

A Survey Study of Urinary Tract Infections and their Susceptibility in Ibn- Al- Balady Hospital in Baghdad - Iraq

Khalid R. Easa (M.B.Ch.B, F.I.M.S)¹, Khalid B. Kago (M.B.Ch.B, D.C.H)², Hayat Hashem Ebead (M.B.Ch.B, D.C.H)³

^{1,2,3}Department of Pediatric-Ibn Al-Balady Hospital, Iraq

Abstract: **Background:** The most common bacterial infection occurred in the urinary tract. Urinary tract infections are diseases of infancy and older age. In the first 3 months of life these infections occurred due to blood spread that is means bacteremia while in older patients urinary tract infection usually occurred because of upward ascending rout via the urethra. **Aim of study:** The incidence rates of UTIs during the first year of life and in patients less than 15 years old is studied. Also their association with gender, sex, and determine the antibiotic sensitivity of bacterial isolates. **Patients and Methods:** During two calendar years 2015 and 2016. 2758 urine samples were collected from children 0-15 years old at Ibn- AlBalady hospital in Baghdad city. Two methods were used for culture of urine: vitektest and conventional biochemical test. Sensitivity to antibiotics done by Kirby Bauer disc diffusion method. **Results:** The incidence rate in girls was more than in boys. Out of them (2758) 834 have growth (UTI) and 1924 have no growth. *E.coli* was the highest percentage 33.21%. *Klebsiella spp.* (8.51%), *proteus spp.* 9.95%, *Salmonella typhi* 0.47% and *Pantoea spp.* was the lowest percentage (0.35%). **Conclusion:** The incidence of urinary tract infection is high as shown in this study. The most common organism cultured from uncomplicated UTI is Enterobacteriaceae. Many factors aided in the initial choice of antibacterial drugs these factors include patients age and antibacterial sensitivity in the particular region.

Keywords: UTI (Urinary tract infection), vesicoureteric reflux. Ascending infection, Antibiotic resistance, Enterobacteriaceae

1. Introduction

In patients with urinary tract anomalies 30% of them UTI is the first presenting clinical disease (1). In patients who have pyrexia of unknown origin UTI is the most common cause (2). Children who have vesicoureteric reflux 30% of them develop UTI which can put these children at risk for recurrent infections and scarring of the kidney. Age factor is important for developing renal scarring so young children and infants are at higher risk for renal damage from urinary tract infections than older children (3). The most serious bacterial infections and most common bacterial infections in pediatric age group are UTI (4). The percentage of boys who develop UTI is 2% while in girls at least 8%. The clinical features and the incidence of UTIs in children are very different for both sexes and at different stages of life (5). 80% of UTIs in children are caused by bacteria which has high resistance to antibiotics. This resistance to antibiotic makes the treatment of UTI more difficult so the morbidity is high and the costs for re-evaluation is high because of re-treatment and frequent hospitalization and use of broad spectrum antibiotics is high (6). Also during treatment of UTI the organisms can lose its sensitivity to an antibiotic (7).

2. Aim of the Study

The aims of present survey are to find out the prevalence of urinary tract infections in infant and young child in Ibn-Al Balady hospital in Baghdad because of their serious effect and determine the antibiotic resistance patterns in UTI in children.

3. Patients and Methods

Bacterial isolates: 2758 urine samples were collected from children expected to have UTI in Ibn-AlBalady hospital in Baghdad. The children at age 0-15 years with diagnosis of urinary tract infection with following variables were examined: age, gender and bacterial species. Two methods were used for bacterial isolates conventional biochemical tests and vitek 2 system (8).

Antibiotic susceptibility testing: According to clinical and Laboratory Standards Institute (CLSI) guidelines we use Kirby-Bauer disk diffusion method for antibacterial susceptibility after the bacterial isolates (9). The antibacterial agents included Ceftriaxone, Trimethoprim, Gentamycin, Ampicillin, Amikacin. Nitrofurantoin, Norfloxacin, Ceftazidime

Statistical Analysis

The values in this study and the difference factors were subjected to the Statistical Analysis System SAS program (10). The comparison between percentages was evaluated by Chi-square test.

4. Results and Discussion

It is difficult to point the exact incidence of urinary tract infections UTIs in children but still UTIs are the most common bacterial infections seen by pediatricians (11).

Results of our survey study included 2758 samples from children who are suspected to have UTI during two years 2015 and 2016. Out of them 834 were with positive growth and 1924 with no growth (Table 1). A significant increase in

the number of cases observed in Ibn-AlBalady hospital in 2015 may be caused an increased search for those cases in particular urinalysis which was performed on any infant or child whose clinical progress deviated in any way from the normal or it was considered that the apparent increase in the incidence resulted from an increase in detection rate, suggesting that patients with mild signs had previously been overlooked, this result agrees with Ali et al. (12), but in 2016, there is apparent decrease in number of UTI, this is rendered to health care or devices health care-associated infection, like those associated with central catheters or may be early diagnosis to UTI and lastly it may be due to using antibiotic with high activity. In infants and young children it is vital to diagnose UTI early because this infection may be a marker to the presence of anomalies of urinary tract and in the neonatal period it may be associated with bacteraemia. Also it is important to diagnose UTI early to protect the renal function of the growing kidney (11).

Table 1: Incidence of Urinary tract Infection by years

Years	Cases	Growth	%	No growth	%	Chi-Square- χ^2
2015	1817	600	33.02	1217	66.97	9.261**
2016	941	234	24.86	707	75.13	11.74**
Total	2758	834	30.23	1924	69.76	9.941**
Chi-Square- χ^2	---	---	4.326*	---	4.326*	---

* (P < 0.05), ** (P < 0.01)

Of 2758 samples, 1394 were female and 1364 were male (Table 2) shows important differences at different age, the highest rate of infections occurred at age group (7-15) year (2018 case). In infants 740 cases. Similar results were reported by Jumbo *et al* (13) who reported that UTIs in female was higher than that in males. Because the urethra is short and its location close to the perineal region, female get higher rate of UTI than male. Also because of poor perineal hygiene and errors in self management made by school age who clean the perineum forwards from the anus toward the vulva and have habit of infrequent micturition which leads to over distention of the urinary bladder with subsequent incomplete emptying leads to residual urine and stagnation of urine which allow for bacterial colonization to occur more easily and rapidly (14).

Table 2: Incidence of UTI among male and female in every year

Years	Male	%	Female	%	Total	Chi-Square- χ^2
2015	1010	55.58	807	44.41	1817	4.519*
2016	354	37.61	587	62.38	941	9.366**
Total	1364	49.45	1394	50.54	2758	---
Chi-Square- χ^2	---	6.952**	---	6.952**	---	---

* (P < 0.05), ** (P < 0.01)

Table 3: Incidence of UTI according the age every year

Years	Age				Total	Chi-Square- χ^2
	<1-6 years	%	7-15 years	%		
2015	644	35.44	1173	64.55	1817	9.277**
2016	96	10.20	845	89.79	941	13.894**
Total	740	26.83	2018	73.16	2758	11.653**
Chi-Square- χ^2	---	6.413**	---	6.413**	---	---

** (P < 0.01)

Also in our survey study from a total of 834 bacterial growth, E.coli was the highest percentage (33.21%), Klebsiella spp. (8.51%), Proteus spp. (9.95%), Salmonella Typhi (0.47%) and Pantoea spp. was the lowest percentage (0.35%) (Table 4).

The diagnosis of UTI in a young child is done by taking urine specimen for culture. Urinalysis can be used prior to culture to support diagnosis of UTI (11).

Table 4: Percentage of isolated bacteria from UTIs for two years 2015 and 2016

Bacteria	Number of isolates	Percentage from total samples	Percentage from growth
E. coli	277	10.04%	33.21%
S. aureus	31	1.12%	3.71%
Klebsiella spp.	71	2.57%	8.51%
Proteus spp.	83	3.00%	9.95%
Pseudomonas aeruginosa	23	0.83%	2.75%
P. putidae	6	0.21%	0.71%
p. lutent	5	0.18%	0.59%
S. epidermidis	30	1.08%	3.59%
S. warneri	2	0.07%	0.23%
Salmonella Typhi	4	0.14%	0.47%
S. haemolyticus	11	0.39%	1.31%
Acinetobacter spp.	22	0.79%	2.63%
Enterobacter spp.	33	1.19%	3.95%
Streptococcus spp.	15	0.54%	1.79%
Enterobacter sakazakii	8	0.29%	0.95%
Serratia odorifera	5	0.18%	0.59%
Serratia fonticola	2	0.07%	0.23%
Pantoea spp.	3	0.10%	0.35%

Table 5: Antibiotic sensitivity test

Isolated Bacteria & number	Antibiotic sensitivity test										
	AK	CIP	TMP	TE	C	AUG	AMP	CTR	CIT	VA	E
E.coli (144)	(%7.0)8	(%10.5)12	(%9.6)11	(%7.0)8	(%4.3)5	(%11.4)13	(%8.7)10	(%6.1)7	(%2.7)4	(%2.0)3	-
Staph.aureus(21)	(%38.0)8	(%33.3)7	-	(%4.3)1	-	(%4.7)1	(%9.5)2	(%4.7)1	(%4.7)1	-	-
Proteus ssp.(28)	(%3.5)1	(%17.8)5	(%7.1)2	(%7.1)2	(%3.5)1	(%3.5)1	(%25)7	(%14.2)4	(%3.5)1	(%7.1)2	-
Klebsiella spp.(18)	(%22.2)4	(%5.5)1	(%16.6)3	(%11.1)2	-	(%10)1	(%27.7)5	(%5.5)1	-	-	(%5.5)1
Enterobacter ssp.(10)	(%20)2	(%10)1	(%10)1	-	-	(%10)1	(%10)1	(%10)1	(%10)1	-	-
Streptococcus ssp.(30)	-	(%25)1	-	(%8)2	-	-	-	-	(%25)1	-	-

The most common bacteria cultured from uncomplicated UTI are Enterobacteriaceae(11), Russell (15) reported that E.coli given a strong suspicion of urinary tract infection. Vigi et al. (16) also found that E.coli is the primary etiologic agent associated with UTI in children. According to study achieved in Baghdad/ Iraq Al-Dawny and Yousif showed that 49% of UTI in Baghdad caused by E.coli (17).

Three useful and beneficial goals are obtained from rapid and correct diagnosis of the management of UTI firstly is prevention of progressive renal disease by eradication of the bacterial pathogen. Secondly is detection of anomalies of urinary tract and management of recurrent infections.

On the other hand, current study indicated that the antimicrobial agents with highest levels of activity against E.coli isolates were ampicillin then, TMP, the highest resistance was shown to AZM and AMC. Only Pseudomonas have resistance to 9 types of antibiotics while Proteus, Klebsiella showed resistant to (CN, NOR and CFM) and (TMP, CN and NOR) respectively. Staphylococcus and streptococcus were sensitive to some and non to others, Table (5), (6). Antimicrobial susceptibility pattern of uropathogens varies widely by region, but our results correspond with data obtained by other investigators (23, 24).

Al Marjani (25) reported that the bacterial culture results isolates from cockroaches were all have resistant to those antibiotics. Amoxicillin-, Cefixime, Al Marjani et al. (26) reported that P. aeruginosa which were cultured from the patients were highly resistant, were resistance 100% for Carbencillin; 80% for Cefixime, and 84% for Amoxicillin-clavulanic acid. The main factors determine your choice of antibacterial agent, the knowledge of the predominant pathogens in the patient's age and antibacterial sensitivity patterns in the practice area.

In conclusion the incidence of urinary tract infection in pediatric age group is high and is more common in female. The most common microorganism causes UTI is Enterobacteriaceae. The choice of antibiotic is based on patients age and antibacterial sensitivity pattern in that particular region.

References

- [1] Stein, R.; Dogan, H.; Hoe be ke, P.; Kocvara, R.; Nijman, R.; Radmayr, Ch. and Tekgul, S. (2015). Urinary Tract Infections in children: EAU/ESPU Guidelines., Uropean Association of Urology., 67:546-558.
- [2] Goldman, M.; Uahat, E.; Strauss, S.; Reisler, G.; Uivne, A.; Gordin, U. and Aladjem, M. (2017) Imaging After Urinary tract Infection in Male Neonates., Pediatrics 105 (6): 1232-2135.
- [3] Cohen, A.; Rivara, F.P.; Daris, R. and Christakis, D. (2017). Compliance with Guidelines for the medical care of first Urinary tract infections in infants: A population-Based study., pediatrics., 115 (6): 1475-1476.
- [4] Spencer, JD.; Schwadere, A.; McHuge, K. and Hanis, DS. (2010). Pediatric Urinary tract Infections: an analysis of hospitalizations, charge and costs in the USA., *Pediatr. Nephrol.*, 25: 2469-2475.
- [5] Bay, AG. and Anacleto, F. (2010). Clinical and laboratory profile of Urinary tract Infection in children among children at outpatient clinic of a tertiary Hospital., *PIDSP1*, 11 (1): 10-16.
- [6] Berk, B.; ozgu, A.; Semith, T. and Tarkan, S. (2010). Circumcision. Pros and cons., *Indian J. Urol.*, 26: 12-15.
- [7] Taneja, N.; Chatterjee, SS.; Singh, M. SS. and sharma, M. (2010). Pediatric Urinary tract infection in a tertiary care center from north India., *Indian J. Med. Res.*, 131: 101-105.
- [8] Collee, J.G., Fraser, A.G., Marmion, B.P., Simmons, A. 1996. Mackie and McCarty practical Medical Microbiology. 14th ed. Churchill living stone, New York ; 413-423.
- [9] CLSI., 2011. Performance standard for antimicrobial susceptibility testing; Twenty-First informational supplement., 31(1), 100-S21.
- [10] SAS. 2012. Statistical Analysis System, User's Guide. Statistical. Version 9.1th ed. SAS. Inst. Inc. Gary. N.C. USA.
- [11] Schlager TA. Urinary tract infections in children younger than 5 years of age: epidemiology, diagnosis, treatment, outcomes and prevention. *Paediatr Drugs*. 2001; 3(3): 219-27.
- [12] Ali, Sh.; Hussien, F.S. and Amer, H. (2017). Profile of renal diseases in Iraqi children: A single-center report., *Saudi Journal of Kidney Diseases and Transplantation.*, 26 (3): 613-618.
- [13] Jumbo, GTA.; Odey, F.; Ibor, S.; Bolarin, DM.; Ejezie, GC. and Egah, DZ. (2010). Subclinical significant bacteriuria among preschool children in calabar municipality: A survey, *J. Med. Sci.*, 4(4): 134-140.
- [14] Saeed, ch.; Otrachi, K. and mansoor, 1. (2015). Prevalence of urinary tract infections and antibiotics susceptibility pattern among infants and young children in Erbil City., *Zanco J. Med. Sci.*, 19(1): 915-922.
- [15] Russell, G. (2016). Antibiotic resistance in children with E. coli urinary tract infection., *BMJ.*, open access., 1-2.
- [16] Russell, G. (2016). Antibiotic resistance in children with E. coli urinary tract infection., *BMJ.*, open access., 1-2.
- [17] Vigi, Ch.; Gaurav, Sh.; Naveen, Ch. and Raghuvanshi, R.K. (2016). High prevalence of Multiple drug resistance among pediatric Escherichia coli infections. *Inter. J. Med. Reser. Health Scien.*, 5(10): 166-169.
- [18] Al-Dawny, F. and Yousif, A.A. (2013). Prevalence of E.coli in intestinal and urinary tract infection in children, *Inter. J. Advan. Resear.*, 1(8): 111-120.
- [19] Nisha, K.V.; shenoy, R.d.; Shetty, A.V.; Shenoy, VM. and Shetty, AK. (2015). Trends in antimicrobial resistance among uropathogens with special reference to E.coli in community acquired pediatric urinary tract infections from Keralla., *J. Evol. Medical and Dental. Sci.*, 4 (54): 9313-20.
- [20] Kumaraswamy, KK; Toleman, Ma; Bagaria, J.; Butt, F. and et al. (2015). Emergence of a new antibiotic mechanism in India, Pakistan and the UK: a molecular, biological and epidemiological study. *Lancet Infect. Dis.*, 10(9): 597-602.
- [21] Jain, A.; Dhir, SK.; Batta, M. and Singh, G. (2016). Knowledge and practices in community regarding

- antibiotic usage. *Inter. j. Res. Med. Sci.*, 4 (220); 610-614.
- [22] Mohsen, Y. M.B.; Shawkat, D.S. and Abd- Alsattar. (2013). Novel probiotic Bifidobacterium overcomes synergistic effect of three Naturalbiotic omni-drug and antibiotic against some UTI pathogens., *Inter. J. Scie. Nature.*, 4 (3); 456-462.
- [23] Muhsin, Y. M.B.; Majeed, H.Z. and shawkat, D. (2015), CFS and crude Bacteriocin of Lactococcus against Growth and Biofilm formation for some pathogenic bacteria.,*Int. J. Curr. Microbiol. App. Sci.*, 4 (7): 35-42.
- [24] Mohsin, YMB.; Majeed, H.Z.; Hasan, A.M. and Bataah, E.H. (2016). Susceptibility pattern of Pseudomonasaeruginosa producing enzymes against antimicrobial agent cell free supernatant of Lactococcus with the focus or its determining quantitate lively by OD (enzyme Linked immune sorbent assay)., *Asian J. Pharma, Clin Resear.*, 6 (1): 61-72.
- [25] Abbas, H.H.; Mohammed, S.A.; Sawkat, D.S. and Baker, Y.M. (2016). Effect of Lactobacillus sp. Crude Bacteriocin (CB) and cell-free Supernatant (CFS) Against E.coli growth and Adherence on vaginal Epithelial ceil Surface. *Inter. J. Adran. Resear*, 4 (1): 614-620.
- [26] Al Marjani M.F., Al-Ammar M.H.M., Kadhem E.Q., Occurrence of ESBL and MB Lgenes in Pseudo-monas aeruginosa and Acinetobacter baumannii Isolated from Baghdad, Iraq. *Inter. J. Current Res.* 5: 2482-2486 (2013).
- [27] Al Marjani M.F., Study Of Extended-Spectrum B-lactamases Producing Enterobacteria isolated from Cockroaches (Periplaneta Americana) of Central Medicine City Hospital., *Al- Mustansiriya J. Sci.* 19: 9-16 (2008).