UTI patients attending indoor and OPD of pediatric department of Calcutta National Medical College. Much attention was paid to the detection of the bacterial pathogen from the pediatric urine sample. An attempt was also made to notice the antibiogram pattern of the isolates so that the correct treatment could improve the condition of the patients and therefore prevent long term sequel of the disease.

1. **Aims & Objectives**
2. To establish a bacteriological profile from pediatric UTI cases.
3. To determine the sensitivity pattern of the bacterial isolates.
4. The given study was conducted in order to determine the prevalence of Urinary Tract Infections in children and to identify any change in the previously known pattern of these infections based on the gender of the children.

In patients suspected with UTIs, antibiotic treatment is usually started empirically before urine culture results are available. To ensure proper and safe treatment, knowledge about the organism causing the UTI and the antibiotic sensitivity pattern shown by the afore-mentioned organism of great importance.

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1. **Review Of Literature**

Urinary Tract infections have been becoming an increasingly common problem in our children and even more so in the past three decades. Treatment in most cases is done by administration of antibiotics. However, the patients, at some point of their life, even after the completion of their treatment have been known to have a relapse of the infection. Improper usage of antibiotics in many cases without determining the exact causative agent/ agents responsible have led to the development of resistant strains of several uropathogens. Thus it is of utmost importance that the microorganism/microorganisms responsible for the UTI in each patient is properly identified and the sensitivity of the same microorganisms for different antibiotics is also properly determined before treatment.Urinary tract infection (UTI) is third most common infection in pediatric age group. It ranks next to respiratory and gastrointestinal infections and accounts for four to ten percent of febrile children admitted to hospitals.

Usually UTI in children occurs due to ascending infection but in the first year of life hematogenous spread maybe more common (Gautam *etal.,*2013).

UTI in children needs more attention because of acute and chronic complications that can develop in children, which are not seen routinely in adults. Most of the infections remain undiagnosed if tests are not routinely performed to detect them. Otherwise, unexplained renal scarring has been cited as one of most common cause of end-stage renal disease (ESRD) and is an established risk factor for subsequent hypertension [3].Up to 50% of long term sequel of UTI in young children is preventable by urine testing and prompt antibiotic therapy[8]. Hence, high index of suspicion should be maintained by the pediatricians and urine culture should be ordered whenever required.

In recent years, bacterial resistance to different antibiotics has increased dramatically leaving physicians with few therapeutic options. Methicillin resistant *Staphylococus aureus* (MRSA), extended-spectrum β-lactamase (ESBL) producing organisms and vancomycin resistant *enterococci* (VRE) have become common hospital problems**[9]**. The rates of resistance to antibiotics differ from region to region; hence, in making an appropriate choice of empiric or definitive therapy for UTI, it is useful to avail information on prevailing levels of antimicrobial resistance among common urinary pathogens. In recent years, bacterial resistance to different antibiotics has increased dramatically leaving physicians with few therapeutic options. Methicillin resistant *Staphylococus aureus* (MRSA), extended-spectrum β-lactamase (ESBL) producing organisms have become common hospital problems**[9]**. The rates of resistance to antibiotics differ from region to region; hence, in making an appropriate choice of empiric or definitive therapy for UTI, it is useful to avail information on prevailing levels of antimicrobial resistance among common urinary pathogens.

Studies conducted by Badhan et.al[4] showed that **E. coli**  was the commonest isolate in pediatric patients with UTI. Other organisms grown in significant numbers were E. fecalis, Klebsiella spp. and S. aureus. Gram-negative isolates were sensitive to nitrofurantoin, amikacin, and cefotaxime. Gram-positive isolates were sensitive to nitrofurantoin, cotrimoxazole, and novobiocin.

In their work Jitendranath et.al [5] suggested that E. coli and Klebsiella form the bulk of the organism isolated and constitute 80% of all cases. This was less than what *Rai et al*. **[6]**reported (93%). Five bacterial genera dominated the bacteriological profile: E. coli, Klebsiella sp., Proteus sp., Enterobacter sp., and Enterococcus were the important ones isolated here which is similar to what Marzouk et al. **[7]**. Gram positive cocci were few in comparison to gram negative bacilli. Staphylococcus saprophyticus was the predominant gram positive cocci isolated. In their study, Jitendranath et.al also suggested that treatment for a period of 7 days was found to be effective in almost all cases of UTI except for 2 cases of recurrent UTI which didn’t resolve and had infection with a different microbe with a different sensitivity pattern.

In another study, Taneja *et al***[8]** found that multi drug resistant microbes (*Enterococcus* species, *K. pneumoniae*, *P. aeruginosa* and *Candida* species) were responsible for a substantial proportion of infections apart from *E. coli* being the most common agent. However, they found that only <2% of UTI are due to *staphylococci,* unlike reports from elsewhere4. They also concluded that 2nd generation cephalosporins, co-trimoxazole and fluoroquinolones, once the mainstay in the treatment of UTI, were no longer useful.

Similar findings were also noticed by recent Iranian study**[9]**. In addition, they have found that *Klebsiella* isolates showed more resistance, especially to gentamicin and amikacin than *E.coli,* despite these agents being used effectively for many years in the past.

A retrospective study [10] among Nepalese children found that *E. coli* was most sensitive to amikacin, nitrofurantoin and ofloxacin and least sensitive to most commonly used drugs like cephalexin, nalidixic acid, cotrimoxazole and norfloxacin11. This appears to be due to overuse and/or misuse of antibiotics.

All these studies are suggestive of need for periodic monitoring of antibiotic

sensitivity pattern to provide effective treatment and thereby, to make it more cost effective particularly in the impoverished countries like ours and elsewhere.

Therefore, to address the given concerns the given study was taken up investigate the etiologic agents of UTIs in a tertiary care hospital and to study their susceptibility pattern to different antimicrobial agents.

1. **Materials & Methods**

**i. Source of data:**

The present study was carried out in The department of Microbiology , Calcutta National Medical College over a period of two and a half months (1st February 2016 - 15th April 2016).The type of study was prospective longitudinal.

Urine Samples were collected from children whose age ranged between 1 to 18 years. Hospitalised symptomatic, asymptomatic and indoor patients and patients visiting the paediatric OPD of Calcutta National Medical College formed the study group.

Fever, Dysuria, abdominal supra-pubic pain, vomiting, poor feeling, smelly urine and any other relevant symptom/symptoms were included in a detailed history and clinical examinations were carried out in all cases with special emphasis on proper sample collection

**ii.Inclusion Criteria**

1. The patients’ age group ranged between 0-18 years of age.
2. Clinically suspected patients with fever, irritation & increased frequency of urination, poor feeding, nausea, vomiting were taken into consideration along with the asymptomatic ones.
3. Only patients with written consent from their legal guardian/ parents were considered as specimen for this profiling.

**iii. Exclusion Criteria**

1. Severely sick children or neonates were excluded except for cases in which the guardian insisted participation.
2. Children whose mothers were unwilling to let their participate in the process.
3. Patients who had consumed antibiotics or sterioids in the last 15 days were not considered for the profiling.

**iv. Sample Collection**

The specimen was collected by Midstream Urine (MSU) clean-catch technique after thoroughly cleaning the perineal area. Sample collection from patients in the paediatric group (especially neonates, infants and children below 13 years of age) required supervision for best results and assistance and understanding of the procedure by care givers. No invasive or supra-pubic catheterization procedure was conducted through sterile plastic bag method was used for younger children who were unable to control urination. Trans-urethral bladder catheterization was done in some infants. The collection was carried out in wide mouth sterile leak-proof containers. More or less 50 ml midstream urine was collected in the sterile containers and the specimen were transported to the bacteriology laboratory and duly processed within 2 hours. In case of delay in transport or inoculation, the staffs were instructed to keep the specimen at 4ᵒc in refrigerator or to add preservative Boric acid (1.8%).

First we noticed the macroscopical appearance of urine for turbidity, colour, odour, specific gravity etc. The proceeded for screening by direct microscopy.

**V.Direct microscopy (Wet-film method):**

Wet mount examination was performed with un-centrifuged urine to look for the presence of mainly pus cells and also red blood cells, crystal or microorganisms. We used clean glass slides, cover slips and high power field of binocular microscope.

**Procedure**:

The technique used for microscopic examination was the wet-film examination procedure. The urine sample was mixed carefully and then 0.05 ml of the same was transferred onto a microscope slide. A 22x22 mm coverslip was mounted on the wet-film at once with care so as to avoid trapping bubbles. The film showed a small excess of the fluid around the edges of the cover-slip and then was about 0.1 mm in depth upon mounting it. Then to search for pus cells ( degenerated WBC) , indicator of inflammation and infection. Microscopic examinations were done to detect pyuria (1 pus cell per 7 HPF), is considered as significant pyuria having high probability to Urinary Tract infections in those cases. Then the sample was granted for inoculation in culture in culture media (MacConkey media and Blood agar), full plate inoculation was done with standard loop method and colony count per ml.

A specimen was considered positive when a single organism isolated gave a colony count of 100000 CFU/ ml and also the microscopy showed that the pus cell count was at least 1 pus cell/ 7 HPF.

**Vi.Significant Bacteriuria:**

The first part of the urine is flushing out the commensal flora of urethra. The bladder urine of an uninfected person is free from bacteria, without proper direction a specimen of spontaneously voided urine is apt to be contaminated with some contamination commensal bacteria from the urethral orifice and perineum.

Thus after proper sampling proof of an UTI requires the demonstration that the potential pathogen in significant numbers is present. The observations of Kass (1956) suggested that this number taken to indicate significant bacteriuria is about 100,000/ml.

**VII. Culture:**

The **semi-quantitative** technique to determine significant bacteriuria was employed by using standard platinum or nichrome loop to inoculate Blood Agar and McConkey Agar with a fixed volume of uncentrifuged urine. The “standard loop procedure” was used to inoculate the specimen. The culture plates were incubated at 37°C for 18-24 hours. Next day the colony count was done. If single organism and grown and showed more than or equal to 105per ml , then it was considered positive for UTI. The sample was considered contaminated in case of more than one bacteria or colony count less than 105. These samples were repeated.

VII. Gram Staining

Gram stain finding of wire is also important and suggestive of significant bacteriuria if one bacterium is seen per oil emulsion field, by examining minimum 20 fields.

Other screening methods like gries nitrate test or leucocyte esterase tests were not performed in our limited time and resource.

IX. Biochemical Tests:

After isolation identification of bacteria was done by gram staining, motility tests, and biochemical reactions and serological agglutination tests.

1. **Calculation:**

3.26mm inner diameter loop contains 0.004 ml of urine volume and after plating and inoculating if the colony count appears to be 400 then 1 ml urine would contain 400/.004 ie 105 colonies.

Confluent growth on culture plate after full plate inoculation was considered as more than 105 colonies.

Gram stain finding of urine is also important and suggestive of significant bacteriuira if atleast one bacteria seen/ oil emulsion field was seen, by examining minimum 20 fields.

Other methods like gries nitrate test or leucocyte esterase test were not performed in our limited time and resources.

After isolation, identification of bacteria was done by gram staining, motility and biochemical reactions and serological agglutinations.

1. **Antibiogram**

The sensitivity of an organism to an antibiotic differs from each other. The sensitivity depends on the type of the organism against which the antibiotic is used and also the age of the culture.

If similar colonies were found in numbers suggesting significant bacteriuria, a separate colony or portion of apparently pure growth was subcultured for identification and testing of its sensitivity to antibiotics [23]. To create this antibiogram the Kirby Bauer disc diffusion method is used.

**Kirby-Bauer disc diffusion method:**

* Inoculum- Pure isolated 8-10 colonies were inoculated in a suitable/ peptone water broth incubated at 35-27 ᵒ C for 3-6 hours. Then the turbidity was matched with 0.5 Mac Farland opacity standard which seems to be approximately 1.5 x 108cfu/ml.
* This broth was inoculated on the MHA medium by spreading and streaking 3 times using sterile swabs on entire plates/ Lawn culture.
* Ideal inoculum will give semi-confluent growth. Similarly inoculum of control strains should be prepared as test strains and used for antibiogram.
* The surface of the agar was allowed to dry for 3-5 minutes before applying the antibiotic discs. On a 100 mm plate 6-7 discs may be applied , one in the centre and 6 in the periphery and incubated at 37 ᵒc for 16-18 hours.
* The zones of complete growth inhibition around the discs are measured. The diameter of the disc is included in the measurement. The interpretation of zone size into sensitive intermediate or resistant is based on the data from interpretation chart.
* Control strains of Staphylococcus (ATCC 25923) for gram positive and E.coli (ATCC 25922) from gram negative were tested each time when a new batch of discs or agar is used

ANTI-BIOTIC SENSITIVITY PATTERN

* The Mueller-Hinton agar medium was then inoculated with the previously prepared bacterial culture in the peptone water after comparing the turbidity of the culture with MacFarland turbidity standard (0.5). The inoculation was done by “lawn culture method”.
* On the inoculated medium, antibiotic discs were placed according to bacterial isolates with the guidance of CLSI 2015. .
* The petri-plates were then kept for incubation at 37ᵒC for 24 hours.
* After 24 hours the petri plates were taken out and checked and the zone of inhibition was measured with the help of scales. The sensitivity pattern was determined.

1. **Results & Interpretation**

Urine is the most common specimen sent to the laboratory from OPD of a hospital as well as from admitted cases [26]. During the study period, total 100 urine samples were collected and processed, out of which 28(28.0%) demonstrated significant bacterial growth. The samples which showed contaminated growth were repeated once for fresh sampling. Out of the 100 collected samples 52 were obtained from female patients while 48 were obtained from male patients. Amongst the four ages majority of the culture positive patients were in group III [12(42.85%)] followed by group IV [8(28.57%)], group II [5(17.85%] and group I [3(10.71%)]. Group I contained patients below 1 year, 2 male patients in this group were seen to have VUR overall.

Overall it was observed that children between 6-13 years of age were most susceptible to urinary tract infections, while it was least in infants (below 1 year).Prevalence of UTI was more in male patients in group I ;however females predominated in other pediatric age groups. However, overall the prevalence was more in female patients than male patients.

It was also noted that most cases were caused by gram –ve *organisms (Klebsiella, E.coli & Acinetobacter*) which were found in 18 of the 28 patients who tested positive. In 10 other instances gram +ve organisms (*Staphylococcus aureus& Enterococcus sp*.) were found to be responsible. This meant gram -ve organisms caused about 64.28% of the infections while gram +ve organisms were responsible for about 35.72% of the UTIs.

The organism found in most frequency was i. *Klebsiella* (9/28 ie 32.14%) followed by ii. *Staphylococcus aureus* (7/28 ie 25.0%), iii. *E.coli*(6/28 ie 21.43 %) .Both Acinetobacter sp and Enterococcus sp. were found in 3 patients each therefore accounting about 10.71% each.

1. Discussion

The prevalent age group having UTI in our study was seen to be that between 6-13 years and was mainly predominated by females. In this group , among the 12 patients , 9 were females while only 3 were male.

In their study Patel et al. found that out of 207 patients enrolled and evaluated for possible urinary tract infection, 56 (27.1%) showed significant bacterial growth in urine culture and were diagnosed to have UTI and analyzed[37]. This percentage was quite similar to that obtained in our study (28.0%).However ,their male: female ratio was 1:1.3 while the ratio obtained in our study was (male: female) 1:2.1. In this aspect ( male: female) ratio the results obtained in our studies were in accordance with that of Malla et al[34](1:2).

Gram negative organisms dominated in the area of the causative agents. About 64 % the positively diagonosed cases were caused by gram negative organisms while 36% of the infections were caused by gram negative organisms.

The major uropathogens isolated were *Klebsiella sp,* followed by *Staphylococcus aureus* and *E.coli* ( chart iii) in our study. Among the gram negative organisms, the one found in the most frequency was Klebsiella followed by *E.coli*. About 32.14 % of the infections were caused by Klebsiella. Among the gram positive organisms *Staphylococcus aureus* was found in most frequency (25%). Both *Acinetobacter* and *Enterococcus sp.*were found in the least frequency(10.71% each).Our findings were similar to that of Abhishek et al. In their study, Klebsiella and Staphylococcus were the major pathogens.The report obtained from our study was different from the report obtained in the study of Jitendranath et al, in the aspect that the major pathogen in their study was *Escherichia coli* [5] while the major organism in our study was *Klebsiella* (32.15%).Our findings were different from that of Gupta et al. as their major isolates were E.coli follwed by Enterococcus and Klebsiella while our major isolates were Klebsiella follwered by Staphylococcus aureus

In their study Abhishek et al. reported that the highest succeptibility to gram negative in their study was shown by piperacillin- tazobactum , imipenem and amikacin. Acinetobacter showed sensitivity to only Colistin in our study. But in the study conducted by Abhishek et al. , Acinetobacter was seen to be sensitive to imipenem.Majority of gram negative isolates were sensitive to gentamycin followed by Meropenem etc. Gram positive isolates were mostly sensitive to Linezolid and Vancomycin.[3]

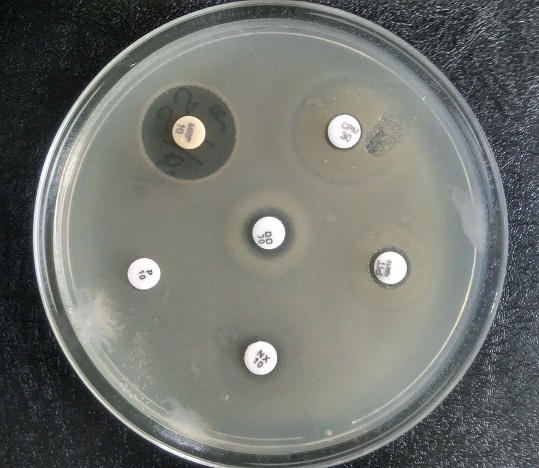
1. **Pictures:**

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**Fig I. Fig ii.**

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**Fig iii.**

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**Fig iv. Fig V**

**Fig I & II demonstrates the method of inoculation of urine on MacConkey & Blood agar for colony count.**

**Fig III Biochemical Tests done for identification of Gram –ve isolates *(E.coli)***

**Fig IV & V demonstrates the sensitivity pattern produced against antibiotic discs.**

1. **Charts & Graphs**

**Graph i: The above pie chart shows the distribution of uropathogens based on their response to gram staining**

|  |  |  |
| --- | --- | --- |
| **Bacterial isolates** | **Numberofisolates** | **Percentage**  **%** |
| *Klebsiella spp.* | 09 | 32.15% |
| *Staphylococcus aureus* | 07 | 25.00% |
| *Escherichia coli* | 06 | 21.43% |
| *Acinetobacter* | 03 | 10.71% |
| Enterococcus sp. | 03 | 10.71% |

**Chart i: Statistical comparison of prevalence of bacterial species found in this study**

**Graph ii:** Graphical representation of percentage of isolated uropathogens

**Graph III :** A graphical representation of “Chart ii”

**X-axis**: age of the patient

**Y-axis**: prevalence of UTIs in number

**Table 1:** Antimicrobial Sensitivity Pattern of Gram Negative Bacterial Isolates

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Antibiotics** | **Group I** | |  | **Group II** | | | | **GroupIII** | | | | | **Group IV** | | | | | |
| **Kleb** | **E.Coli** | **Acineto** | **Kleb** | **E.coli** |  | **Acineto** |  | **Kleb.** | **E.coli** | | **Acineto.** |  |  |  | **Kleb** | **E.coli** | **Acineto** |
| **Gentamycin** | ------- | 1(100%) | N/A | 1(100%) | 1(100%) | 1(0 %) | | 2(50%) | | | 2(66.66%) | 1(100%) | 1(100%) | | | | N/A | 1(0%) |
| **Amikacin** | ----- | ----- | ----- | 1(100%) | ---- | --- | | 2(66.66%) | | | 1(100%) | ----- | 0(0%) | | | | --- | ---- |
| **Cotrimoxazole** | ----- | ------ | ------ | 0 (0%) | ---- | ------ | | ------ | | | ----- | ----- | 1(100%) | | | | ------ | --- |
| **Cefotaxime** |  |  |  |  | 2(100%) |  | |  | | |  |  |  | | | |  |  |
| **Ampicillin** | 0(0%) | 0(%) | 0(%) |  | 0(%) |  | | 0(%) | | |  | 0(%) | 1(33.3%) | | | | 0(%) |  |
| **Amoxyclav** | --- | --- | --- | ---- | ---- | --- | | ---- | | | 1(100%) | --- | --- | | | | --- | --- |
| **Piperacillin+tazobactam** |  | 0% |  | 0% |  |  | | 2(100%) | | | 0% | 0% |  | | | |  | 0(%) |
| **Nitrofurantoin** |  |  | 0% |  | 4(100%) |  | |  | | |  |  | 0% | | | |  |  |
| **Doxycyclin** | 0% |  |  |  |  | 0% | |  | | |  |  |  | | | |  |  |
| **Norfloxacin** |  |  | 0% |  |  |  | | 0% | | |  | 0% |  | | | |  | 0% |
| **Ciprofloxacin** | 1(33%) | ---- | --- | 2(100) | 1(100%) | ----- | |  | | |  |  |  | | | |  |  |
| **Meropenem** | 1(100%) | 1(100%) | --- | 1(100%) | 1(50%) | --- | | --- | | | 1(100%) | ----- | ----- | | | | 1(100%) | ---- |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Antibiotics** | **Group I** | | **Group II** | | | | **Group III** | | | **Group IV** | | |
| **Staph** | **Enterococcus** |  | **Staph** | **Enterococcus** |  | | **Staph** | **Enterococcus** | | **Staph** | **Enterococcus** |  |
| **Doxycyclin** |  |  |  | 1(100%) |  |  | | 2(66.66%) |  | | 1(50%) |  |  |
| **Cotrimoxazole** |  |  |  |  |  |  | |  |  | |  | 1(100%) |  |
| **Vancomycin** |  |  |  | 1(100%) |  |  | | 4(100%) |  | | 2(100%) |  |  |
| **Nitrofurantoin** |  | 2(100%) |  | 1(100%) |  |  | | 1(100%) |  | | 1(50%) | 1(100%) |  |
| **Norfloxacin** |  |  |  |  |  |  | |  | 0% | | 1(100%) |  |  |
|  |  |  |  |  |  | |  |  | |  |  |
| **Linezolid** |  |  |  | 1(100%) |  |  | | 3(100%) |  | | 1(100%) |  |  |
| **Levofloxacin** | 2(66.66%) | 1(100%) |  | ---- | ---- |  | | 2(50%) | 3(75%) | | --- | ---- |  |
| **Amikacin** |  |  |  | 0% |  |  | | 2(100%) |  | |  | 0% |  |
| **Gentamycin** |  |  |  | 0% |  |  | | 2(66.66%) |  | | 1(50%) |  |  |

**Table 2:** Antimicrobial sensitivity pattern of Gram positive bacterial isolates

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 3 *:*** Antibiogram of culture positive cases N=18 ( Gram negative*)* | | |  |
|  |  |  |  |
|  |  |  |  |
| ***Antibiotic*** | ***Sensitivity tested*** | ***sensitive (no)*** | **Sensitive(%)** |
| ***Gentamycin*** | *14* | *11* | 78.67% |
| ***Amikacin*** | *6* | *4* | 66.66% |
| ***Cotrimoxazole*** | *2* | *1* | 50.00% |
| ***Cefotaxime*** | *2* | *2* | 100% |
| ***Amoxycyclav*** | *10* | *4* | 40.00% |
| ***Piperacillin+tazobactam*** | *7* | *2* | 28.57 % |
| ***Nitrofurantoin*** | *6* | *4* | 66.66 % |
| ***Norfloxacin*** | *6* | *2* | 66.66% |
| ***Meropenem*** | *7* | *6* | 85.71% |

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 4**: Antibiogram of culture positive cases N=10 ( Gram postive) | | |  |
|  |  |  |  |
|  |  |  |  |
| **Antibiotic** | **Sensitivity tested** | **sensitive (no)** | **Sensitive(%)** |
| ***Norfloxacin*** | 1 | 1 | 100% |
| ***Linezolide*** | 5 | 5 | 100% |
| ***Vancomycin*** | 6 | 6 | 100% |
| ***Nitrofurantoin*** | 5 | 4 | 80% |
| ***Levofloxacin*** | 11 | 7 | 63.63 % |
| ***Amikacin*** | 4 | 2 | 50.0% |
| ***Doxycyclin*** | 7 | 4 | 57.14% |

**13 .Conclusion**

As drug resistance among bacterial pathogens is an evolving process, regular surveillance and monitoring is necessary to provide physician’s knowledge on the updated and most effective empirical treatment of UTIs. The appropriate choice of antibiotic for UTI requires an adequate understanding of epidemiology and profiles of local antibiotic resistance of associated uropathogen. Antibiotic sensitivity can change over time.

Due to the non-specific nature of the symptoms caused due to UTIs in this age group (particularly in infants), it may be difficult to identify UTI in children. Periodic reassessment of in vitro susceptibility pattern of urinary pathogens to serve as a guide for antibiotic therapy since these organisms exhibit resistance to first-line drugs used for UTI infection. In order to prevent or decrease resistance to antibiotics, the use of antibiotics should be kept under supervision, should be given in appropriate doses for an appropriate period of time.

It was observed that the number of patients suffering from UTI consisted of about equal number of males and females between till 1 year old. Among the patients in the other age groups the number of females was more significant than the number of males.

Due to the time restraints, this study could only be carried out on 100 samples. It is of utmost importance that proper follow up is done to verify the consistency of the data obtained in this study.

1. References
2. Mackie and McCartney: Practical Medical Microbiology, 14th edition: Page 86-90.
3. Koneman's Color Atlas and Textbook of Diagnostic Microbiology, Sixth Edition, Page no. 82.
4. Dr. Abhishek S Goenka, Dr. Rajesh P Karyakarte, Dr. Sumit S Aggarwal, Dr. Nitin A Ambhore and Dr. Rupali S Mantri 2015. Study of bacteriological profile of urinary tract infection among patient attending tertiary care center, International Journal of Information Research and Review. Vol. 2, Issue, 07, pp. 929-932, July, 2015.
5. Badhan R, Singh DV, Badhan LR, Kaur A. Evaluation of bacteriological profile and antibiotic sensitivity patterns in children with urinary tract infection: A prospective study from a tertiary care center. Indian J Urol. 2016;32:50-6.
6. Jitendranath A, Radhika R, Bhargavi L, Bhai G, Beevi R (2015) Microbiological Profile of Urinary Tract Infection in Pediatric Population from a Tertiary Care Hospital in South Kerala. J Bacteriol Mycol Open Access 1(1): 00002. DOI: 10.15406/jbmoa.2015.01.00002.
7. P. K. Chhetri, S. K. Rai, U. N. Pathak, et al., “Retrospective Study of Urinary Tract Infection at Nepal Medical College Teaching Hospital, Kathmandu,” Nepal Medical College Journal, Vol. 3, 2001, pp. 83-85.
8. Marzouk M, Ferjani A, Haj Ali M (2015) Profile and susceptibility to antibiotics in urinary tract infections in children and newborns from 2012 to 2013: Data from 1879 urine cultures. Arch Pediatr 22(5): 505-509. [Article in French].
9. Taneja N, Chatterjee SS, Singh M, Sharma M. Pediatric urinary tract infections in a tertiary care centre from north India. Indian J Med Res 2010; 131:101-5.
10. Mashouf RY, Babalhavaeji H, Yousef J. Urinary Tract Infections: Bacteriology and Antibiotic Resistance Patterns. Indian Pediatr 2009; 46:617-20.
11. Rai GK, Upreti HC, Rai SK, Shah KP, Shrestha RM.Causative agents of urinary tract infections in children and their antibiotic sensitivity pattern: a hospital based study. Nepal Med Coll J 2008; 10(2): 86-90.

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1. .Boloor R, Pai RJ, Scaria B, Shetty AK, Pinto H. Microbiological profile of the uropathoens isolated from paediatric patients from a tertiary care centre. Karnataka Pediatric Journal 2010; 24(2):42-45.
2. Matthai J, Ramaswamy M. Urinalysis in urinary tract infection. Indian J Pediatr 1995; 62:713-16.
3. A Sharma, S Shrestha, S Upadhyay and P Rijal . Clinical and Bacteriological profile of urinary tract infection in children at Nepal Medical College Teaching Hospital. Nepal Med Coll J 2011; 13(1): 24-26
4. Kumari N, Rai A, Jaiswal CP, Xess A, Shahi SK. Coagulase negative Staphylococci as causative agents urinary tract infections-Prevalence and resistance status in IGIMS, Patna. Indian J PatholMicrobiol 2001; 44(4):415-19.
5. Jones K V. Urinary tract infection in childhood. The practitioner 1991; 235:135-43.
6. . Jacobson SH, Eklof O, EricksSon GC, Lins LE, Tidgren B, Winberg J. Development of hypertension and uremia after pyelonephritis in childhood: 27 years follow up. Br Med J 1989; 299:703-6.
7. Smellie JM, Poulton A, Prescod NP. Retrospective study of children with renal scarring associated with reflux and urinary infection. Br Med J 1994; 308:1193-96.
8. Kramer MS, Tange SM, Drummond KN, Mills EL. Urine testing in young febrile children: a risk-benefit analysis. J Pediatr 1994; 125:6-13.
9. Mohanty S, Kapil A, Das BK, Dhawan B. Antimicrobial resistance profile of nosocomial uropathogens in a tertiary care hospital. Indian J Med Sci 2003; 57:148-54.
10. Mashouf RY, Babalhavaeji H, Yousef J. Urinary Tract Infections: Bacteriology and Antibiotic Resistance Patterns. Indian Pediatri 2009; 46:617-20.
11. Rai GK, Upreti HC, Rai SK, Shah KP, Shrestha RM.Causative agents of urinary tract infections in children and their antibiotic sensitivity pattern: a hospital based study. Nepal Med Coll J 2008; 10(2): 86-90.
12. Forbes BA, Sahm DF, Weissfeld AS. Infections of the urinary tract. In, Bailey & Scott’s. Diagnostic Microbiology, 12th edition. St. Louis (USA), Mosby Elsevier Publishers, 2007; 846-854.
13. Consensus Statement on Management of Urinary Tract Infections, Indian Paediatric Nephrology group, Indian Academy of Paediatrics. Indian Pediatr 2001; 38: 1106-1115.
14. Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing; 17th informational supplement, CSLI M100-S17. Vol.27 no.1. Wayne, PA, USA: Clinical and Laboratory Standards Institute; 2007; 46-114.
15. Practical Medical Microbiology, Mackie & McCartney, Fourteenth Edition, page no. 86-89.
16. <http://www.microbelibrary.org/library>
17. Fatima Khan ,Indu Shukla , Meher Rizvi1 , Asfia Sultan , Praveen Kumar , Tariq Mansoor and Satish Chandra Sharma.Screening For Detection of MRSA in Patients and Hospital Staff of a Tertiary Institutional Hospital. International Journal of current microbiology and applied sciences.ISSN: 2319-7706 Volume 2 Number 12 (2013) pp. 569-574.
18. Sohely Sharmin et al.Antimicrobial sensitivity pattern of uropathogens in children. Bangladesh J Med Microbiol 2009; 03 (01): 18-22.
19. Alia, E.M.A., Osman, A.H. 2009. Acute urinary tract infections in children in Khartoum State: pathogens, antimicrobial susceptibility and associated risk factors. Arab. J. Nephrol. Transplant., 2(2): 11 5.
20. Clinical and Laboratory Standards Institute. 2014. Performance standards for antimicrobial susceptibility testing: Twenty fourth informational supplement: Approved standards M100-S24. Clinical and Laboratory Standards Institute, Baltimore, USA.
21. Fatima Khan, Indu Shukla, Meher Rizvi, Asfia Sultan, Praveen Kumar, Tariq Mansoor, Satish Chandra Sharma. 2013. Screening For Detection of MRSA in Patients and Hospital Staff of a Tertiary Institutional Hospital. Int. J. Curr. Microbiol. App. Sci., 2(12): 569 574.
22. Gautam, G., Regmi, S., Magar, N.T., Subedi, B., Sharma, T., Regmi, S.M. 2013. Occurrence of urinary tract infection among children attending
23. Lee, K.Y., Chong, H.B., Shin, Y.A., Yong, K.D., Yum, J.H. 2001. Modified Hodge test and EDTA disc synergy tests to screen metallo beta lactamase producing strains of Pseudomonas and Acinetobacter species. Clin. Microbiol. Infect., 7: 88 91.
24. Malla, K.K., Sarma, M.S., Malla, T., Thapalial, A. 2008. Clinical profile bacterial isolates and antibiotic susceptibility patterns in urinary tract infection in children- hospital bases Study. J. Nepal. Paediatr. Soc., 28: 52 61.
25. Muoneke, M.U., Ibekwe, R.C., Ibekwe, 2012. Childhood urinary tract infection in Abakaliki: Etiological organisms and antibiotic sensitivity pattern. Ann. Med. Health Sci. Res., 2(1): 29 32.
26. Neelam Taneja, Shiv Sekhar Chatterjee, Meenakshi Singh, Surjit Singh, Meera Sharma. 2010. Pediatric urinary tract infections in a tertiary care center from north India. Indian J. Med. Res., 131: 101 105.
27. Pooja Patel, Garala, R.N. 2014. Bacteriological profile and antibiotic susceptibility pattern (antibiogram) of urinary tract infections in paediatric patients. J. Res. Med. Dent. Sci., 2(1): 20 23.
28. Raghubanshi, B.R., Shrestha D., Chaudhary, M., Karki, B.M.S., Dhakal, A.K. 2014. Bacteriology of urinary tract infection in paediatric patients. At KIST Medical College Teaching Hospital. J. Kathmandu Med. College, 3(1): 7.
29. Rizvi, M., Fatima, N., Rashid, M. 2009. Extended spectrum AmpC and metallo-beta lactamases in Serratia and Citrobacter spp. in a disc approximation assay. J. Infect. Dev. Ctries., 3(4): 285 94.
30. Shahla Afsharpaiman, Fatemeh Bairaghdar, Mohammad Torkaman, Zohreh Kavehmanesh, Suzan Amirsalari, Mehran Moradi, Mohammad Javad Safavimirmahalleh. 2012. Bacterial pathogens and resistance patterns in children with community-acquired urinary tract infection: a cross sectional study. J. Compr. Ped., 3(1): 16 20.
31. Singh, S.D., Madhup, S.K. 2013. Clinical profile and antibiotics sensitivity in childhood urinary tract infection at Dhulikhel hospital. Kathmandu Univ. Med. J., 11(44): 319 324.
32. SohelySharmin, FarhanaAlamgir, Fahmida, Ahmed Abu Saleh. 2009. Antimicrobial sensitivity pattern of uropathogens in children. Bangladesh J. Med. Microbiol., 03(01): 18 22.
33. Williams, G., Craig, J.C. 2011. Long-term antibiotics for preventing recurrent urinary tract infection in children (Review). The Cochrane Library., Issue 3.
34. World Health Organisation (WHO). 2005. Department of Child and Adolescent Health and Development.

Annexure I

**GLOSSARY**

* “Res” : Resistant
* “Sen” : Sensitive
* Amo: Amoxicillin
* Amp : Ampicillin
* Azi : Azithromycin
* Cpx : Ciprofloxacin
* Cef : Cefotaxime
* Ctr : Cotrimoxazole
* Dox : Doxycycline
* ESBL : Extended Spectrum β- Lactamase
* Gen : Gentamycin
* Levo : Levofloxacin
* Lz : Linezolid
* Mer : Meropenem
* MRSA : MethysylineRestistant*Staphylococcus aureus*
* Nit : Nitrofurantoin
* Nor : Norfloxacin
* Pit : PiperacillinTazobactum
* Tob : Amikacin
* UTI : Urinary Tract Infection
* Van : Vancomycin
* Nal : Nalidixic Acid
* Ami : Amikacin
* VUR : Vesico-Uretery Reflux

**Annexure ii**

1. **TSI (Triple Sugar Iron) Agar :**

To determine the ability of an organism to attack specific carbohydrates incorporated in a growth medium, with or without production of gas, along with the determination of possible Hydrogen peroxide production.

1. **Indole test :**

The indole test is done determine the ability of an organism to decompose tryptophan into indole. Tryptophan is decomposed by an enzyme tryptophanase produced by certain bacteria.

1. **Urease test :**

The urease test was done to determine the ability of an organism to produce an enzyme which splits urea into ammonia. Ammonia makes the medium alkaline and thus the phenol red indicator changes pink or red in colour.

1. **Citrate test** :

It is the ability of an organism to utilize citrate as the sole source of carbon for its growth, with resulting alkalinity.

1. **Oxidase test** :

The oxidase test is done to determine the presence of enzyme cytochrome oxidase which catalyses the oxidation of reduced cytochrome by molecular oxygen.

1. **Catalase test :**

Certain Bacteria have a catalase enzyme which acts at Hydrogen Peroxide to release oxygen.

H2O2CatalaseH2O + O (nascent oxygen)

1. **Slide Coagulase test**:

Slide coagulase test detects the bound coagulase. A few colonies of bacteria are emulsified in a drop of normal saline solution on a clean glass slide and mixed with a drop of undiluted rabbit or human plasma. Prompt clumping of the suspension occurs with coagulase positive strains.

**Annexure iii**

* For Gram Positive Species**:**

|  |
| --- |
| Gentamycin, Amikacin, Cotrimoxazole, Cefotaxime, Ampicillin., Amoxyclav, Piperacillin+tazobactam, Nitrofurantoin, Doxycyclin, Norfloxcin, Ciprofloxacin, Meropenem |

* For Gram Negative Species:

Meropenem, Ciprofloxacin, Ampicillin, Amikacin, Piperacillin, Piperacillin + Tazobactum, Doxycyclin / Tertacyclin, Cotrimoxazole, Gentamycin , Nitrofurantoin, Amoxyclav, Cefotaxime, Cefuroxime ,

**Annexure iv**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Slno | Age | Sex | Ward no | Causative agent |
|  |  |  |  |  |
| 1 | 16 Yrs | Female | GF-18 | **N/G** |
| 2 | 12 Yrs | Male | POPD | **N/G** |
| 3 | 16 Yrs | Female | MOPD | **N/G** |
| 4 | 07 Yrs | Female | Uro-OPD | **N/G** |
| 5 | 09 Yrs | Female | POPD | ***Klebsiella Sp.*** |
|  |  |  |  | **sen->Mer** |
|  |  |  |  | **Res->Amp ,Gen,Tob,Nit** |
| 6 | 03 Yrs | Female | RF-177 | **N/G** |
| 7 | 13 Yrs | Female | SOPD | **Not Significant** |
| 8 | 04 Yrs | Female | GOPD | **N/G** |
| 9 | 02 Yrs | Female | Uro-OPD | **Sample contaminated** |
| 10 | 05 Yrs | Female | MOPD | **N/G** |
| 11 | 1 Yr 6 Mnths | Male | POPD | ***Klebsiella Sp*** |
|  |  |  |  | **Sen->Genta ,Mer ,Tob** |
|  |  |  |  | **Res->Amp , Nit** |
| 12 | 03 Yrs | Female | GOPD | **N/G** |
| 13 | 10 Yrs | Male | Uro-OPD | **Sample contaminated** |
| 14 | 1 Yr 6 Mnth | Male | POPD | **N/G** |
| 15 | 08 Yrs | Male | GOPD | **N/G** |
| 16 | 17 Yrs | Female | GOPD | **N/G** |
| 17 | 01 Yr | Male | POPD | **N/G** |
| 18 | 1 Yr 4 Mnth | Male | POPD | **N/G** |
| 19 | 06 Yrs | Female | RF 5/113 | ***E. Coli*** |
|  |  |  |  | **Sen->Cef,Gen,Mer** |
|  |  |  |  | **Nor, Nit** |
| 20 | 04 Yrs | Female | POPD | **N/G** |
| 21 | 02 Yrs | Female | ANC | **N/G** |
| 22 | 09 Months | Male | POPD | **N/G** |
| 23 | 03 Months | Male | POPD | **N/G** |
| 24 | 11 Yrs | Female | ANC | **N/G** |
| 25 | 10 Yrs | Male | Uro-OPD | **N/G** |
| 26 | 18 Yrs | Female | GOPD | ***S. Aureus*** |
|  |  |  |  | **Sen->Lz , Nit ,Van** |
|  |  |  |  | **Res->Amp ,Dox ,Tob** |
|  |  |  |  |  |
| 27 | 5 Yrs 6Mnths | Female | Rf5/9 | **N/G** |
| 28 | 2 Yrs 6Mnths | Male | MOPD | **N/G** |
| 29 | 14 Yrs 4Mnths | Male | POPD | **N/G** |
| 30 | 16 Months | Male | SOPD | **N/G** |
| 31 | 06 Yrs | Male | TMO/7 | **N/G** |
| 32 | 03 Yrs | Male | PSO/9 | **N/G** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| 33 | 04 Yrs | Female | POPD | ***S. Aureus*** |
|  |  |  |  | **Sen->Dox, Lz, Nit, Van** |
|  |  |  |  | **Res-> Amp , Tob** |
|  |  |  |  |  |
| 34 | 12 Yrs | Female | ANC | **N/G** |
| 35 | 10 Yrs | Female | RF5/59 | ***E.Coli*** |
|  |  |  |  | **Sen->Gen,Tob,Mer,Nit** |
|  |  |  |  | **Res->Cef** |
|  |  |  |  |  |
| 36 | 10 Yrs | Female | SOPD | ***S. Aureus*** |
|  |  |  |  | **Sen->Tob, Lz, Nit, Van** |
|  |  |  |  | **Res->Amp,Dox** |
|  |  |  |  |  |
| 37 | 16 Yrs | Male | POPD | **N/G** |
| 38 | 6 Months | Female | POPD | **N/G** |
| 39 | 09 Yrs | Male | POPD | ***Klebsiella Sp.*** |
|  |  |  |  | **Sen->Gen , Mer, Tob** |
|  |  |  |  | **Res->Nit, Cef** |
|  |  |  |  |  |
| 40 | 08 Mnths | Male | POPD | ***E.coli*** |
|  |  |  |  | **Sen->Gen,Mer,Cpx,Nit** |
|  |  |  |  | **Res->Amp** |
|  |  |  |  |  |
| 41 | 11 Yrs | Male | POPD | ***E.coli*** |
|  |  |  |  | **Sen->Mer ,Lz ,Nit,Van** |
|  |  |  |  | **Res->Amp ,Gen** |
|  |  |  |  |  |
| 42 | 05 Yrs | Female | RF5/18 | ***E. coli*** |
|  |  |  |  | **Res->Amp, Gen, Cef** |
|  |  |  |  | **Mer, Nit** |
|  |  |  |  |  |
| 43 | 14 Yrs | Female | RF5/16 | ***Acinetobacter Sp*** |
|  |  |  |  | **Sen->Dox ,Col** |
|  |  |  |  | **Res-> Gen, Mer, Nor** |
|  |  |  |  | **,Nit, Ptb** |
|  |  |  |  |  |
| 44 | 03 Yrs | Female | POPD | **N/G** |
|  |  |  |  |  |
| 45 | 06 Yrs | Female | RF5/35 | ***Staphyloccus aureus*** |
|  |  |  |  | **Sen->Dox, Nit,Van,Tob** |
|  |  |  |  | **Res->Amp, Nor** |
|  |  |  |  |  |
| 46 | 03 Yrs | Female | Uro-OPD | **N/G** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| 47 | 07 Years | Female | RF5/F13 | ***Klebsiella Sp*** |
|  |  |  |  | **Sen->Tob ,Gen , Mer** |
|  |  |  |  | **Res->Nit** |
|  |  |  |  |  |
| 48 | 15 Years | Female | RF5/30 | ***Klebsiella Sp*** |
|  |  |  |  | **Sen->Colistin** |
|  |  |  |  | **Res->Dox, Tob , PiT, Gen, Nor** |
|  |  |  |  |  |
| 49 | 6 Yrs 8 Mnths | Female | RF5/21 | ***Klebsiella Sp*** |
|  |  |  |  | **Sen ->Mer** |
|  |  |  |  | **Res ->Ctr, Gen, Nal, Pit , Nit** |
|  |  |  |  |  |
| 50 | 01 Year | Female | RF5/14 | **N/G** |
|  |  |  |  |  |
| 51 | 17 Months | Female | RF5/33 | ***Acinetobactersp*** |
|  |  |  |  | **Sen->Mer , Pit** |
|  |  |  |  | **Res->Ctr, Gen, Nal, Nit** |
|  |  |  |  |  |
| 52 | 07 Years | Male | POPD | **N/G** |
| 53 | 3 Yrs 7 Mnths | Male | POPD | **N/G** |
| 54 | 1 Yr 8 Mnths | Male | RF5/2 | **N/G** |
| 55 | 15 Years | Female | GOPD | ***Staphycoccus aureus*** |
|  |  |  |  | **Sen-> Dox, Lz ,Nor , Nit, Van** |
|  |  |  |  |  |
| 56 | 12 Years | Female | GOPD | ***Staphycoccus aureus*** |
|  |  |  |  | **Sen->Lz, Van** |
|  |  |  |  | **Res-> Cip , Levo** |
|  |  |  |  |  |
| 57 | 04 Years | Male | RF5/18 | ***Klebsiella pneumoneae*** |
|  |  |  |  | **Sen->Cip, Mer, Nor , Pit** |
|  |  |  |  | **Res -> Amp , Ctr , Gen , Nit** |
|  |  |  |  |  |
| 58 | 17 Years | Female | GOPD | **N/G** |
| 59 | 07 Years | Male | POPD | **N/G** |
| 60 | 03 Months | Male | POPD | **N/G** |
| 61 | 14 Years | Female | GOPD | ***Enterococcus Sp*** |
|  |  |  |  | **Sen->Ctr , Nit** |
|  |  |  |  | **Res ->Cpx , Levo** |
|  |  |  |  |  |
| 62 | 04 Years | Female | Rf5/9 | **N/G** |
| 63 | 3Yrs9Mnths | Male | MOPD | **N/G** |
| 64 | 14Yrs 4Mnths | Male | POPD | **N/G** |
| 65 | 16 Months | Male | SOPD | **N/G** |
| 66 | 01 Year | Male | POPD | **N/G** |
| 67 | 04 Years | Male | PSO/9 | **N/G** |
| 68 | 4 Yrs 4 Mnths | Female | GOPD | ***E. coli*** |
|  |  |  |  | **S->Azm, Dox , Van ,Amo, Cef** |
|  |  |  |  | **Res->Tob** |
|  |  |  |  |  |
| 69 | 15 Years | Male | Rf5/18 | **N/G** |
| 70 | 1 Yr 8 Mnth | Female | POPD | **N/G** |
| 71 | 11 Years | Male | POPD | **N/G** |
| 72 | 13 Years | Female | GOPD | ***Staphycoccus aureus*** |
|  |  |  |  | **Sen->Dox, Lz, Nit, Van** |
|  |  |  |  | **Res-> Amp , Nor** |
| 73 | 7 yrs 4 mnths | Female | SOPD | **N/G** |
| 74 | 08 Years | Male | RF5/33 | **N/G** |
| 75 | 09 Months | Male | POPD | **N/G** |
| 76 | 14 Years | Male | SOPD | ***Klebsiella pneumoneae*** |
|  |  |  |  | **Sen-> Amp , Gen , Nit, Ctr,** |
|  |  |  |  | **Res->Mer** |
| 77 | 1 Year 8 Months | Female | ANC | **N/G** |
| 78 | 10 Years | Male | Rf5/29 | ***Acinetobacter sp*** |
|  |  |  |  | **Sen->Ctr, Gen, Nal , Nit** |
|  |  |  |  | **Res-> Pit, Mer** |
|  |  |  |  |  |
| 79 | 7 Years | Male | POPD | **N/G** |
| 80 | 12 Years | Female | GOPD | **N/G** |
| 81 | 6 Years 4 Months | Male | POPD | **N/G** |
| 82 | 5 Months | Male | ANC | **Not Significant** |
| 83 | 4 Years 1 Month | Female | Rf5/18 | **N/G** |
| 84 | 8 Years | Male | POPD | **N/G** |
| 85 | 3 Years | Male | POPD | **Not Significant** |
| 86 | 11 Months | Female | POPD | **N/G** |
| 87 | 16 Years | Female | GOPD | **N/G** |
| 88 | 7 Months | Male | POPD | ***Enterococcus sp*** |
|  |  |  |  | **Sen ->Levo** |
|  |  |  |  | **Res->Cip, Nit,Ctr** |
|  |  |  |  |  |
| 89 | 2 Years | Female | Rf5/33 | **N/G** |
| 90 | 4 Years 2 months | Male | POPD | **N/G** |
| 91 | 16 Years | Female | GOPD | ***Klebsiella Sp*** |
|  |  |  |  | **Sen ->Nal, Pit, Ctr , Nit** |
|  |  |  |  | **Res -> Gen** |
|  |  |  |  |  |
| 92 | 12 Months | ------ | SOPD | ***Enterococcus sp*** |
|  |  |  |  | ***Sen->Cpx, Nit, Ctr , Levo*** |
|  |  |  |  |  |
| 93 | 14 Years | Male | POPD | ***N/G*** |
| 94 | 3 Years | Female | POPD | ***N/G*** |
| 95 | 9 Years | Male | GOPD | ***N/G*** |
| 96 | 3 Year 9 months | Female | ANC | ***N/G*** |
| 97 | 12 Years | Male | SOPD | ***N/G*** |
| 98 | 03 Yrs | Female | POPD | **N/G** |
| 99 | 12 Yrs | Female | ANC | **N/G** |
| 100 | 16 Yrs | Male | POPD | **N/G** |