URINARY TRACT INFECTION IN CHILDREN BELOW FIVE YEARS AND ITS RELATION TO SOCIO-ECONOMIC STATUS

FATMA ABDALHAMZA OBED

MSC. microbiology, Al-mustansiriya national center of hematology. Email: alomran662000@yahoo.com

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ABSTRACT

Objective: The aim of the study is to determine the incidence of UTI in children between 2 months - 5 years age in the Swaeb and Al moasalat district and its relation with the socio-economic status (SES) of family. Throughout childhood; the risk of having UTI is 2% in males, 8% in females and the prevalence of UTI vary with sex and age. It is greater in younger age with a rate of nearly 7% among febrile newborn. UTI can lead to serious kidney damage when associated with urinary obstruction or renal papillary damage. SES is usually measured by determining education, income, occupation or a composite of these dimensions. However, education is usually the commonly used measure of SES in epidemiological studies.

Methods: The study included 150 children, 101 females and 49 males. Their ages were between 2 months - 5 years. complaining from signs and symptoms of UTI during the period of November 2012 - January 2013. Urine specimens were obtained from patients sent to the laboratory for UA. Only cases diagnosed as UTI by urine analysis were sent to do culture on the same day. Demographic data of age, sex and socio-economic status obtained through self-administered questionnaires.

Results: Our study revealed high rate of infection in female of 35(35.6) had pyuria, 35(35.6) with positive culture while 25(25%) of male had pyuria only 23(46%) with positive culture. Five different micro organism where isolated from 50 positive culture included Escherichia coli in 50.1%, Klebsiella pneumonia 20.7%, Proteus mirabilis 10.3%, Staph aureus 10.3% high rate of UTI cases for the low SES and rural areas. This increased rate of cases compared with the actual number of people living in these areas indicates no significant relationship between SES and UTI.

The highest rate of UTI cases found in the rural district. 17 (number of people 3400) compared with other districts of different SE levels in the city.

Conclusion: Malnutrition, poor hygiene, and low socioeconomic level are risk factors for developing UTI. These factors are usually found in rural areas. Therefore, it is recommended to raise health awareness for the families in rural areas regarding general hygiene.

Key words: UTI-urinary tract infection, SES-socioeconomic status, UA-urine analysis, UC-urine culture.

INTRODUCTION

Urinary tract infection (UTI) is defined as an infection in any part of the urinary tract caused by fungi, viruses and bacteria. The most common cause are bacteria which usually live in the patient’s own bowels. E. coli bacteria cause the vast majority of UTI.[1]

Normally, immune defense and regular urination help urinary sterile by flushing away bacteria. Holding in urine, inadequate fluid intake, and chronic constipation will allow bacteria to grow and cause UTI. The presence of urinary tract anomalies will increase the risk of UTI. 6-month old uncircumcised boys are at greater risk for UTI than circumcised boys the same age.[1]

UTI is considered common disease in infants and children. In USA, UTI affects 3% of children every year. It accounts for more than 1 million visits to pediatrician office every year[1]. Throughout childhood; the risk of having UTI is 2% in males, 8% in females and the prevalence of UTI vary with sex and age. [1] It is greater in younger age with a rate of nearly 7% among febrile newborn.[2,3] It is more common in males during the 1st year of life while beyond 1-2 years there is striking female preponderance.[4]

UTI can lead to serious kidney damage when associated with urinary obstruction or renal papillary damage. The common abnormality in children is vesico-ureteral reflux where reflux nephropathy cause end stage renal diseases (baily 1992). However, when reflux is recognized early and managed appropriately renal insufficiency is rare.

The objective of the study is to determine the incidence of UTI in children between 2 months - 5 years age in the Swaeb and Al moasalat district and its relation with the socioeconomic status (SES).

SES is usually measured by determining education, income, occupation or a composite of these dimensions. However, education is usually the commonly used measure of SES in epidemiological studies.[5]

Patient and methods

The study was conducted in the swaeb and al-mouasalat primary health center. Urine samples were collected from a total of 150 children, 101 females and 49 males. Their ages were between 2 months - 5 years. They were complaining from signs and symptoms of UTI during the period of November 2012 - January 2013. The presenting symptoms and signs are according to the following table:

<table>
<thead>
<tr>
<th>Age group</th>
<th>Symptoms and signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants younger than 3 months</td>
<td>Fever, Vomiting, Lethargy, Irritability, Abdominal pain</td>
</tr>
<tr>
<td>Infants and children, 3 months or older</td>
<td>Poor feeding, Failure to thrive, Dysuria, Loin tenderness, Abdominal pain, Haematuria</td>
</tr>
</tbody>
</table>

Table 1: Presenting symptoms and signs in infants and children with UTI.[6]

<table>
<thead>
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References

All these children were outpatients visited the health center and involved in IMCI (integrated management of childhood illness) program. Patients who had been on antibiotics for at least three days were excluded.

Out of 150 patients presented with signs and symptoms of UTI, only 61 patients fulfilled the inclusion criteria of the study. Clear voided midstream urine specimens were obtained from patients (who are toilet trained) in sterile universal cups and adhesive bags use for those who are not toilet training. These samples were sent to the laboratory for microscopy (invasive methods such as suprapubic puncture and catheterization were not used routinely). The results of UA were considered positive if there were 5 and more of pus cells/high power field, and negative if they were <5 pus cells/high power field.[7]

Only cases diagnosed as UTI by urine analysis were sent to do culture on the same day. They were given forms of self-administered questionnaire and follow up was done according to IMCI program.

Urine cultures were performed in the national center of hematology. Samples were applied on both MacConkey agar medium and blood agar medium. The plates were incubated at 37c for 18-24 hours .The growth of 105CFU/ml of a single organism in a sample considered positive[7]. The method used in the identification and characterization of the isolated bacteria include gram stain fellowed by microscopic examination, motility and biochemical test using apiE20,apistaph. The method used in the identification and characterization of the isolated bacteria include gram stain followed by microscopic examination, motility, and biochemical test using apiE20, apistaph.

Demographic data of age, sex and socioeconomic status obtained through self-administered questionnaires which involve questions related to parental income, occupation, and education. Addresses consist of district and locality.

RESULTS

There were 4185 patients aged between 2months to 5 years who visited swabt and aimousalat health center during the study period. Of this patient only 150 (5.3%) had sign and symptom suspected UTI. Significant pyuria in 61(40.6%) patients only (we were depend on pyuria as primary test in diagnosis) and 58 (38.6) with bacteruria. Of the 101 female 36(35.6) had pyuria and 35(34.6) with positive culture while25 (51%) of49 male had pyuria and 23 (46%) with positive culture. Table2 show the sex and age of patients with significant pyuria and positive culture.

Table 2: age and sex distribution.

<table>
<thead>
<tr>
<th>Age</th>
<th>Number(% of positive UA)</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1year</td>
<td>9(14.7%)</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>years1-5</td>
<td>9(15.5%)</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>For puss cell</td>
<td>5(8.2%)</td>
<td>2(3.3%)</td>
<td>3(50.8%)</td>
</tr>
<tr>
<td>Number(% of positive UC)</td>
<td>5(24.2%)</td>
<td>4(51.7%)</td>
<td></td>
</tr>
</tbody>
</table>

3.5% presented with hematuria .28% with abdominal pain.18% presented with fever.five different micro organism where isolated from 58 positive culture included Escherichia coli in 50.1%, klebsiella pneumonia20.7%, proteus mirabilis10.3%. staph aureus 10.3%. Pseudomonos aeroginosa 8.6 % as shown in table 3.

Table 3: Type of bacteria isolated by culture.

<table>
<thead>
<tr>
<th>bacteria</th>
<th>%</th>
<th>number</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.coli</td>
<td>50.1</td>
<td>29</td>
<td>21.3(97.6)</td>
<td>7(24.3%)</td>
</tr>
<tr>
<td>-Klebsiella</td>
<td>20.7</td>
<td>12</td>
<td>2(24.3%)</td>
<td>3(14.3%)</td>
</tr>
<tr>
<td>pneum.</td>
<td>10.3</td>
<td>6</td>
<td>2(18.6%)</td>
<td>4(26.3%)</td>
</tr>
<tr>
<td>Proteus</td>
<td>6</td>
<td>2(5.4%)</td>
<td>4(19.1%)</td>
<td></td>
</tr>
<tr>
<td>mirabilis-</td>
<td>10.3</td>
<td>5</td>
<td>3(62%)</td>
<td>2(9.5%)</td>
</tr>
<tr>
<td>-Staph aureus</td>
<td>8.6</td>
<td>1</td>
<td>3(100%)</td>
<td>1(100%)</td>
</tr>
</tbody>
</table>

DISCUSSION

The signs and symptoms of UTI are mostly non specific or absent especially in young children. Additionally, infection can occur in the absence of pyuria and pyuria can present without UTI. Therefore, pyuria is considered more confirmatory than diagnostic criteria.

The decision to investigate urine as a possible cause for fever or other complaints needs to rely on a prior possibility of UTI as determined by age and sex. However, whether those children require a screening UA ± UC or urine culture regardless the UA result is controversial. This decision is magnified by the invasiveness of proper culture testing compared with non invasive bag specimens that can be used for screening UA[1,2,4,6].

This study is for cases with symptomatic bacteruria to differentiate it from other cases with asymptomatic bacteriuria which reported in 4% of child below 5 years.

On this study, Two issues were covered; Firstly, the incidence of the UTI in children and its relation with SES. Secondly, the uropathogens cause this infection.

Out of 61 patients presented with pyuria, 58 patients revealed positive cultures. There were three patients with sterile pyuria (positive leukocytes and negative culture) which usually occurs in partially treated UTI, such as viral infections, renal TB, renal abscess, or inflammation near the ureter or bladder.[8]

Out of 4185 children visited the health center during the period of study, there were only 58 patients presented with bacteriuria. The incidence of UTI in children below 5 years was 1.4% during the period of study, 0.9% in females and 0.5% in males. However, the study population, urine collection methods and definition of UTI have varied[4,10,11]. Also, Lack of standardization for the definition of pyuria may explain some differences in reported incidence of pyuria from less than 30% to more than 90%.[9]

In our study the incidence of UTI is lower than other large population based study like in Sweden and Madrid, where the incidence for symptomatic UTI was 6.6% for girls and 1.8% for boys. It was noticed that the majority of children who were affected by common cold and bronchitis visited the health center, while the majority of children who were affected by UTI visited the private clinics for the purpose of diagnosis and treatment. This may explain the reduced UTI incidence for children visited the health centre compared with the incidence of the previous research papers.

This study found the incidence of UTI was high among the females(23.3) than males(15.3). Close proximity of female’s urethral meatus to anus, shorter urethra have been reported as factors that influence this higher prevalence. In girls, peak rate during infancy and toilet training while in boys, peak rate at first year and 95% uncircumcised. In our study, 100% of males below one year with UTI are uncircumcised. Circumcision is usually delayed in our country till summer unlike other Islamic country that is usually performed on the 1st or second weeks of birth.

A total number of 58 isolates were obtained from the 58 patients with positive cultures, that is only one bacterial species was isolated from each patient. This can suggest amino-microbial nature of infection in the study population.
These 58 isolates were made up of five different organisms. They are \textit{E. coli}, \textit{Klebsiella spp}, \textit{P. mirabilis}, \textit{S. aureus}, \textit{P. aeruginosa}. \textit{E. coli} was the most common organism isolated from patients with significant bacteruria and was isolated from 29 case (50.1\%) followed by \textit{Klebsiella spp.} from 12 cases (20.7\%), \textit{P. mirabilis} from six patients (10.3\%), \textit{S. aureus} was isolated from six cases (10.3\%) and \textit{P. aeruginosa} from five patients (8.6\%)

\textit{E. coli} bacteria were found to be the most common cause of UTI in all age groups. They sequentially colonize bowel, perineum, and periurethral area. Thereafter they ascend the urethra to bladder. The presence of P-FIMBRIA enables these bacteria to adhere to uroepithelial cells with surface receptors recognized by these bacteria. Adherence is the prerequisite in establishing colonization leading to subsequent infection. This adhesion molecules are presents in 90\% of \textit{E. coli} strains associated with pyelonephritis, and 20\% with cystitis. These two factors explain why \textit{E. coli} are the common bacteria which cause UTI.

There are few research papers which have discussed the relationship between the socioeconomic status and UTI in children. These papers have found no or little significant relationship.

Table 4 shows high rate of UTI cases for the low SES and rural areas. However, this increased rate of cases compared with the actual number of people living in these areas indicates high rate of cases of the district 863 (number of people are 2565) which has better SE level than the district 871 (number of people are 13610). This can conclude that there is no significant relationship between SES and UTI.

The results also showed the highest rate of UTI cases found in the rural district 17 (number of people 3400) compared with other districts of different SE levels in the city. This study indicates that contaminated water usage and low level of health awareness are the main causes of UTI in children.

CONCLUSION

It can be concluded that malnutrition, poor hygiene, and low socioeconomic level are risk factors for developing UTI. These factors are usually found in rural areas[12]. Therefore, it is recommended to raise health awareness for the families in rural areas regarding general hygiene. It is also necessary to advise them to use clean water. Finally, it is important to provide health education and promotion for health professionals regarding UTI issues and prevention.

REFERENCES