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The Use of Strip Method as Early Diagnostic Test for Urinary Tract Infectionin Children Attending Kirkuk Pediatric Hospital

ABSTRACT

Background : Urinary tract infection is a common infection causing illness in children. It is either presented with specific symptoms or may asymptomatic especially in younger infant. It is most common cause of febrile disease in children .Affecting about 2% of boys and 80% of girls by the age of 11 years. UTI is important infection usually occurs due to bacteria although viruses and fungi and parasites can also cause infection.

Aim : The aim of this study early diagnosis of UTI by use strip method.

Patients and method: Across sectional hospital based study done on patients who attended the outpatient clinic of pediatric General hospital in Kirkuk city selected randomly ,during the period from 1st of July to 30th of August 2017 .The population included in this study was children aged 2 month to 12 years old ,total number about 250 cases, only selected the patient with positive stripe test for pus ,which represented about 170 patients (95 girls and 75 boys), were send t for urine culture .The patients included in this study ,were those patients who had signs and symptoms of UTI .Each patient included in the study were assessed by appropriate questionnaire which include name ,age ,sex, ….etc .Each patient included in the study were assessed for presence of UTI using strip method .Urine sample taken from patients by clean catch and by urine collection bag in children younger than 2 years, after learning the mother to wash genital area with water and soap if available before applying the urine bag .Patient > 2year ,urine were taken by midstream urine sample after cleaning the area as above .Urine putted in tube and sent immediately to the lab fir culture after take the results of strip method . The strip screen for presence of 8 different items in addition to pus, cell, nitrate ,PH, protein ,glucose, ketone ,bilirubin , erythrocyte, and Hb. The number of pus cell in strip were represented in different colors according to number of pus cell. The patient were diagnosed as UTI by strip method in the presence of 1+ or more pus by comparing the matching color .

Results: The total number of cases included in the study were 250 cases , 170 (68%) of cases were positive by strip for UTI , 52 (30%) of cases were positive by culture of urine. 155 (62%) of cases were female . 215 (86%) of cases live in urban area .135 (54%)of cases were poor .166 (66%) of patient have illiterate mother ,55 (22%) primary school,29 (11.6%) secondary school, (0%) collage .

Conclusion :The study concluded that The strip method is not specific to diagnosis UTI and still the culture method is the sole method to diagnosis of UTI.

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Introduction:

urinary tract infection is defined by the presence of organisms in the urinary tract, which is usually sterile. The UTI is the most common cause of febrile disease in the children, affecting 2% of boys and 8% of girls by the age of 11 years , the incidence of UTI in females is about 30% compared to only 1% in male .About 75 % of infant younger than 3 month age with bacteriuria are boys compared to only 10 % between (3 and 8 months of age) of UTI usually seen in females .Urinary tract infection important infection usually occur due to bacteria ,although viruses ,fungi, and parasites can also cause infection.(1)(2)

Half of the children with urinary tract infections, present to primary health care center are not diagnosed at their first presentation, establishing the diagnosis is difficult in early childhood owing to nonspecific urinary symptoms like fever ,irritability and vomiting .also difficulty in urine collection, and contamination of the samples ,and lack of toilet training.(3)Most children have a single episode and recover promptly. Urinary tract infection usually classified according to site of infection, in the bladder (cystitis), in the kidney (pyelonephritis), in urine (bacteriuria). UTI either symptomatic or asymptomatic ,symptoms ranging from mild irrigative voiding to bacteremia, sepsis, or even death.(4)(5)(6)

Consequently the information will be combined for UTI identification and management in the first health facilities ,will be suggested including the complications. There are multiple important medical and financial inferences associated with UTI ,the estimated annual cost of community-acquired UTI is significant .(8)(9)

Recently, a retrospective population-based study investigated the incidence rate of first time symptomatic UTI in children <6 years of age. The cumulative incidence rate of UTI was 3 times greater in girls than boys. Acute uncomplicated UTIs ,are usually considered to be benign condition. However ,sever infections may require

hospitalization . long term consequences of acute UTI are rare ,substantial medical squeal are more frequently associated with complicated infection, or with infections that occur in specific subpopulations, such as pediatric patients .(10)

Aim of study : The aim of this study early diagnosis of UTI by use strip method .

Patients and method:

Across sectional hospital based study done on patients who attended the outpatient clinic of pediatric General hospital in Kirkuk city selected randomly ,during the period from 1st of July to 30th of August 2017 .The population included in this study was children aged 2 month to 12 years old ,total number about 250 cases, only selected the patient with positive stripe test for pus ,which represented about 170 patients (95 girls and 75 boys), were send t for urine culture .

The patients included in this study ,were those patients who had signs and symptoms of UTI .

Each patient included in the study were assessed by appropriate questionnaire which include name ,age ,sex, ….etc Appendix 1.

Each patient included in the study were assessed for presence of

UTI using strip method .figure(3- 1).

Figure (1-1)urine strip

Urine sample taken from patients by clean catch and by urine collection bag in children younger than 2 years, after learning the mother to wash genital area with water and soap if available before applying the urine bag .Patient > 2year ,urine were taken by midstream urine sample after cleaning the area as above .Urine putted in tube and sanded immediately to the lab fir culture after take the results of strip method .

The strip screen for presence of 8

different items in addition to pus, cell, nitrate ,PH, protein ,glucose, ketone ,bilirubin , erythrocyte, and Hb. Figure (3-2) show different indicator.

The number of pus cell in strip were represented in different colors according to number of pus cell.

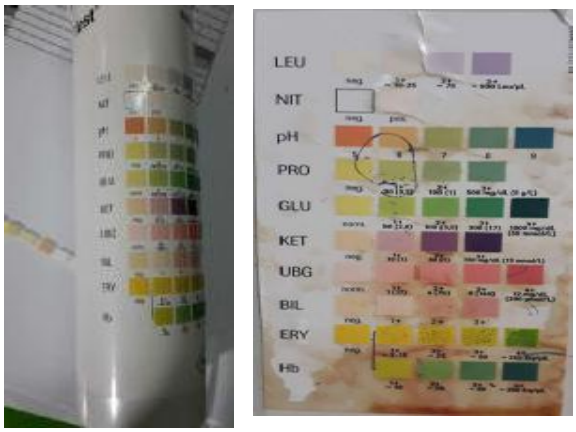

Figure (3-2) Urine strip indicator

The patient were diagnosed as UTI by strip method in the presence of 1+ or more pus by comparing the matching color .

If the test for leukocyte esterase is positive this mean there is an infection.

Each case diagnosed as UTI by strip method ,were send for urine culture.

The urine sample for strip and for culture were fresh urine sample taken with in 20 minute. The result obtained after 3 days as positive or negative growth.

Patients who diagnosed as UTI were send for abdominal ultrasound looks for sign of UTI whether acute or chronic and any renal anomalies.

The U/S were done by experienced radiologist .Using pediatric probe .

Each patient diagnosed as UTI were send for hemoglobin (Hb) level, to exclude associated anemia.

Inclusion criteria:

1) Patients between age 2month - 12 years.
2) Patients with signs and symptoms of UTI .

Exclusion criteria :

1) Patient < 2 month of age as UTI may be a part of septicemia .

2) Patients who was on antibiotics.

3) Patients who have history of previous UTI .

4) Patient who presented with other disease that may interfere with feature of UTI.

5) Patient with immune deficiency or immune suppressive drugs , cerebral palsy, renal stone .

Results:

The total number of cases included in the study were 250 cases , 170 (68%) of cases were positive by strip for UTI , 52 (30%) of cases were positive by culture of urine as shown in the figure(4- 1):

Table (4-1) show that the demographic distribution of the cases.155 (62%) of cases were female . 215 (86%) of cases live in urban area .135 (54%)of caseswere poor .166 (66%) of patient have illiterate mother ,55 (22%) primary school,29 (11.6%) secondary school, (0%) collage .

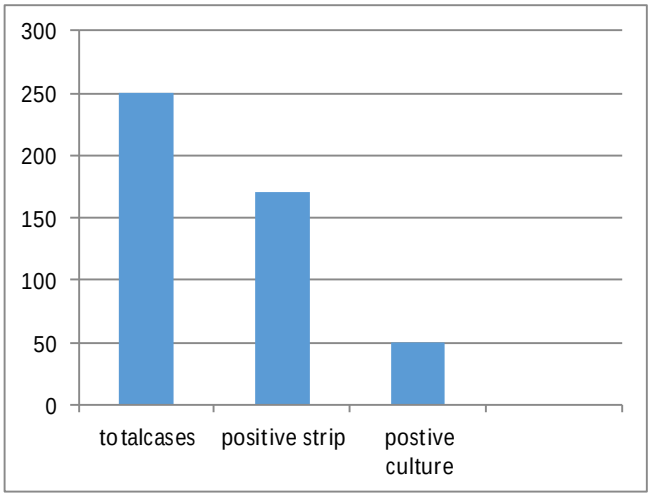

Figure (4-1) : sample case distribution according to the result of strip and culture test.

Table(4-1) demographic character of sample

Character		Number	%
Sex	Male	95	38
	female	155	62
Age	2 month-11month	54	21.6
	1-5 year	79	31.6
	6-10 year	87	34.8
	11-12 year	30	12
Residence	Urban	215	86
	Rural	35	14
Maternal education level	Illiterate	166	66.4
	Primary school	55	22
	Secondary school	29	11.6
	collage	0	0

The figure show that the number of female UTI cases more than male.

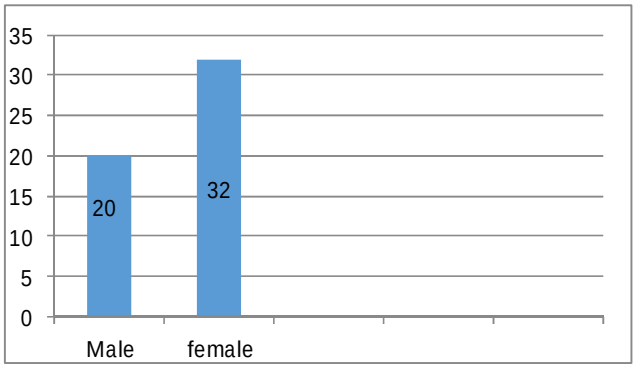

Figure (4-2) Distribution of cases proved UTI according to sex.

The table show that(53.8%)of UTI patient age (1-5) years, and (5.7%) age (10-11)years.

Table (4-2) show distribution of cases according to age.

Age	Male		Female		Total	
	No.	%	N0.	%	No.	%
2month-11month	4	20	6	8.7	10	19
1-5 year	12	60	16	50	28	53.8
6-10 year	3	15	8	25	11	21
11-12 year	1	5	2	6.25	3	5.7
Total	20	38.4	32	61.5	52	100

The figure shows that most UTI patient were from urban area (86%).

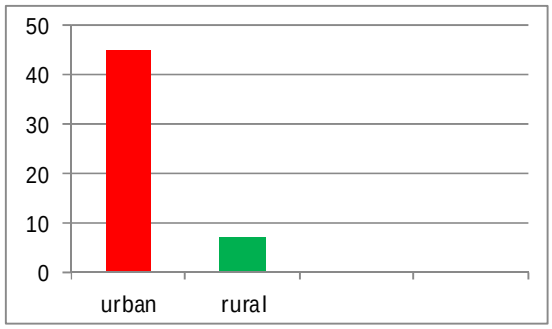

Figure (4-3) Distribution of UTI proved cases according to the residence.

The table show that most of the cases were on mixed feeding (breast &bottle) (36.5%).

Table (4-3) distribution of cases according to type of feeding

Type of feeding	Male No.	%	Female No.	%	Total No.	%
Breast only	1	5	1	3.1	2	3.8
Bottle only	4	20	6	18.7	10	19.2
Mixed Breast &bottle	4	70	15	46.8	19	36.5
Milk & sold	5	25	2	6.25	7	13
Sold only	6	30	8	25	14	26.9
total	20	38.4	32	61.5	52	100

The table shows most of patient mother were illiterate 35 (67.3%) ,primary school 9 (17.3%) ,secondary school 8 (15.3%)

Table(4-4):educational level of positive culture patients mother.

Education	No.	%
Illiterate	35	67.3
Primary school	9	17.3
Secondary school	8	15.3
Collage	0	0
Total	52	100

The table shows that most of cases have family history of UTI, most of male patients circumcised and most of patients non diabetic.

Table (4-5) : Risk factor for occurrence of UTI.

Risk factor	Male		Female	
	yes	No	yes	No
History of UTI in family	16(80%)	4(20%)	24(75%)	8(25%)
History of circumcisin	19(95%)	1(5%)	(0%)	32(100%)
Diabetes	3(15%)	17(85%)	5(15%)	27(84%)
Total	20(100%)		32(100%)	

*We only found these risk factors in our patients.

The table show most common signs &symptom were poor feeding ,dysuria ,vomiting and pallor.

Table (4-6) The sign and symptom of UTI in diagnosed patient.

Signs and symptoms	Male		Female	
	Yes	No	yes	No
Fever	4	16	25	8
Dysuria	20	0	32	0
Frequency	16	4	29	3
Nocturia	9	11	15	18
Incontinence	13	7	15	17
Constipation	14	6	20	10
Vomiting	17	3	31	1
abdominal pain(loin pain)	15	5	22	10
Pallor	17	3	30	2
Poor feeding	20	0	32	0
Hypertension	All patient have normal blood pressure		All patient have normal blood pressure	

Table(4-7) shows that most common U/S finding was cystitis, male(95%) and female (90%).

Table (4-7) Radiological manifestation of UTI.

Ultrasound finding	Male		Female	
	Yes	No	Yes	No
PCSD*	5(25%)	15(75%)	17(53%)	15(46%)
Hydronphrosis	0(0%)	20(100%)	1(3%)	32(97%)
Stone	0(0%)	0(0%)	0(0%)	0(0%)

* PCSD (pelvicalysial system dilatation)

Table (4-8) shows most of patient with UTI were anemic male 80% & female 59% .

Table (4-8) :Hemoglobin level of UTI patient.

Hb level	Male no	%	Female no	%	total
<10	16	80	19	59	35
>10	4	20	13	40.6	17
Total	20	38.4	32	61.5	52

There was significant result regarding the use of strip method as diagnostic for UTI as the table show, total number of patient 250 ,170(68%) of them strip positive,75 (78%) male and 95 (61.2%) female . Chi square =8.4 Correlation =0.18

The relation is significant .strong association.

Table (4-9) :Distribution of cases according to gender of patients and positive strip test method.

Strip method	Male		Female		Total	
	No.	%	No.	%	No.	%
Positive	75	78.9	95	61.2	170	68
Negative	20	21	60	38.7	80	32
Total	95	38	155	62	250	100

P value =0.004 .

There were no significant relation between diagnosis of UTI by culture and strip

method as only 52 cases (30.5%) were positive by culture (No significant relation). Table (4-10).

Correlation=0.07 weak relation

Table (4-10) Strip method in regards to culture in the diagnosis of UTI.

Culture	Strip method		Total	
	Positive			
	No.	%	No.	%
Positive	52	30.5	52	30.5
Negative	118	69.4	118	69.4
Total	170	100	170	100

Discussion:

Urine infection is one of the most common bacterial infections and its occurrence in childhood may carry special significance.

Most of cases were female ,this goes with an early study in Sweden put forward that 3% of girls and 1.1% of boys had UTIs through the age of 11 years. Later studies, on the other hand, indicate that the population incidence of symptomatic UTI in developed countries is possible to be higher than previously recognized.(52) because UTI still, are most common in female than male ,this may be due to short urethra in female that permit the entrance of microorganisms to the urinary tract from stool ,or skin of perineum or urethral meatus.

Most of cases were between the age of (1-5) this is go with studies in The Royal College of General Practitioners Birmingham Research Unit produces annual morbidity statistics. this is due to the fact that this age is the most age affected for UTI in females in which the study sample have more females than males.

Most of cases with UTI were from urban area .this is due to the fact that most of our cases were internally displaced persons (IDPs),that come from rural areas as apart of security

reasons.

Most of the study cases were on mixed breast and bottle feeding. this is not goes with A case–control study conducted in Sweden aimed to investigate the association between breastfeeding and the risk of first-time febrile UTI(11)

Exclusive breastfeeding was found to have a protective effect on the risk of UTI. The risk of UTI was 2.3 times higher in non breast fed children when compared with exclusively breastfed children.

The protective effect of breastfeeding was dependent on the duration of breastfeeding as well as the gender of the child or infant. A longer duration of breast feeding as well as the gender of the child or infant. A longer duration of breastfeeding was associated with a lower risk of infection after weaning and the effect was stronger in girls.(12)

The reason why bottle fed babies have more UTI is that bottle milk have more solute than breast milk which leads to increase precipitate of crystals in the urine that increase the incidence of UTI.

Most of study cases were from poor families and of lower social state. This does not goes with studies which shows no relation between UTI and socioeconomic state .This may be due to different in sample size.(13)

Still circumcision is protective against UTI ,because the fact that circumcision is prevent UTI by preventing the bacteria to grow near the urethral meatus that send to urinary bladder. This is goes with other study by an Australian meta-analysis looked at the effect of circumcision on the risk of UTI in boys in twelve studies. The meta-analysis included one RCT, four cohort studies, and seven case–control studies. seven studies have investigated the association between circumcision and risk of UTI. The RCT was a study of recurrent UTI in 70 uncircumcised boys with proven UTI aged 3 months to 10 years who were randomized to circumcision or no circumcision and showed an OR of 0.13.(14)(15)

UTI presented in many features like fever, dysuria, frequency, abdominal

pain ,irritability, poor feeding ,and vomiting this goes with 'Feverish illness in children' (NICE clinical guideline .(14)

The reason why UTI have multiple signs and symptoms is that UTI have both local and systemic symptoms as ,fever ,convulsion….ect.(15)

Cystitis and pelvicalysal cystem dilatation (PCSD)were the most common feature of UTI by U/S. this is goes with study in Royal College of Pediatrics and Child Health(15).This is because UTI is classified as lower (most common ,more simple like cystitis), and upper (less common, more sever like pyelonephritis).

There is no significant result regarding the use of strip method to diagnosis of UTI this is goes with other studies in China ,conducted that the urine dipstick test can be used as screen to determine whether or not a urine culture should be performed .(15)

This is due to strip method is depended on chemical reaction that may be affected by urine PH or hydration state which may not pick up UTI successfully as well as different microorganism might have different reaction (as study byMarkus MacGill .2016)(14)

There were no significant correlation between strip method and culture as Strip test is not specific and it is useful as diagnostic test for patients with signs and symptoms of UTI ,and the positive strip test is not specific to diagnosis of UTI as there were no significant correlation with the result of culture and it means there were other factors might make the test positive other than UTI .one study conducted that no other method like strip method should not substitute culture method in symptomatic children.(15)

Conclusion :

The study concluded that The strip method is not specific to diagnosis UTI and still the culture method is the sole method to diagnosis of UTI.

Most of cases in the study had HB level <10 in those with positive culture

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