CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
SJIF Impact Factor: 7.187
http://doi.org/10.5281/zenodo.4430121

Avalable online at: http://www.iajps.com *Research Article*

STUDY TO DETERMINE THE EFFICACY OF RENAL ULTRASONOGRAM IN CHILDREN WITH URINARY TRACT INFECTION

[1]Dr Muhammad Muntazir Mehdee, [2]Dr Afshan Riaz, [3]Dr Salman Aslam

[1]Taishan Medical University., [2]Nishtar Medical University, Multan., [3]Jinzhou Medical University, China.

Article Received: November 2020 **Accepted:** December 2020 **Published:** January 2021

Abstract:

Aim: *The aim of the study was to evaluate the ultrasound of the kidneys in children and adolescents admitted with uncomplicated urinary tract infections.*

Patients and Methods: *This retrospective study was conducted at the Pediatric Unit-I and Radiology department of Nishtar Hospital Multan for one-year duration from June 2019 to June 2020. Cases with a positive urine culture were included in the study. Positive urine culture was defined as 100,000 CFU / mL in the midstream or urine bag sample, or 10,000 CFU / mL in the suprapubic sample. Gender, age, ultrasound results, VCUG and DMSA scan results were recorded. For comparison, the T test, chi-square and ANOVA were used. SPSS version 18.0 (SPSS Inc, Chicago, II, USA) was used for the analysis.*

Results: *Our study included 625 cases. Hydronephrosis (56.40%); bladder wall thickness 33 (23.57%); hydroureter 13 (9.29%); The most common symptoms were parenchyma echogenicity 8 (5.71%) and calculus 6 (4.29%). Of 538 renal ultrasound scans, 398 (73.97%) were normal and 140 were abnormal (26.03%) (p <0.0001). The sensitivity, specificity, positive predictive value, and negative RUS predictive value for VUR were 42.68%, 78.96%, 38.04%, and 81.99%, respectively.*

Conclusion: *In cases with UTI, the majority of kidney ultrasound results were normal. Hydronephrosis was the most frequently reported abnormality among VUR cases.*

Key words: *ultrasonography, urinary tract infection, urethral bladder drainage, VUR*

Corresponding author:

Dr Muhammad Muntazir Mehdee

Taishan Medical University.

QR code

Please cite this article in press Muhammad Muntazir Mehdee et al, ***Study To Determine The Efficacy Of Renal Ultrasonogram In Children With Urinary Tract Infection.,*** *Indo Am. J. P. Sci, 2021; 08(1).*

INTRODUCTION:

Urinary tract infections are common in young children with an overall incidence of 0.7% in children with a fever. Kidney ultrasound examination is recommended to detect abnormalities in the upper urinary tract in daily practice. Its non-invasive nature and low radiation make it an ideal pre-assessment tool. However, recent publications question the importance of routine renal ultrasound (RUS) in treating children with uncomplicated urinary tract infections (UTIs). The aim of the study was to evaluate kidney ultrasound, which is routinely performed in our hospital in children and adolescents with uncomplicated urinary tract infections.

PATIENTS AND METHODS:

This retrospective study was conducted at the Pediatric Unit-I and Radiology department of Nishtar Hospital Multan for one-year duration from June 2019 to June 2020. Cases with a positive urine culture were included in the study. Positive urine culture was defined as 100,000 CFU / mL in the midstream or urine bag sample, or 10,000 CFU / mL in the suprapubic sample. Gender, age, ultrasound results, VCUG and DMSA scan results were recorded. For comparison, the T test, chi-square and ANOVA were used. SPSS version 18.0 (SPSS Inc, Chicago, II, USA) was used for the analysis.

RESULTS:

Of 887 (male = 378, female = 487) cases with a primary diagnosis of UTI, urine culture was positive in 625 cases. Of the 625 cases admitted to UTIs, 487 (77.92%) were female and 138 (22.08%) were male (p <5 years, hydronephrosis is the most common abnormality) (Table1).

TABLE 1: Age distribution among children admitted with urinary tract infection

Age	Number	Percentage
Newborn	20	03.20
<1yr	24	38.72
1-2yr	130	20.80
2-5 yr	126	20.16
5-10	93	14.88
>10	14	02.24

In older children, bladder wall thickening was the most common abnormality (Table 2).

TABLE 2: Ultrasound findings among children < 5 yr and children > 5 yr

Age	Hydroureter (%)	Hydronephrosis (%)	Stone (%)	Bladder wall thickness (%)	Ectopic kidney (%)	Increased parenchymal echogenesity (%)	Other (%)	Total
<5yr	10(10.0)	49(49.0)	6(6.0)	11(11.0)	6(6.0)	8(8.0)	10(10.0)	100
>5yr	03(07.5)	07(17.5)	0	22(55.0)	2(5.0)	4(10.0)	2(5.0)	40

There was a significant correlation between abnormal renal ultrasound and VUR (Table 3).

TABLE 3: Vesicourethral reflux among cases with normal or abnormal sonography

Renal ultrasound	Reflux (+)	Reflux (-)	Total
Normal	47(18%)	214(82%)	**261**
Abnormal*	35(38%)	57(62%)	**92**
Hydroureter	03	03	
Hydronephrosis	19	22	
Stone	02	02	
Bladder thickness	04	17	
Ectopic kidney	01	04	
Parenchymal echogenicity	04	05	
Other	20	04	

Sensitivity, specificity, positive predictive value and negative predictive value of RUS for VUR were 42.68%, 78, 96%, 38.04% and 81.99%. It is a more common ultrasound finding in cases with VUR. There was no significant correlation between abnormal renal ultrasound and VUR results (P = 0.432). In men, 71 (58.7%) had normal ultrasound of the kidneys, and 50 (41.3%) had abnormal ultrasound. In girls, 327 (78.4%) had normal ultrasound results, and 90 (21.6%) had abnormal results. Abnormal results were more common in men than in women (P <0.001). Hydronephrosis was the most common abnormality detected on ultrasound in both men and women (Table 4).

TABLE 4: Distribution of ultrasound findings among males and females

	Male (%)	Female (%)
Hydronephrosis	24(48.0)	32(35.55)
Bladder wall thickening	11(22.0)	22(24.44)
Hydroureter	08(16.0)	5(5.55)
Increased parenchymal echogenicity	02(4.0)	10(11.11)
Ectopic kidney		08(8.90)
Renal stone	01(2.0)	05(5.55)
Other	04(8.0)	08(8.90)
Total	**50(100.0)**	**90(100.0)**

There was no significant in the case of circumcision and non-circumcision with respect to the results of the ultrasound. Of the circumcised boys, 24 (68.6%) had E. coli in their urine cultures and 61 (70.9%) were E. coli negative (P = 0.797). In five (26.3%) cases of circumcised boys and 17 (30.9%) of uncircumcised boys, neuromuscular reflux occurred (P = 0.706). Of the 625 urine cultures, E. coli (83.3%) was the most common pathogen, followed by Klebsiella pneumonia (9%); Proteus (2.8%); Enterobacter (1.5%); and Coagulase Negative Staph (1.2%). Of 434 cases with positive E. Coli UTI, 103 (23.73%) had abnormal ultrasound images, and 331 (76.27%) had normal kidney ultrasound. In 81 cases with other bacteria, 24 (29.62%) cases had an abnormal ultrasound scan and 57 (70.37) %) had a normal US scan. There was no significant difference between E. coli positive and other bacteria in terms of abnormal ultrasound (P = 0.2). In both E. Coli and Non-E. coli, normal ultrasound was significantly higher than abnormal ultrasound (p <0.001).

TABLE 5: Result of Renal Ultrasound among Circumcised and Non-Circumcised boy

Circumscion	Normal Sonography	Abnormal sonography
Yes	20(55.6)	16(44.4)
No	51(60.0)	34(40.0)

DISCUSSION:

In the present study, the most common age of infection was <12 months. This finding was similar to the study by Wagenlehner et al. But our results were inconsistent with the studies by Yuksel et al. In our study, 77.92% of the cases were girls. In the study by Zamir et al. Girls accounted for 75.3% of cases8. In Hoberman et al. In the study, 89.32% of cases were girls. The result of our study was similar to this study with a slight difference in the age of the cases. The main causative factors in our study were Escherichia coli, Klebsiella pneumonia and Proteus sp. Our discovery was similar to Zamira et al. Study. In a study from Saudi Arabia including 130 patients with UTI, 92 (69.7%) had normal kidney ultrasound and 38 (30.3%) had normal kidney ultrasound. In their study, of 38 cases with abnormal kidney ultrasound, 50% had VUR on VCUG. In our study, of 92 cases with abnormal ultrasound, 38% had VUR on VCUG. The results of the two studies showed little difference, but our study included a larger sample (625 cases) compared to the study by Alshamsan et al. With 130 cases. In a prospective study by Hoberman et al. On 309 children aged 1-24

months, the results of kidney ultrasound were normal in 88% (272 out of 309) of cases. In 37 cases, 41 irregularities were found. Most of the abnormalities were related to pelvic dilation (13 cases), lesser pelvis (12 cases), ureter dilation (9 cases) and hydronephrosis (2 cases). In a study by Montini et al. 300 children with 1st febrile UTI, kidney ultrasound was abnormal in 13% (38 out of 300) of cases. In a study from Finland on 399 ultrasound of the kidneys, 31 boys and 40 girls had abnormal results. Zamir et al., In a 255 ultrasound of the kidneys, 85.8% were normal8. In their study, of 219 cases with normal ultrasound, 38 patients had abnormal VCUG. DiPietro et al. Studied 70 children aged <5 years using both VCUG and RUS. Five children had abnormal kidney ultrasound and 65 had normal RUS. In the Smelli-Rigden study of 58 children with UTI, VCUG VUR was found in 62% of cases, but only 8 cases had abnormal RUS. They concluded that RUS is an unreliable method of detecting VUR. In our study, hydronephrosis was the most common symptom among VUR cases. A similar result was obtained by Alshamsan et al. In the study by Montini et al., The authors concluded that the benefits of ultrasound in the acute phase of the disease were minimal. In a study in Saudi Arabia, ultrasound has little value in treating a child with their first UTI with a fever. Hoberman et al. Concluded that the ultrasound of the kidneys is of little value in the treatment of children with urinary tract infection. As noted in most studies, kidney ultrasound was normal in most UTI cases.

CONCLUSION:

Most of the kidney ultrasound was normal. Ultrasound is of little value in treating a child with an uncomplicated urinary tract infection. Hydronephrosis was the most common abnormality among VUR cases. A follow-up investigation is recommended to determine the role of renal ultrasound in treating urinary tract infections.

REFERENCES:

1. Wallace, Sowdhamini S., Kathryn Ban, Amrita Singh, Karen Lui, Imgard Carolina Molleda, Robert C. Orth, Stacy B. Pierson et al. "Clinical predictors for abnormal renal bladder ultrasound in hospitalized young children with a first febrile urinary tract infection." *Hospital Pediatrics* 10, no. 5 (2020): 392-400.
2. Buettcher, Michael, Johannes Trueck, Anita Niederer-Loher, Ulrich Heininger, Philipp Agyeman, Sandra Asner, Christoph Berger et al. "Swiss consensus recommendations on urinary tract infections in children." *European journal of pediatrics* (2020): 1-12.
3. Guarino, Stefano, Daniela Capalbo, Nunzia Martin, Giuseppina Campana, Pier Francesco Rambaldi, Emanuele Miraglia del Giudice, Angela La Manna, and Pierluigi Marzuillo. "In children with urinary tract infection reduced kidney length and vesicoureteric reflux predict abnormal DMSA scan." *Pediatric Research* 87, no. 4 (2020): 779-784.
4. Velaer, Kyla Nichole, Pearl Chang, and His-Yang Wu. "Ultrasound in Hospitalized Children With First Febrile UTI: What Exactly Are We Looking For?." *Hospital Pediatrics* 10, no. 5 (2020): 460-461.
5. Ammenti, Anita, Irene Alberici, Milena Brugnara, Roberto Chimenz, Stefano Guarino, Angela La Manna, Claudio La Scola et al. "Updated Italian recommendations for the diagnosis, treatment and follow-up of the first febrile urinary tract infection in young children." *Acta Paediatrica* 109, no. 2 (2020): 236-247.
6. Herthelius, Maria, Rimma Axelsson, and Karl-Johan Lidefelt. "Antenatally detected urinary tract dilatation: a 12–15-year follow-up." *Pediatric Nephrology* 35, no. 11 (2020): 2129-2135.
7. Keskinoğlu, Ahmet, and Su Özgür. "The use of artificial neural networks for differential diagnosis between vesicoureteral reflux and urinary tract infection in children." *Journal of Pediatric Research* 7, no. 3 (2020): 230-235.
8. Finkelstein, Julia B., James T. Rague, Jeanne Chow, Alyssia Venna, Tanya Logvinenko, Caleb P. Nelson, and Richard S. Lee. "Accuracy of Ultrasound in Identifying Renal Scarring as Compared to DMSA Scan." *Urology* (2020).
9. Gök, Ebru Suman, Adnan Ayvacı, Ayşe Ağbaş, İbrahim Adaletli, Nur Canpolat, Lale Sever, and Salim Çalışkan. "The Frequency of Familial Congenital Anomalies of the Kidney and Urinary Tract: Should We Screen Asymptomatic First-Degree Relatives Using Urinary Tract Ultrasonography?." *Nephron* 144, no. 3 (2020): 118-123.
10. Jiang, Dapeng, Qi Wang, Zhengzhou Shi, and Jie Sun. "Congenital Anomalies of the Kidney and Urinary Tract in Children with Congenital Heart Defects." *Kidney and Blood Pressure Research* 45, no. 2 (2020): 307-313.
11. Su, Boxing, Chaoyue Ji, Jianxing Li, Bo Xiao, Song Chen, Yuzhe Tang, Yubao Liu, Meng Fu, Wenjie Bai, and Weiguo Hu. "Outcomes of ultrasound-guided percutaneous nephrolithotomy for the treatment of large stones within non-functioning atrophic kidneys." *International Journal of Urology* (2020).

12. Sadeghi-Bojd, S., R. Naghshizadian, M. Mazaheri, F. Ghane Sharbaf, and F. Assadi. "Efficacy of probiotic prophylaxis after the first febrile urinary tract infection in children with normal urinary tracts." *Journal of the Pediatric Infectious Diseases Society* 9, no. 3 (2020): 305-310.
13. Gele, Ibrahim Haruna, S. B. Muhammad, S. A. Sa'idu, and S. M. Ma'aji. "Recurrent urinary tract infection due to large urinary bladder calculus in a 6-year-old child." *Sahel Medical Journal* 23, no. 3 (2020): 198.
14. Shaki, David, Gabriel Hodik, Siham Elamour, Raouf Nassar, Eyal Kristal, Ron Leibovitz, Amir Horev, and Eugene Leibovitz. "Urinary tract infections in children< 2 years of age hospitalized in a tertiary medical center in Southern Israel: epidemiologic, imaging, and microbiologic characteristics of first episode in life." *European Journal of Clinical Microbiology & Infectious Diseases* (2020): 1-9.
15. Köse, Timur, Su Özgür, Erdal Coşgun, Ahmet Keskinoğlu, and Pembe Keskinoğlu. "Effect of missing data imputation on deep learning prediction performance for vesicoureteral reflux and recurrent urinary tract infection clinical study." *BioMed Research International* 2020 (2020).