

Characterization of Urinary Tract in Patients with Schistosomiasis Using Ultrasound in School Children in the Gezira State, Sudan

Nahla Abbas Ahmed¹, Sarah Suliman Mohammed¹,
Dr. Ahmed Abdelrahim Mohammed²

¹(National University-Sudan, College of Radiography and Medical Imaging Sciences, Khartoum, Sudan)

²(Alzaieim Alazhari University, Faculty of Radiological Sciences and Medical Imaging, Khartoum, Sudan)

Abstract:

Background: Schistosomiasis impact of urinary tract which leads to apparition of physiological changes, this changes leads to other several diseases affect visceral organs.

Materials and Methods: This is descriptive, cross section study aimed to assess urinary schistosomiasis using ultrasonography; in 60 students in age ranged 7-18 years with positive schistosoma haematobium came for abdominal ultrasound. During the period from February 2019 to September 2020. The data was collected by data collection sheet special design for this study and then analyzed by statistical package for social science and correlation person's coefficient (SPSS) version 21.0.

Results: The study show that more than halve of students affected by schistosomiasis are in age group 11-14 years (51.7%) , followed by 7-11years (38.3%), Male students are affected by schistosomiasis more than female (85%) , This study was detected urinary system abnormalities abnormal bladder shape (20%), irregularities (10%), Urinary bladder wall thickening that noted in 37(61.7%) the majority of them has focal thickening 29 (48.3%) while 3 patients have diffuse thickening 3 (5%) ,multifocal thinking 5 (8.3%) and normal thickness 23(38.3%), (1.7%) single polyp , (1.7%) single mass while 96.7% of patients showed no lesion, While dilatation of pelvicalyceal system (hydronephrosis) was observed in 7(11.7%) patients, the mean age of students was 11.25 Yrs. \pm 2.28, the mean UB wall thickness was 5.54 ± 4.1 , while the mean volume of bladder pre and post voiding measured (142.4 ± 80.16 and 9.18 ± 12.79) respectively.

Conclusion: The bladder wall thickness reflected no correlation with variable (Age ,pre and post urinary bladder volume). The age can be affected by bladder volume pre and post voiding, this relation show significant ($p.value > 0.05$) .The study concluded that; Ultrasound examination is considered a valuable tool to assess the urinary system, pathology and complications associated with schistosomiasis.

Key Word: Ultrasound; Schistosomiasis; Children; Urinary Tract; Sudan.

Date of Submission: 20-08-2021

Date of Acceptance: 05-09-2021

I. Introduction

Schistosomiasis refers to human disease resulting from infection by any of the parasitic blood flukes of Schistosoma.(1)There are five species of schistosoma; (haematobium, mansoni, japonicum, mekongi, intercalatum)and there are three major species of schistosoma (haematobium, mansoni, japonicum).(2)

Schistosoma haematobium is the most common agent to affect the urinary tract. The worms enter the human host by penetrating the skin. They are then carried via the portal venous system to the liver, where they mature into their adult form. S. haematobium likely enters the perivesical venous plexus from the hemorrhoidal plexus. The female worm then deposits eggs into the venules of the bladder wall and ureter. Granuloma formation and obliterative endarteritis occur. Serologic tests demonstrating ova allow diagnosis. Hematuria is the most frequent complaint.(3) At sonography, the kidneys are normal until late in the disease. Pseudotubercles develop in the ureter and bladder, and the urothelium becomes thickened. Over time the pseudotubercles calcify; the calcification may be fine, granular and linear, or thick and irregular. If repeated infections occur, the bladder will become small and fibrotic. Bladder stasis results in an increased incidence of ureteral and bladder calculi. Patients with chronic disease also have an increased incidence of squamous cell carcinoma.(3) The major manifestations of S. haematobium infection are seen in children and young adults living in endemic areas. As Schistosomiasis is public health problem in certain regions of the world, including South America, the Caribbean, Africa, and the Middle East; in Sudan diagnosis is still based on parasitology and serology in Several previous studies , Schistosomiasis impact of urinary tract which leads to apparition of physiological changes,

this changes leads to other several diseases affect visceral organs. As result of all of the above the aim of this study is to characterize of urinary tract Schistosomiasis using Ultrasound in Sudanese children.

Schistosomiasis remains one of the most prevalent helminthic infections in the world. It is found in tropical and subtropical areas of South America, Africa, the Middle East, East Asia, and the Philippines. Recent World Health Organization (WHO) estimates indicate that more than 200 million people are infected worldwide, with over 600 million people at risk of infection. (3)

The World Health Organization (WHO) recently proposed a standardization of the use of diagnostic ultrasound in schistosomiasis indicated for field studies. For epidemiological purposes, it is very important that ultrasound examinations be carried out and recorded in a standardized way, to ensure that results obtained in different places at different times can be compared. This standardization has been used in several countries in endemic areas.(4)

II. Material And Methods

This was cross sectional study done to evaluate renal system in students with schistosomiasis, the data collected from 60 students in age ranged 7-18 years.

Study Design: This study is descriptive, cross sectional study.

Study Location: The study was conducted in Gezira state hospitals, Sedira, Laaota, Abuoshar and Hasahysa.

Study Duration: February 2019 to August 2020.

Sample size: 60 patients.

Sample size calculation: convenient sample size.

Subjects & selection method: The study population was consisting of school students ages 7 years up to 18 years. Were investigated by ultrasonography.

Inclusion criteria:

All Students with history of urinary schistosomiasis their ages between 7 and 18 years.

Exclusion criteria:

All normal students.

Procedure methodology:

The data was collected by data collection sheets which designed to include all variables of the study and US examination. In this study the variables was patient age, gender, thickness of urinary bladder wall, irregularities, shape, presence of polyps and mass, volume pre and post voiding, dilatation of renal pelvic.

An Ultrasound machines;(Mindary DP-660)and (SIUI) with curvilinear probe(3.5-5) MHz were used for patients scanning; Firstly started by room and machine preparation, explain the procedure to the patient, then start the scanning technique; for the Bladder: the patient supine, apply coupling acoustic gel, Start with transverse scan, Follow with longitudinal scan, then measured the urinary bladder thickness and measured the urinary bladder volume pre voiding in three dimensions tow in transverse and one in longitudinal, Any area that appears abnormal must be viewed in several projections. After scanning the patient should empty the bladder and should then be rescanned to measure the urinary bladder volume post voiding. While for the Kidney; the patient supine, apply coupling acoustic gel, Start with a longitudinal scan and then follow with a transverse scan, ask the patient to take a deep breath and hold the breath in, Both kidneys should be observed to check hydronephrosis or any abnormalities.

Statistical analysis:

The data was analyzed by using standard statistical package for the social sciences (SPSS) version 21.0.

III. Result

Table no 1: Shows frequency distribution of age (years).

Age \years	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
7-10	23	38.3	38.3	38.3
11-14	31	51.7	51.7	90.0
15-18	6	10.0	10.0	100.0
Total	60	100.0	100.0	

Table no 2: Shows frequency distribution of gender

Gender	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Female	9	15.0	15.0	15.0
Male	51	85.0	85.0	100.0
Total	60	100.0	100.0	

Table no 3: Shows frequency distribution of bladder shape

Shape	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Distorted	1	1.7	1.7	1.7
Normal	47	78.3	78.3	80.0
Round	12	20.0	20.0	100.0
Total	60	100.0	100.0	

Table no 4: Shows frequency distribution of bladder wall irregularity

Bladder wall irregularity	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Diffuse	1	1.7	1.7	1.7
Focal	5	8.3	8.3	10.0
Normal	54	90.0	90.0	100.0
Total	60	100.0	100.0	

Table no 5: Shows frequency distribution of bladder wall thickness

Bladder wall thickness	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Diffuse	3	5.0	5.0	5.0
Focal	29	48.3	48.3	53.3
Multifocal	5	8.3	8.3	61.7
Normal	23	38.3	38.3	100.0
Total	60	100.0	100.0	

Table no 6: Shows frequency distribution of bladder wall lesions

Pathology of bladder wall	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Single Pseudopolyp	1	1.7	50.0	50.0
Single Mass	1	1.7	50.0	100.0
Normal	58	96.7	100.0	

Table no7: Shows frequency distribution of associated renal findings

Kidneys finding	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
right kidney Mild hydronephrosis	3	5.0	5.0	5.0
left kidney mild hydronephrosis	2	3.3	3.3	8.3
normal both kidneys	53	88.3	88.3	96.7
right kidney mild ,left kidney moderate hydronephrosis	1	1.7	1.7	98.3
bilateral mild hydronephrosis	1	1.7	1.7	100.0
Total	60	100.0	100.0	

Table no 8: Shows the descriptive statistic for age, bladder wall thickness, pre and post void

*bladder volume (minimum, maximum, mean± Std. Deviation)

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Age (Year)	60	7	18	11.25	2.289
Bladder wall thickness (mm)	60	2.29	29.40	5.5437	4.11056
Bladder Volume before voiding (cm3)	60	20	396	142.43	80.164
Bladder Volume after voiding (cm3)	60	.0	61.0	9.183	12.7993
Valid N (listwise)	60				

Table no 9: Shows cross tabulation associated renal findings and bladder wall thickening

Renal finding	Bladder wall thickening				Total
	Diffuse	Focal	Multifocal	Normal	
right kidney Mild hydronephrosis	0	1	0	2	3
left kidney mild hydronephrosis	0	1	1	0	2
normal both kidneys	3	27	4	19	53
right kidney mild ,left kidney moderate hydronephrosis	0	0	0	1	1
bilateral mild hydronephrosis	0	0	0	1	1
Total	3	29	5	23	60

P value 0.645 (not significant >0.05)

Table no 10: Shows correlation between age, bladder wall thickness and bladder volume pre and post voiding

		Age (Year)	Bladder wall thickness (mm)	Bladder Volume before voiding (cm3)	Bladder Volume after voiding (cm3)
Age (Year)	Pearson Correlation	1	.160	.368**	.454**
	Sig. (2-tailed)		.223	.004	.000
Bladder wall thickness	Pearson Correlation	.160	1	-.188	-.080
	Sig. (2-tailed)	.223		.150	.545
Bladder Volume before voiding (cm3)	Pearson Correlation	.368**	-.188	1	.294*
	Sig. (2-tailed)	.004	.150		.022
Bladder Volume after voiding (cm3)	Pearson Correlation	.454**	-.080	.294*	1
	Sig. (2-tailed)	.000	.545	.022	

** . Correlation is significant at the 0.01 level (2-tailed).
* . Correlation is significant at the 0.05 level (2-tailed).

IV. Discussion

This was cross sectional study done in Gazira state in the period from February 2019 to September 2020, to evaluate renal system in students with schistosomiasis, the data collected from 60 students in age ranged 7-18 year.

The study found that more than halve of students affected by schistosomiasis are in age group 11-14 years (51.7%) , followed by 7-11 years (38.3%), the mean age of students was 11.25 Yrs. ± 2.28, ranged 7-18 years ,this results similar to Elmadani et al 2013 which they found mean age was 11.3 ± 2.9 years and disagree with Bocanegra et al 2018mean age of the children was 8.7 (SD 3.2) years.

Male students are affected by schistosomiasis more than female (85%) , because the male children go to shower in the water of canals, which contains the parasite of schistosomiasis , this results similar to Ma'aji and Adamu in 2015 There were 84 males accounting for 78.5% and 23 females accounting for 21.5%.

The study found abnormal bladder shape (20%) round, (1.7%) distorted, (78.3%) normal shape and bladder wall irregularities (10%),(8.3%) focal , (1.7%) diffuse, (90%)normal, this results similar to Onile OS et al 2016 abnormal bladder shape (15.2%). bladder wall irregularities (15.2%), disagree with Strickland GT, Abdel-Wahab MF in1993 Community-based screening in S. haematobium endemic areas has shown high prevalence of bladder wall irregularities.

This study was detected urinary bladder wall thickening that noted in 37(61.7%) the majority of them has focal thickening 29 (48.3%) while 3 patients have diffuse thickening 3 (5%) ,multifocal thickening 5 (8.3%) and normal thickness 23(38.3%). this results similar to Onile OS et al 2016 pathologies observed by ultrasound in subjects with S. haematobium infections included abnormal bladder wall thickness (59%), and this results similar to Elmadani et al 2013 The findings revealed the following degrees of wall thickening: 53.0% mild, 18.2% moderate and 21.2% severe. and similar to Strickland GT, Abdel-Wahab MF in1993Community-based screening in S. haematobium endemic areas has shown high prevalence of bladder wall thickening.

The bladder wall thickening some time associated with other bladder lesions including pseudo polyps and mass which were noted in 2 patients (1.7%) single polyp , (1.7%) single mass while 96.7% of patients showed no lesion at the time of scanning. This findings are in line Ma'aji SM, Adamu B. 2015 bladder mass was 15 (14.0%) while polypoid mass accounted for 4 (3.7%).in contrast he found urinary bladder stone with wall thickening was the most common finding accounting for 37 (36.4%). This findings are in line with Barda B, Coulibaly JT, Hatz C and Keiser J on 2017, they found 4% of patients were presented with polyps or masses on bladder wall ,disagree with Elmadani et al 2013 which they found Urinary bladder polyp(s) were noted in 43.3% (single) and 40.9% (multiple) of the subjects.

While dilatation of pelvicalyceal system (hydronephrosis) was observed in 7(11.7%) patients, this study is in line with findings by Barda B, Coulibaly JT, Hatz C and Keiser J on 2017 which found 6% of patients had hydronephrosis. and in line with study done by chinyelu A Ekwunife, Fabian C Okafor,Obioma C

Nwaorgu 2009 (They were found About 4(6.7%) and 1(1.7%) of the patients had the right pelvis and left pelvis of their kidney moderately dilated respectively). The study found that, the mean UB wall thickness was 5.54 ± 4.1 , ranged 2.29 - 29.40 while the mean volume of bladder pre and post voiding measured (142.4 ± 80.16 and 9.18 ± 12.79) respectively.

The study found that, most cases of kidney finding are normal (53) although most bladder wall thickness are focal (29/53) this result is not significant (p.value>0.645) .

The bladder wall thickness reflected no correlation with variable (Age , pre and post urinary bladder volume).The age can be affected by bladder volume pre and post voiding, this relation show significant (p.value>005)

V. Conclusion

This study concludes that ,the most common group of age affected by urinary schistosomiasis were in age group 11-14 years ,The prevalence of urinary schistosomiasis was more common in males rather than females.

In this study one third of students were effected by schistosomiasis,show normal urinary system, ultrasound finding the most common presenting abnormalities was the following by abnormal bladder shape , bladder wall irregularities. This study was detected urinary bladder wall thickening the majority of them has focal thickening, diffuse thickening, multifocal thinking and normal thickness.The bladder wall thickening some time associated with other bladder lesions including pseudo polyps and mass which were noted in 2 patients while most of patients showed no lesion at the time of scanning.dilatation of pelvicalyceal system (hydronephrosis) was observed in 7 patients.

The study found that, most cases of kidney finding are normal although most bladder wall thickness are focal this result is not significant and Correlation of age with bladder volume pre and post voiding show significant.

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Nahla Abbas Ahmed, et. al. "Characterization of Urinary Tract in Patients with Schistosomiasis Using Ultrasound in School Children in the Gezira State, Sudan." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(08), 2021, pp. 01-05.