Bacterial Urinary Tract infection in schoolchildren, Benghazi City

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Abstract:

This study conducted to measure the prevalence of UTI among children in schools inside Benghazi city, to identify bacteria responsible for UTI, to explore sensitivity to certain antibiotics used in the treatment of UTI for them, and to study the relation between some demographic variables and UTI. This study was conducted in the period between January and March 2016, included 160 samples. Target age group from 4-15 years, this study utilized two main instruments, questionnaire and urine testing (urinalysis and urine culture), The response rate in this study was 31.8% (51/160), where 47% (24/160) were among girls while boys 53% (27/160).

Gram positive bacteria were responsible for total 64.71% Staphylococcus epidermidis was the most predominant uropathogen with 35.30%, followed Staphylococcus aureus 23.53%, Enterococcus sp 5.88% of UTIs in comparison to gram negative 35.29%, bacteria which were Escherichia coli 19.61, Providmicia sp 5.88%, protues sp 5.88%, Klebsiella Pneumonia 1.96% pseudomonas sp 1.96% Antibiotics used in this study for gram positive bacteria 90% from samples sensitivity of Gentamicin 90% from samples resistance of Penicillin G for gram positive, but 100% from samples sensitivity of Tetracycline. 100% from samples resistance of Furadntin and Amoxicillin for gram negative bacteria.

In this study, the relationship UTI with demographic Variables; age (p=0.089), gender (p=0.64), type of water (p=0.488), and present of infection relative((p=0.19) was not significant but UTI was statistically associated with Reinfection (p=0.001) using of school toilet (p=0.000), residency (p=0.000), associated significant relationship

. Pupils must be allowed to go to toilets up on their request during their stay at school and they must be educated on how to use the toilets by themselves in a safe and hygienic way, Urine culture is an important diagnostic tool to confirm UTI. Rules must be put on the consumption of antibiotics to limit their abuse and misuse.

Aim of work:

1. To determine the prevalence of UTI among primary schools in Benghazi city with ages ranging between 4 and 15 years old.

2. To determine the common microbes causing UTI among primary schools in Benghazi city.

3. Evaluate the antibiotic susceptibility patterns of the isolates causing UTI among primary schools in Benghazi city.

4. Consider the demographic variables and their relationship with UTI,

5. (Demographic variables include: child's age, child's gender, using of school toilet, Residency, Reifection, present of infection relative, type of water)

3. Materials and Methods

Introduction

Urinary tract infections are almost exclusively due to bacteria. Diagnosis therefore cannot be made without bacteriological analysis of urine.Urinary tract infection is defined by the presence of a pure growth of more than 105,000 colony-forming units of bacteria per mL of urine, Lower counts of bacteria may be clinically important, especially in boys and in specimens obtained by urinary catheter. Any growth of typical urinary pathogens is considered clinically important if obtained by suprapubic aspiration. In practice, three age ranges are usually considered on the basis of differential risk and different approaches to management: children younger than one year; young children (ages one to four, five, or seven years, depending on the information source); and older children (up to 12 to 16 years of age); (Larcombe 1999). Recurrent infections can be further subdivided into unresolved bacteriuria,bacterial persistence, and reinfection (Steven, 2006).

Boys are more susceptible to UTI than girls before the age of 6 months; thereafter, the incidence is substantially higher in girls than boys. Girls tend to have UTI more often than boys because bacteria can reach the bladder more easily in girls. This is partially due to the short and wider female urethra and its proximity to anus (Farajnia, 2009). In uncircumcised boy's Urinary tract infections (UTIs) affect about 3 percent of children in the United States every year. Throughout childhood, the risk of a UTI is 2 percent for boys and 8 percent for girls. UTIs account for more than 1 million visits to pediatricians' offices every year. The symptoms are not always obvious to parents, and younger children are usually unable to describe how they feel. Recognizing and treating urinary tract infections is important. Untreated UTIs can lead to serious kidney problems that could threaten the life of your child.

The use of urinary catheters in young children, and in those experiencing nervous system disorders and children who are convalescing or unconscious for long periods may result in an increased risk of UTI (Molander, et al., 2002). The urinary bladder 10 wall is coated with various mannosylated proteins, such as Tamm-Horsfall proteins, which block the binding of bacteria to the uroepithelium (Toth et al., 2003). As binding is an important factor in establishing pathogenicity for these organisms, its disruption results in reduced capacity for invasion of the tissues. Due to poor adhesion, the unbound bacteria are more easily removed from thebladder by voiding urine hence reducing the chance of infection (Toth et al., 2003). The use of urinary catheters may physically disturb this protective lining, thereby allowing bacteria to invade the exposed epithelium (Esposito et al., 2008). Elderly individuals are more likely to harbour bacteria in their genitourinary system at any time (Alexander et al., 2009). This colonization may be accompanied by symptoms of infection that may necessitate treatment. The presence of bacteria in the urinary tract of older adults, without symptoms or associated consequences, is also a well-recognized phenomenon which may not require antibiotics (Nurullaev, 2004). This is usually referred to as asymptomatic bacteriuria. The overuse of antibiotics in the treatment of bacteriuria is of concern and a controversial issue (Rodhe et al., 2009).

Most of urinary tract infections are caused by Gram negative bacteria like E coli, Klebsiellaspp., Proteus sp. P aureginosa, Acinetobacter, and Serratia (Shaikh et al., 2008). A few of UTI cases are caused by Gram positive bacteria which include Enterococci, Staphylococcus and, Streptococcus agalactiae (Foxman, 2003). E coli causes 60% to 80% of UTI cases, Proteus (more common in boys and in children with renal stones), Klebsiella sp. 30-40%, Enterococci and coagulase negative Staphylococci 10-20% (Watson, 2004). Escherichia coli are the most common Gram-negative bacteria responsible for UTI (Shaikh et al., 2008). Proteus sp, and Klebsiella infections account for 10% and 6% respectively (Ghedira et al., 2004, Yuksel et al., 2006), Also Mycobacterium tuberculosis, Leptospira interrogans, Chlamydia, Mycoplasma and Candida species (39). Table (1) shows Bacteria that causes UTI

Escherichia coli are facultative anaerobes, normal flora; found in gastrointestinal (GTI) of humans and animals. Transmission of pathogenic E. coli often occurs via fecal contamination, dirty hands, and through sexual contact (Brown and Foxman, 2000; Gupta et al., 2001). Since bacteria can enter the urinary tract through the urethra (an ascending infection), poor toilet habits can predispose to infection, (Lane and Mobley, 2007). However, in most cases the initiating cause is unclear.

Diagnosis of UTI

Urinary tract infection is defined by a combination of clinical features and the presence of bacteria in urine (Mcloughlin and Joseph, 2003). It is also defined by the presence of more than 105,000 colony forming units (CFUs/ml) of single bacteria in cultured urine. The clinical features of UTI may include both specific and nonspecific signs and symptoms. Accurate diagnosis and treatment of UTI is essential to limit its associated morbidity, mortality and to avoid prolonged or unnecessary use of antibiotics (Tonagho and Mcanich, 2004). Diagnosis of UII is difficult particularly in young children and infants. This is because in this age group, the clinical presentation of urine infection is often with non-specific clinical signs such as fever, irritability, and vomiting that are also commonly seen in other childhood viral illnesses (NICE, 2012). Evaluation of UTI relies on both lab investigations and clinical signs and symptoms. Lab investigations include both urinalysis and urine culture. Diagnosis of UTI is not always straight forward because one cannot look at its appearance and conclude an infection (Kolawole et al., 2009). Criteria for the diagnosis of UTI vary greatly depending on the patients and context. A sample of urine is needed to confirm the diagnosis. Urine normally has no germs (bacteria) present, or only very few. A urine infection can be confirmed by urine tests that detect bacteria and/or the effects of infection in the urine (Tonagho and Mcanich, 2004). Ideally, thesample of urine should not come into contact with skin or other materials that may contaminate it with other bacteria (Hooton and Stamm, 1997). To make the diagnosis of a urinary tract infection in children, a positive urinary culture is required (Manges, 2006). There is considerable evidence of practice variation in use of diagnostic tests, interpretation of signs or symptoms and initiation of antibiotic treatment such as drug selection, dose, duration and route of administration (Gallati et al, 2006). Urine culture should be obtained for diagnosis of UTI in children if there is high clinical suspicion, cloudy urine, or 18 positive urine dipsticks (Manges et al, 2006).

Oral antibiotics should be used (when tolerated) instead of parenteral antibiotics to manage UTI in children. One day course of antibiotics should not be used to manage UTI in children instead; short courses of Antibiotics

(two to five days) may be used. Prophylactic antibiotics may be used to reduce the risk of recurrent UTI (Jamieson et al, 2006) Leucocytes can be found in the urine with any febrile illness and are nonspecific

for UTI. It is rare to find a true urine infection in the absence of significant pyuria, and the possibility of asymptomatic bacteriuria or a contaminated specimen should be considered (Kara.2012)

The classic presentations of dysuria, frequency, hesitancy, and flank pain in adults are unreliable when applied to pediatric UTI, particularly in infants. The presenting complaints in children tend to be vague, including fever, irritability, lethargy, poor feeding, failure to thrive, nonspecific GI complaints, and incontinence. Fever is the most common presentation in young children. (Hoberman A,1997).

Resistance of uropathogens to antimicrobials

Antimicrobial resistance occurs in intestinal bacteria due to antibiotic therapy for treating infections outside the urinary tract. The use of antibiotics has an influence in the spread of antimicrobial resistance among bacteria. The etiology of UTI and the antibiotic resistance of uropathogens have been changing over the past years, both in community and nosocomial infection (Kahan et al., 2006). Indiscriminate use of 22 antibiotics has also increased resistance to ß-lactam agents and Trimethoprim; in some regions rates of resistance to these drugs are above 20% when empiric use is no longer recommended. Quoinolone, resistance is also increasing; however, resistance to Nitrofurantion is rare (Katherine et al, 2009). In Africa, broad spectrum antimicrobial drugs such as Fluroquinolones, ß-lactam inhibitors, and cephalosporin have lost their effectiveness over the years (Kariuki et al, 2007). A study conducted in Tunisia revealed that the susceptibility of bacteria to the principal antibiotics used for the treatment of UTI was characterized by low sensitivity (Boukadida et al., 2002). However, a similar study carried out in Kenya revealed a similar trend in antimicrobial resistance among uropathogenic E. coli (Kariukiet al, 2007).

Fluroquinolones have become popular treatment for patients with uncomplicated UTI, but a study conducted by Kariuki et al, (2007), showed that uropathogenic E. coli are becoming resistant to Fluroquinolonesamong other antibiotics. This high upsurge of resistance in Kenya is due to frequent misuse and prolonged use of certain drugs that expose these strains to adapt resistance (Mitema and Kikuvi, 2004) The source of resistance may either be endogenous from contamination of the patient's urethra or perineum by the bacteria from the colonic flora or exogenous due to cross infection with bacteria from the infected urinary tract of another patient (Katherine et al, 2009) Transmission is by instruments like cytoscopes and catheters or by the hands of doctors and nurses as in the case of MRSA, Antibiotic resistance is a major clinical problem in treating infections caused by these microorganisms. The resistance to the antimicrobials has increased over the years. Resistance rates vary from one community to another and country to country depending on the commonly used antibiotics (Gales et al, 2001).

Prevention of UTI

Prevention of UTIs is difficult, but proper hygiene may help. Girls should be taught to wipe themselves from front to back (as opposed to back to front) after a bowel movement and after urinating to minimize the chance of bacteria entering the urethral opening. Avoiding frequent bubble baths, which may irritate the skin around the urethral opening of both boys and girls, may help lessen the risk of UTIs. Circumcision of boys lowers their risk of UTIs during infancy. Boys who are circumcised are infected with UTIs only 1/10th as often as boys who are not circumcised, but it is not clear whether this advantage by itself is a sufficient reason for circumcision. Regular urination and regular bowel movements (especially treatment of severe constipation) may lessen the risk of UTIs (Geoffrey A,2020). Prevention of recurrent UTI focuses both on detection and correction, if possible, of urinary tract abnormalities.

Interventions that have been associated with a decrease in symptomatic UTI in children with a history of recurrent UTI include relief of constipation and voiding dysfunction (Schlager, 2001). According to the National Institute for Health and Clinical Excellence guidelines, prevention of UTI recurrence includes: Relieving constipation and dysfunctional elimination syndromes in children who have had a UTI, encouraging them to drink an adequate amount, and ensuring that these children have ready access to clean toilets when required (NICE, 2012).

Materials and Method

1-Materials used in urine testing:

1. Sterile urine container.
2. Microscope
3. Centrifuge
4. Media for culture; Muller-Hinton Media, Cled, macConky, blood agar.
5. Antimicrobial susceptibility test discs.
6. Sterile calibrated loops 10 (ml)
7. Incubator.
8. Autoclave.
9. Biochemistry tests

Study Population:

The study was conducted on 160 samples of children (age 4_15) in schools, children were randomly selected to include all areas of Benghazi from 1 january to 30march 2016.

Inclusion criteria:

1-Children (4-15) years of age.

2- Children with good general health

Exclusion criteria:

Children taking Antibiotics at the time of taking samples were excluded from our calculations for the prevalence.

Study limitation:

The opposition of some the student's parents and the lack of responspecial the school principals to the study are causa for the lack of samples.

Instrument of data collective:

The study utilized two main Instrument:

A specially designed questionnaire was prepared for this porpone the questionnaire included both demographic and clinical parts.

Urine testing:

*Microscopic Examination

*Culture

Statistical analysis:

Data was tabulated and analyzed using the Statistical Package for Social Sciences SPSS software. Data were presented as frequencies. Chisquare analysis (22) was used in findings on comparison of positively UTI cases according to individual characteristics. Evaluations were carried out at 95% confidence level and $P<0.05$ was considered statistically significant.

2- Methods

Sample Collection:

This cross-sectional study was on a group of 160 children in the age group from 4-15 years in benghazi schools, but only 32% (160/500) responded to both taking urine samples from them and filling the study questionnaire, clean catch midstream urine samples were collected from cach patient into a sterile screw capped universal container. The samples were labeled, transported to the laboratory and processed within two hours of collection, to ensure maximum recovery of the organisms.

Microscopic Examination:

Microscopic examination of a centrifuged sample for White blood cells and bacteria was done for samples positive for Leukocyte. The presence of more than 5 WBC/HPF indicated pyuria.

Culturing of Urine Sample:

The cysteine lactose electrolyte deficient (CLED) (Oxoid limited) was used as selective media for isolation. The media were prepared according to the manufacturer's instructions and 0.001 ml of sample inoculated onto media using a platinum wire loop. Plates were then incubated for 24 hours at 37C. The number of pure colony forming units was then multiplied by 1000 to determine the number of micro-organisms per milliliter in the original specimen of urine. Those with more than 105 colonies were selected for further tests.

Identification of bacteria:

A total of 160 samples were collected and tested bacteriologically using standard procedures. Isolation of uropathogens was performed by a surface streak on CLED agar and incubated aerobically at 37°C for 24 hours (Tenaet al., 2008). A significant bacterial growth was considered in cases where the bacteria were above a concentration of 105 CFU/ml (Tonagho and Mcanich, 2004). The bacteria were confirmed by use of biochemical tests; Urease Test, Citrate Test, TSI Test, Oxidase Test, Catalase Test, Indole Test, Coagulase Test and DNase Test.

_The Gram Stain:

It is used to distinguish between gram-positive and gram-negative bacteria, which have distinct and consistent differences in their cell walls.

_ MacConkey Agar:

MacConkey Agar (MAC) is a selective and differential medium designed to isolate and differentiate enterics based on their ability to ferment lactose.

_ Blood Agar:

Blood agar is a type of growth medium (trypticase soya agar enriched with 5% sheep blood) that encourages the growth of bacteria, such as streptococci, that otherwise wouldn't grow.

Biochemical tests:

1- Urease Test:

Testing for urease enzyme activity is important in differentiating enterobacteria Proteus strains are strong urease producers. Y. enterocolitica also shows urease activity (weakly at 35-37 C). Salmonellae and shigellae do not produce urease (Cheesbrough, 1998).

2- Citrate test:

This test is one of several techniques used occasionally to assist in the identification of enterobacteria. The test is based on the ability of an organism to use citrate as its only source of carbon (Cheesbrough, 1998).

3- Triple Sugar Iron Agar (TSI)

Triple sugar iron agar was used to test for the fermentation of only glucose (yellow butt), fermentation of lactose and sucrose (all over yellow), CO_2 formation (crack in agar), or ferrous ammonium sulphate produced (black precipitate) (WHO, 2003).

4- Oxidase test

The oxidase test is used to assist in the identification of Pseudomonas, Neisseria, Vibrio, Brucella, and Pasteurella species, all of which produce the enzyme cytochrome oxidase (Cheesbrough, 1998)

5- Indole test:

Testing for indole production is important in the identification of enterobacteria. Most strains of E. coli, P. vulgaris, P. rettgeri, M. morganii, and Providencia species break down the amino acid tryptophan with the release of indole (Cheesbrough, 1998).

6- Catalase test

This test is used to differentiate those bacteria that produce the enzyme catalase, such as staphylococci, from non-catalase producing bacteria such as streptococci (Cheesbrough, 1998).

7- Coagulase Test

This test is used to identify S. aureus which produces the enzyme coagulase (Cheesbrough, 1998).

8 -DNase Test

This test is used to help in the identification of S. aureus which produces deoxyribonuclease (DNAase) enzymes (Cheesbrough, 1998).

Sensitivity test

Kirby Bauer Antibiotic Susceptibility Test Antimicrobial susceptibility of isolates was tested, using antibiotic discs with the minimum inhibitory concentration (MIC) on a bacterial lawn growing by the disk diffusion by method Mueller-Hinton medium this creates a zone of inhibition. This Size of the zone depends upon the sensitivity of the bacteria to the antibiotic.

The plates are read after 18 hours incubation at 36 C, Antimicrobial agents tested present in Table (1)

Table (1) Antimicrobial agents which usedin my study:

No	Antimicrobial agent		Con. mg
1	Amoxicillin	AX	10
2	Amoxicillin and clavulanate	AMC	10/20
3	Azithromycin	AZM	15
4	Ciprofloxacin	CIP	5
5	Cephalexin	CI	10
6	Ceftriaxone	CRO	30
7	Cefuroxime	CXM	30
8	Cefoxitin	FOX	30
9	Gentamycin	CN	10
10	Methicillin	ME	5
11	Nalidixic acid	NA	30
12	Nitrofurantion	F	300
13	Oxacillin	OX	1
14	Penicillin G	P	10
15	Tetracycline	TE	30
16	Trimethoprim + Sulphamethe	SXT	25

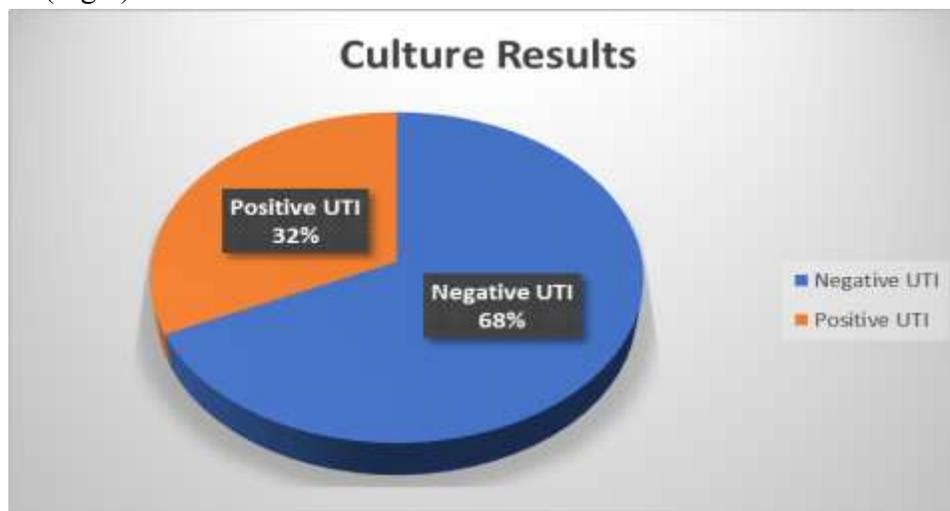## Results
1- Urinalysis
1.1 Microscopy results

A microscopic examination of 160 samples found that 55(34%) cases had white blood cells and bacteria, 35(22%) positive for pyuria, and 70(44%) negative for pyuria or bacteriuria (Fig. 1).
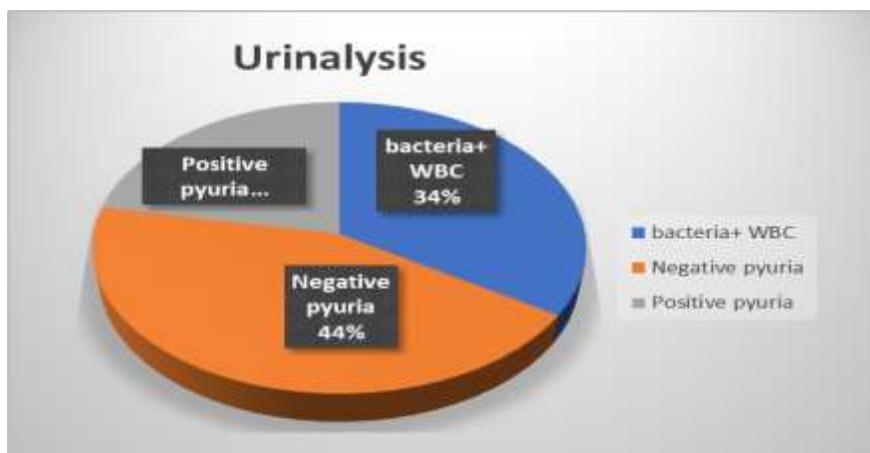
(Fig. 1) Urinalysis

2- Culture results

after screening 160 samples for primary school children in Benghazi. from age 4-15, they which are randomly selected to include all areas, the overall prevalence of UTI was calculated to be 51/160(32%), whereas the prevalence of UTI in girls was calculated to be 24(47%), in boys 27(53%), According to gram dye negative bacteria was responsible for 35% of UTIs in comparison to gram positive bacteria which was 65%. (Fig.2)

(Fig.2) Culture results

Identification of isolated bacteria:

by use of biochemical tests of bacteria (Table2):

	Gram stain	Catalase	Oxidase	Citrate	Urease	Coagulase	DNase	TSI

S aureus	+	+	-	+	+	+	+	A/A,G
S epidermidis	+	+	-	+	+	-	-	-
Enterococcus sp	+	-	-	-	-	-	-	-
E coli	-	-	-	-	-	-	-	A/A,G
K pneumonia	-	+	-	+	+	-	-	A/A,G
Provideenci sp	-	+	-	+	+	-	-	K/A,G
P mirabilis	-	+	-	+	+	-	-	K/A,G,H2S
P aerugi	-	-	+	+	-	-	-	K/K

Identification of Klebsiella pneumonia

is Gram-negative rods appeared capsulated non motile.It appeared lactose fermented mucoued pink colonies on MacConkey agar, give positive citrate test. negative indol test and confirmed by TSI media (acid in butt and slant without production of gas and H2S.

Identification of Escherichia coli It is Gram-negative rod, motile under the microscope and gives lactose Fermenting yellow colonies on CLED Agar and pink colonies on MacConkey and with biochemical reactions thy produced positive indole test and negative. citrate & urease tests and confirmed by TSI media, (acid in butt and slant with production of gas and no H2S.

Identification of Providencia sp:

Gram negative motile rods flagellated. non lactose fermenters, Catalase Positive, Citrate Positive, TSI (K/A, gas Positive, H2S Negative). Indole Positive, Oxidase Negative, Urease Negative.

Identification of Proteus mirablis:

Gram negative, non-lactose fermenter. Ferments glucose, maltose and sucrose, it shows Swarming on blood agar, With production of acid and gas, citrate negative, urease and H2S positive confirmed by TSI (acid in but and alkaline slant, Gas (+) H2S (+).

Identification of staphylococcus epidermidis

Gram-positive cocci bacterium, Catalase Positive, Coagulase Negative, Citrate Negative, Gas and H2S Positive, Motility Negative, Oxidase.

Identification of staphylococcus aureus

Gram-positive cocci Motility Negative, catalase-positive, coagulase-positive. DNAse-positive. Citrate positive, Gas and H2S Negative, Indole Negative, Oxidase Negative, Urease positive.

Identification of Enterococcus sp:

Gram Positive Cocci non motile, Catalase Negative, Oxidase Negative, Indole Negative, Citrate Negative, Urease Negative, Gas and H2S Negative, Coagulase Negative, fermention of Lactose, Glucose and Fructose Positive.

Identification of Pseudomonas aregenosae

Gram-negative, Rod Motility, One or more polar flagella motility catalase Positive oxidase Positive indole negative. Hemolytic (on blood agar, TSI. Citrate Positive, Gas and H2S Negative, Indole Negative, Oxidase Positive, Urease Negative, non-lactose fermenter.

- Distribution of Uropathogens among the 51 positively UTI samples:

1-Distribution of Gram-positive bacteria among uropathogen

Table ((3 shows that Gram positive bacteria was the most common of uropathogens responsible for UTI with a 64.71% and the highest (35.30%) of Staphylococcus epidermidis, folowed by Staphylococcus aureus 23.53%, Enterococcus sp 5.88%.

2- Distribution of Gram-negative bacteria among uropathogen

Table (3) shows that Distribution of Gram-negative bacteria responsible for UTI with 35.29% percentage of Escherichia coli followed by (19.61%) Providmicia sp. protues sp followed by (5.88%). seudomonas sp (1.96%). and Klebsiella Pneumonia (1.96%).

Table (3) shows that Gram positive and Gram-negative bacteria

- Gram stain	%	+ Gram stain	%
E coli	19.61%	*S aureus*	23.53%
K pneumonia	1.69%	*S epidermidis*	35.30%
Provideenci sp	5.88%	*Enterococcus sp*	5.88%
P mirabilis	5.88%	/	
P aerugi	1.69%	/	
Total	35.29%	64.71%	

_ The prevalence of uropathogens according to the age of children

According to data presented in Table(4) showed that : Staphylococcus epidermidis found among age 4-7(12%), 8-11(14%), 12-15(10%), Staphylococcus aureus 4-7(8%), 8-11(10%), 12-15(6%) while Escherichia coli 4-7(8%), 8-11(6%), 12-15(6%), Proteus spp 4-7 (4%), 12-15(2%), Enterococcus sp 4-7(2%), 12-15(4%), providmicia sp 12-15(6%) Pseudomonas sp only infection at ages (12-15(2%) Klebsiella Pneumonia infect only at ages from 4-7(2%).

Table (4(show the prevalence of uropathogens according to the age of children

uropathogens	4-7	8-11	12-15
S aureus	7.84%	9.81%	5.88%
S epidermidis	11.76%	13.74%	9.81%
Enterococcus sp	1.96%	-	3.92%
E coli	7.84%	5.88%	5.88%
K pneumonia	1.96%	-	-
Provideenci sp	-	-	5.88%
P mirabilis	3.92%	-	1.96
P aerugi	-	-	1.96%

- The prevalence of uropathogens according to the gender of children:

According to data presented in Table (5(showed that: *Staphylococcus epidermidis* 12% female, 24% male, *Staphylococcus aureus* (8%) female, (16%) male, while *Escherichia coli* (16%) female, (4%) male,

providmicia sp (4%) female, (2%) male, *Enterococcus sp* (2%) female, (4%) male, *Proteus sp* infect only (6%) female while *Pseudomonas sp* (2%) male, *Klebsiella Pneumonia* (2%) male. fig (3)

Table (5(showed prevalence of uropathogens according to the gender of children

uropathogens	female	male
S aureus	7.84%	15.69%
S epidermidis	11.77%	23.53%
Enterococcus sp	1.96%	3.92%
E coli	15.69%	3.92%
K pneumonia	-	1.96%
Provideenci sp	3.92%	1.96%
P mirabilis	5.88%	-
P aerugi	-	1.96%
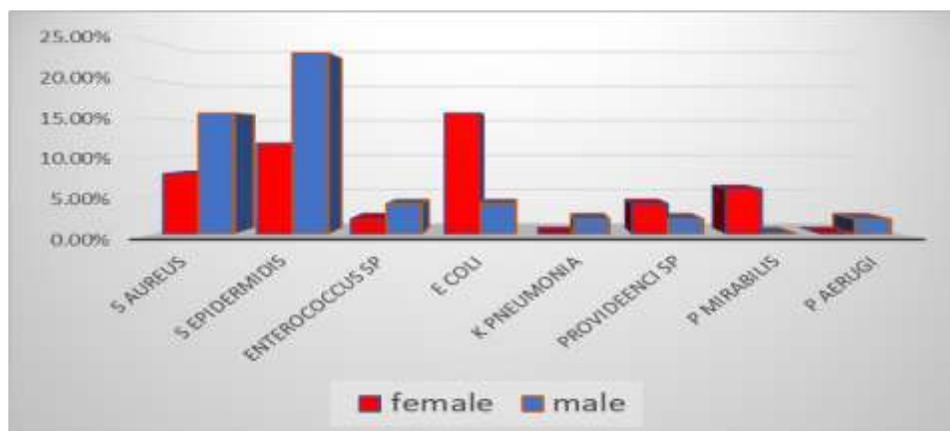
fig (3) showed prevalence of uropathogens according to the gender of children

- The prevalence of uropathogens according to the gender of children and their ages.

According to data presented in Table (6) showed that:

During the age 4-7 there are 18 cases, 19.6% male, 15.7% at female. While at age (8-11) was 15 cases, 19.6% male while 9.8% at female, but age (12-15) was 18 cases 13.7% male and 21.6% at female.

Table (6) showed prevalence of uropathogens according to the gender of children and their ages.

	female	male
4 - 7	15.7%	19.6%
8 - 11	9.8%	19.6%
12 - 15	21.6%	13.7%
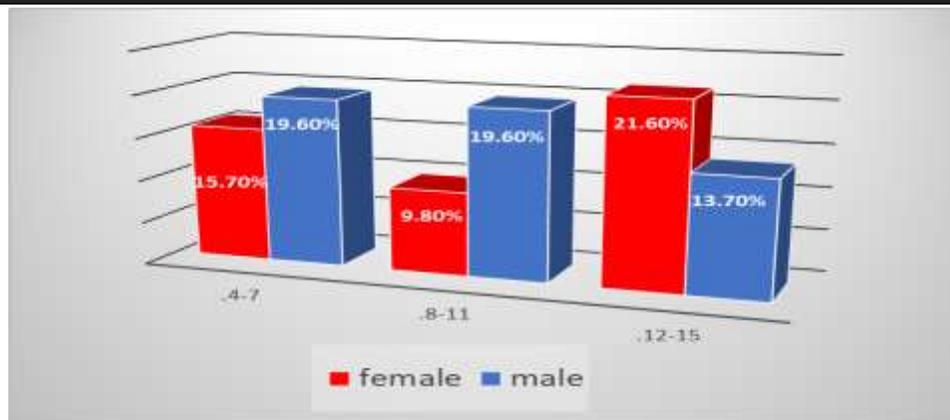
fig (4) showed prevalence of uropathogens according to the gender of children and their ages.

- prevalence of uropathogens according to antimicrobial agent

Kirby Bauer Antibiotic Susceptibility Test Antimicrobial susceptibility of isolates was tested, using antibiotic discs with the minimum inhibitory concentration (MIC) on a bacterial lawn growing by the disk diffusion by method Mueller-Hinton medium this creates a zone of inhibition. This Size of the zone depends upon the sensitivity of the bacteria to the antibiotic. The plates are read after 18 hours incubation at 36° C.

In this study Different types of antibiotics against Gram negative bacteria and Gram-positive bacteria were used where Gram-negative bacterial isolated was most sensitive to Tetracycline100%, ciprofloxacin 90%, while the highest degree of resistance for Furadntin 100%, Amoxicillin 100% and colistin 85%, Table (7). while.Gram- positive bacterial isolated was most sensitive to Gentamicin 90%, Ciprofloxacin 80% and, Cefoxitin 75%, but the highest degree of resistance for Penicillin G90%, Oxacillin 75% and Amoxicillin 75%, Table. (8),

Table. (7) Sensitivity of gram-Negative bacteria to antibiotics

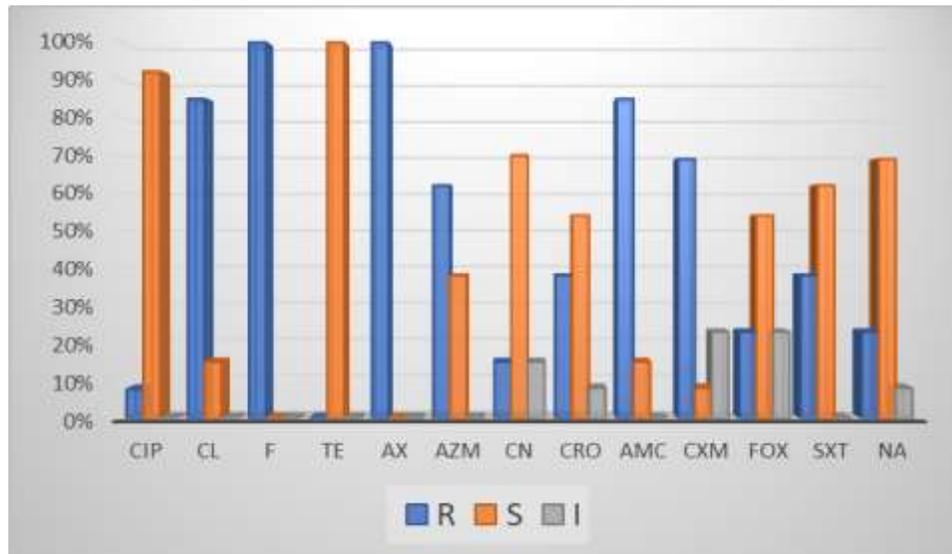| Antibiotics		R	S	I
Ciprofloxacin	CIP	8%	92%	0%
Colistin	CL	85%	15%	0%
Furadntin	F	100%	0%	0%
Tetracycline	TE	0%	100%	0%
Amoxicillin	AX	100%	0%	0%
Azithromycin	AZM	62%	38%	0%
Gentamicin	CN	15%	70%	15%
Ceftriaxone	CRO	38%	54%	8%
Amoxicillin + Clavulanic acid	AMC	85%	15%	0%
Cefuroxime	CXM	69%	8%	23%
Cefoxitin	FOX	23%	54%	23%
Trimethoprim + Sulphamethe	SXT	38%	62%	0%
Nalidixic Acid	NA	23%	69%	8%

Fig (4) Sensitivity of gram-Negative bacteria to antibiotics

Table (8) show Sensitivity of gram-positive bacteria to antibiotics

Antibiotics		R	S	I
Ciprofloxacin	CIP	20%	80%	0%
Colistin	CL	45%	50%	5%
Furadntin	F	50%	50%	0%
Oxacillin	OX	75%	25%	0%
Tetracycline	TE	35%	65%	0%
Penicillin G	P	90%	10%	0%
Amoxicillin	AX	75%	25%	0%
Azithromycin	AZM	35%	60%	5%
Gentamicin	CN	10%	90%	0%
Ceftriaxone	CRO	35%	60%	5%
Amoxicillin + Clavulanic acid	AMC	60%	40%	0%
Methicillin	ME	45%	55%	0%
Cefuroxime	CXM	40%	60%	0%
Cefoxitin	FOX	25%	75%	0%
Trimethoprim + Sulphamethe	SXT	35%	65%	0%
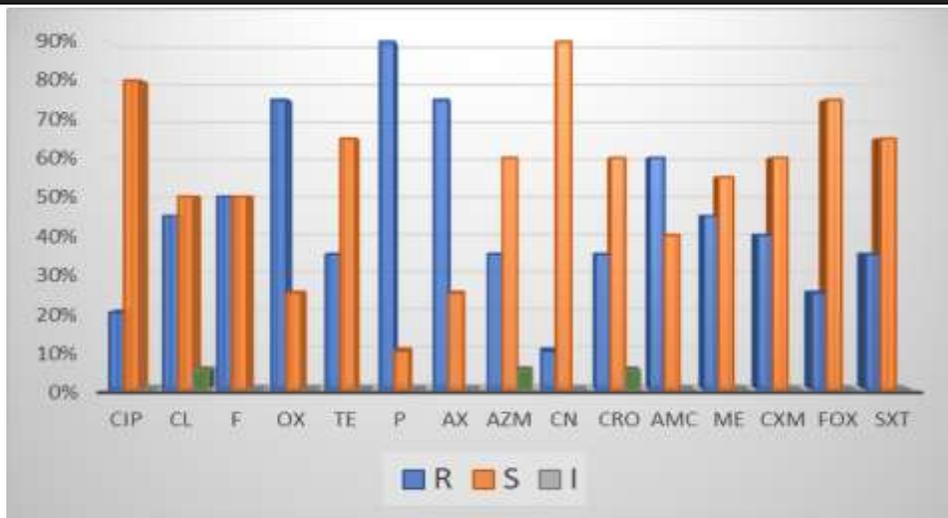
fig (5) shows Sensitivity of gram-positive bacteria to antibiotic

- UTI and demographic characteristics:

Table (9) shows the relationship between urinary tract infection and the variables: The age(p=0.089), Gender(p=0.64) of the child, Type of drinking water(p=0.488), Reinfection (p=0.001), present of infection relative, (p=0.004), were not statistically significant with p values, using of school toilet (p=0.00), and Residency (p=0.00) was statistically significant.

see to Fig (6,7,8,9,10,11,12))

Table (9) shows the relationship between urinary tract infection and the variables

Demographic characters and behavior		UTI (+) N=51	UTI (-) N=109	Chi sequare	P Value
AGE	4_7	18	48		
	8_11	15	40	4.842	0.089
	12_15	18	21		
Gender	male	27	62	0.218	0.64
	female	24	47		
Residency	Flat	15	14	15.55	0.000
	Home	24	85		
	Moving	12	10		
Type of water	Tab water	14	21	1.433	0.488
	Treatment water	22	50		
	Distiller water	15	38		
Reinfection	yes	12	6	11.306	0.001
	No	39	103		
Present of infection relative	yes	14	20	1.72	0.19
	No	37	89		
Using of school Toilet	yes	28	14	31.745	0.000
	No	23	95		
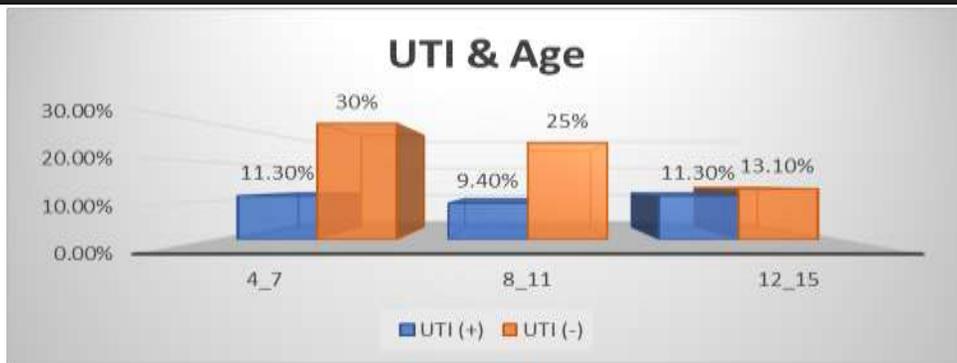
Fig (6) shows the relationship between UTI and age
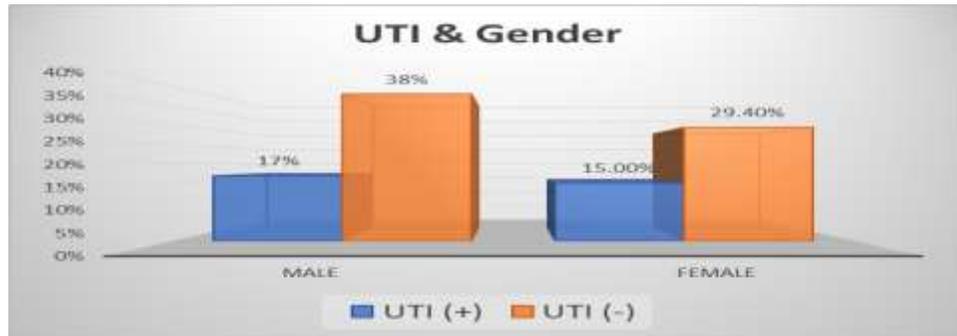
Fig (7) shows the relationship between UTI and Gender
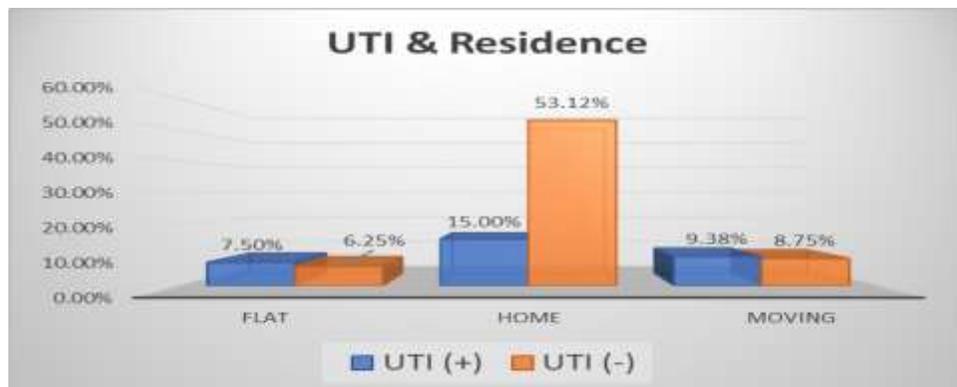
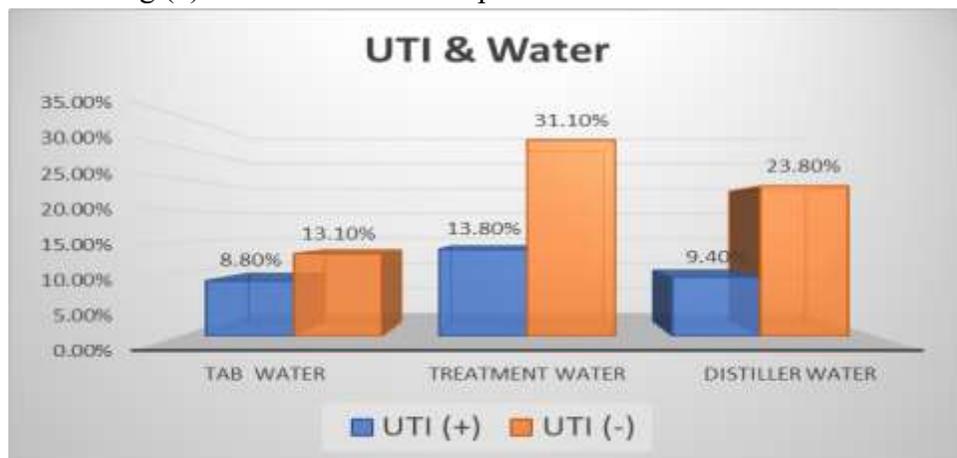Fig (8) shows the relationship between UTI and Residence

Fig (9) shows the relationship between UTI and type of water
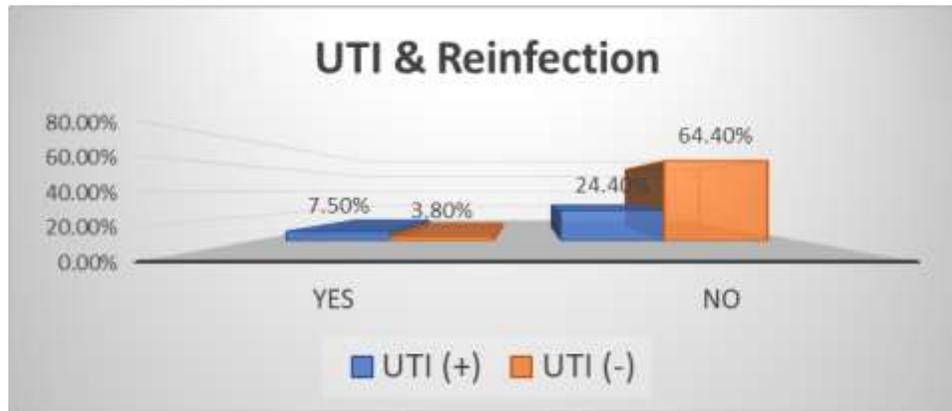
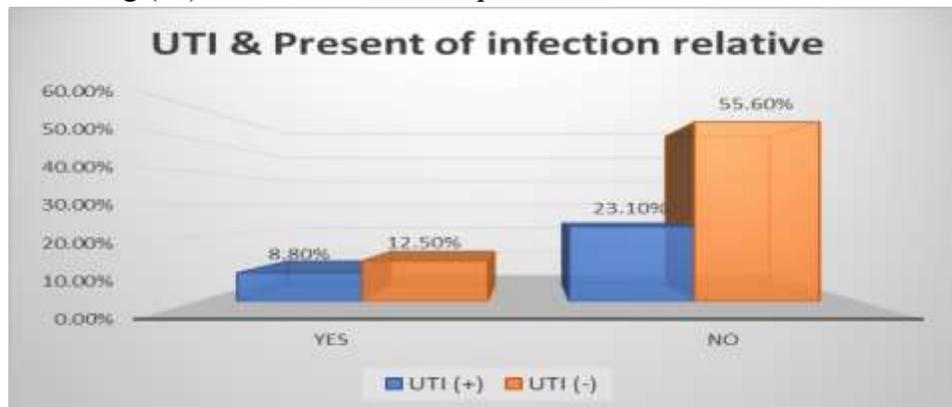Fig (10) shows the relationship between UTI and Reinfection

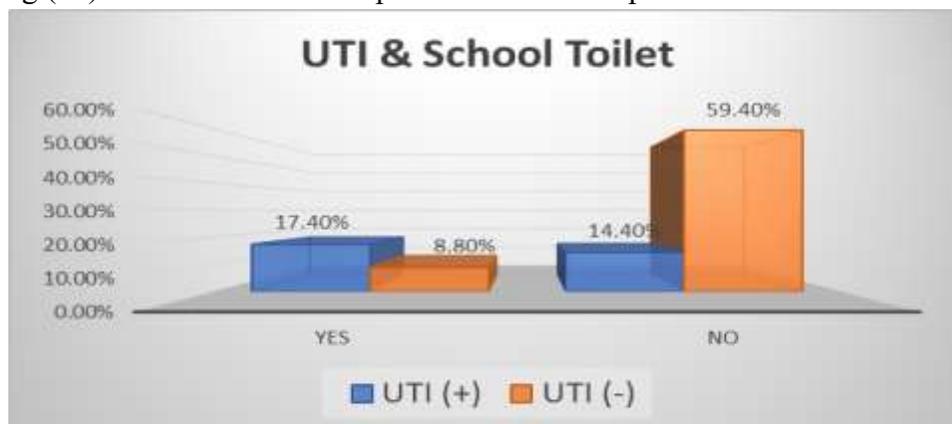Fig (11) shows the relationship between UTI and present of infection relative

Fig (12) shows the relationship between UTI and Using of school Toilet

-Discussion

Epidemiological studies of UTI are based on the presence of appositive urine culture. The classical diagnosis of urinary tract infection (105,000 cfu/ml) is applied in the childhood diagnosis of urinary tract infection, in addition to pyuria (more than 5 white cells per high powered field on microscopy) and bacteriuria The presence of both pyuria and bacteriuria from a fresh urine sample are highly indicative for UTI. In this study, results showed that rate of the response for 160 samples for primary school children in Benghazi, from age 4-15, was 51(32%). whereas the prevalence of UTI in girls was calculated to be 24(47%), in boys 27(53%), similar result was observed by (Najim, et al, 2018) that UTIs are less common in females than males (6% and 20%) respectively. in contrast result was observed by (Aiyegoro, et al.,

2007). In Nigeria, another study showd that female (22.4%) had positive urine culture while (4.56%) males had significant bacteriuria. And also, the result was observed by (LaMond, 2005), In north of England the incidence of UTI was 3.6% in boys and 11.3% in girls by the age of 16 years, in this study showed that sex is not associated with UTI, and the relationship is not statistically significant with p=0.64. and the age from 4-15 generally are not associated with uti and the relationship is not significant with P-0.089. but the age group (12-15) in particular was more able to adapt to urinary tract infection than the rest of the age group.

Similar study by (swalha, 2009) the rate of life expectancy in females is higher than that of males, at 12-15 years, possibly because of the onset of adolescence and the onset of the menstrual cycle.

According to gram dye, the Gram-positive bacteria were responsible for total 64.71% Staphylococcus epidermidis was the most predominant uropathogen with 35.30%, Staphylococcus aureus followed by 23.53%, Enterococcus sp 5.88% of UTIs, Similar result by (Fadhel, 2013) found that S.epidermidis are higher prevalence than S.aureus 55.5% (10 out of 18) and 26.6% (8 out of 30). There are some reports that support the result of my study Staphylococcus epidermidi became more causative for UTI may be due to two main advantages: its natural status on human skin, leading to easy access to any device entered or implanted across the skin, and its ability to adhere biomaterials and form a biofilm The biofilm protects the organisms from phagocytic cells and reduces the penetration of antibiotics, and thus appears to facilitate infection by shielding these normally low-virulent organisms from elimination by host defenses or antimicrobial therapy (Rupp, 2014 and Von, et al., 2002).

In this study Gram negative 35.29%, bacteria which were Escherichia coli 19.61, Providmicia sp 5.88% protues sp 5.88%, Klebsiella Pneumonia 1.96% pseudomonas sp1.96%. In contrast study by (Mcloughlin. 2003) found that 89% had UTI due to Escherichia coli, 3.7% to Klebsiella, 1.2% to Proteus sp., 1.2% to Citrobacter, 1.2% to Staphylococcus sp 1.2%, and Enterococcus 3.7%. In other Egyptian study by (El-Gamasy, 2017). The most common pathogens were Escherichia coli 55%, Klebsiella sp 26.6%, and Proteus mirabilis 14.2%, in Indian study by (Bhooshan, et al., 2013) Most commonly isolated pathogen was E. coli 27.05%, Klebsiella 18.82% and Proteus 11.76%, respectively. Other pathogens were isolated with lower frequency. by (Aiyegoro, et al.,2007)

Escherichia coli constituted the predominant organism and was responsible for 52.77% of the cases of UTL. This was followed by Klebsiella sp 25%, Proteus mirabilis 13.89%, Escherichia coli was the most prevalent isolate generally and in females, while Staphylococcus aureus was the predominant isolate causing urinary tract infection in males. similar result was observed by (Bankole, et al,2011).

In this study Different types of antibiotics against Gram negative bacteria and Gram-positive bacteria were used Where Gram- negative bacterial isolated was most sensitive to Tetracycline 100%, ciprofloxacin 90%, while the highest degree of resistance for Furadntin 100%, Amoxicillin 100% and colistin 85% (Table.7). while.Gram- positive bacterial isolated was most sensitive to Gentamicin (90%) and Ciprofloxacin 80%and, Cefoxitin 75%, but the highest degree of resistance for PenicillinG 90%, Oxacillin 75% and Amoxicillin 75% (Table.8).

By (Kayaş,et al,2011) found that the resistance rates against trimethoprim-sulfamethoxazole were 71.3%, ampicillin 82.4%, amoxicillin-clavulanate 54.7% and tetracycline 68.3%, and the least resistance rates were for ceftriaxone 16% and amikacin 8.1. In study by (Amin, 2009) showed the highest degree of resistance to ampicillin, cefalothin. The Gram-negative bacilli. isolated from UTI were sensitive to amikacin and ciprofloxacin 83%,100%, and Gram-positive cocci were sensitive to kanamicin and

tobramicin 100%. The amikacin was more effective against Pseudomonas spp. and Acinetobacter spp. isolated in present-study. E coli showed that this bacterium was sensitive to gentamicin, ceftriaxone, amikacin 90.5%, and to cefotaxime, ciprofloxacin and tobramicin 85.3-89.6% respectivel, Most of the isolated bacteria in this study were resistant to ampicillin 92.4%, cephalothin 80.8%, and tetracycline 73.8%, other Study by (Kareem, 2007) shows that The percentage of resistance for E coli varies from 73% to 86%, to Ceftzidime and Ceftriaxone, Trimethoprim Sulfamethaxozol; for K pneumoniae it ranges from71% to 100% for Amoxicillin, Pipracillin, Trimethoprim Sulfamethaxozole, and Colistin; for P mirabilis plus P vulgaris ranging from 66% to 100% for Cetazidime, Trimethoprim Sulfamethaxozol, and Cefotaxime; and for P. aeruginose ranges from 66% to 100% for Cefazidime, Colistin, Nafcillin, Gentamycin, Trimethoprim Sulfamethaxozol. Conclusion E coli caused, UTI in female higher than men in the community, and the gram-negative rods had multi antibiotic resistant. Prevalence of UTI according to residency was positivity and the relationship with UTI is significant with $P=0.000$ in contrast result was observed by (Sawalha, 2009) Prevalence of UTI according to residency is not significant with $P=0.235$, Children stay long time at school during which they need to use toilets several times alone without the supervision of anyone. in this study shows that the relationship between UTI and using of student's school toilet positivity $(p=0.000)$ from same table we may concludethat Reifection and UTI are associated significant relationship shows $(p.value =0.001)$ present of infection relative and UTI are not associated with $(p.value =0.19)$, and the relationship between UTI and the Type of drinking water $(p = 0.488)$, No significant relationship.

Results of study different for most other studies maybe the conditions in the period of research were different because the circumstances of war, displacement and Some of them were moved to live in schools in groups where there was a lot of pollution.

Problems encountered in this study:

1. The refusal of the administrations of some private schools to conduct tests for students.

2. Lack of most students' response to give me a sample of his urine Where only 160 of the 500 (32%) target students responded.

Conclusions

1. 1. The overall prevalence of UTI is 32% (51/160) in the age group from 6-15 among primary school in Benghazi.

2. Gram negative bacteria was responsible for 35.29% of UTIs in comparison to gram positive bacteria which was 64.71%. Staphylococcus epidermidis most predominant pathogen18(35.23%).

3. In this study Different types of antibiotics against Gram negative bacteria and Gram-positive bacteria were used where Gram-negative bacterial isolated was most sensitive to Tetracycline 100%, ciprofloxacin 90%, while the highest degree of resistance for Furadntin 100%, Amoxicillin 100% and colistin 85%. while.Gram-positive bacterial isolated was most sensitive to Gentamicin 90%, Ciprofloxacin 80% and, Cefoxitin 75%, but the highest degree of resistance for PenicillinG 90%, Oxacillin 75% and Amoxicillin 75%.

4. There is relationship between age and UTI at (12-15).

5. The relationship between urinary tract infection and the variables: age (p 0.089). Sex (p=0.64). Type of drinking water (p = 0.488), present relative infection. No significant relationship. Either use the school toilet (p = 0.00), reinfection (p=0.000). residency (p 0.00) According to the study data, there is a relationship between the disease and them.

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