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A Comparison between Urine Analysis, Ultrasound And Cystoscopy in Detecting Urinary Schistosomiasis and its Manifestations

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Results: Dipstick tests showed haematuria (61.8%), while microscopy showed ova in only (3.1%) of patients. The majority of patients had no pathology on U/S exam (68%), minor pathology in (1%) and severe pathology in (31%) of patients. The most common ultrasound finding was increased bladder wall thickness (27.5%) followed by bladder masses (14.5%). Cystoscopy diagnosed the disease in all presenting patients; the most common cystoscopic findings were sandy patches (89.3%), followed by granuloma (23.7%).

Conclusion: In this study cystoscopy was the most reliable investigation for diagnosing urinary schistosomiasis. Dipstick tests came second followed by ultrasonography, while urine for schistosomal ova was the least diagnostic test.

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1. INTRODUCTION

It is thought that urinary schistosomiasis affected the people of Sudan for many centuries, but the map of endemic areas of the disease is changing with movement of individuals from rural areas to the cities. The region of Wadi Halfa, the Nile basin, and various areas in the provinces of Kordofan (Nubian mountains) and Darfour were noted to be endemic.⁽¹⁾ In Sudan the risk for *S. haematobium* is widespread in the different regions⁽²⁻⁴⁾ and school age children are at a much higher risk of developing *S. haematobium* infection than the other age groups.⁽³⁾ The spread of the disease is associated with the establishment of irrigation schemes, and movement of population from endemic area to the cities. The prevalence range of the disease is 57–79%.^(5, 6, 7)

The disease is caused by the blood fluke *Schistosoma haematobium* and is transmitted by its vector the snail *Bulinus truncatus*. The microscopic worms penetrate the skin and make their way to the bladder where they grow and lay eggs. The cycle is completed when ova pass to the environment in urine. Chronic infection causes bladder lesions which when left untreated may lead to irreversible bladder pathology which might progress to squamous cell carcinoma in the 3rd and 4th decades. In endemic areas infection is usually acquired as a child, the intensity and prevalence of infection rises with age and peaks usually between ages 15 and 20 years. In older adults, no significant change is found in the prevalence of disease, but the parasite burden or intensity decreases.⁽⁸⁾

Clinical manifestations start from penetration of the skin by larva causing Katayama fever, eosinophilia, urticaria, and other manifestations of serum sickness.^(9,10) Subacute manifestations are dominated by inflammatory lesions of the bladder, granulomatous lesions coalesce to form tubules, nodules or masses often ulcerate resulting in a surrounding hyperaemic mucosa.⁽¹¹⁾ The characteristic clinical presentation is terminal haematuria and dysuria. Chronic manifestations may include fibrotic lesions, glomerulonephritis, amyloidosis and malignancy.⁽¹²⁾

Diagnosis

Urinalysis is done looking for haematuria, proteinuria. An egg count is done to determine severity of infection.⁽¹³⁾

Evaluation of consequences of urogenital tract lesions is by cystoscopy, the findings are very characteristic, in early stages there are defined haemorrhagic alteration; later on in the disease nodules with ova and ulcers are seen and finally sandy patches may be seen around the bladder neck and ureteric orifices. Manifestations of late stages of the disease include hypertrophy of the bladder wall, calcification, and stones. Squamous cell carcinoma of the bladder may develop up to 10-20 years after the initial infection.^(14,15)

Other diagnostic tests: Ultrasonography is useful in detecting ureteral obstruction and hydronephrosis. Other tests: Urography, computerized tomography and retrograde cystography.

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Treatment:

Praziquantel, an antischistosomal drug, is the drug of choice today. It is effective against all species of human pathogenic schistosomes with a cure rate of 80%.⁽¹⁶⁾

II. OBJECTIVES

General: To compare the effectiveness of three diagnostic methods in evaluating the presence of haematobium infection and its other manifestations in the general population.

Specific objectives: To evaluate the most effective method of diagnosing the disease; and to evaluate the most common symptoms and complications of the disease.

III. MATERIALS AND METHODS

The study is a hospital based descriptive cross sectional study, conducted in three specialized urology centres in Khartoum, Sudan; in the period between Oct 2012- Sep 2013.

Inclusion criteria were all patients presenting to the outpatient clinic with different urinary symptoms diagnosed as schistosomiasis.

Exclusion criteria were patients who did not perform all three modalities of investigation required in the study.

Investigations:

1. All patients had a base line urea and creatinine.
2. Urine analysis: dipstick test, urine for schistosomal ova.
3. Abdominal ultrasound.
4. Cystoscopy.

Follow up: All patients requiring biopsy or a surgical procedure were followed up and the results of the tissue biopsy and type of surgical management were recorded and included in the results.

Data analysis: A questionnaire was designed in a way that facilitates for computer based analysis of data. The data was entered into the computer and analysed using the SPSS program.

IV. RESULTS

Most patients were males (85.5%), the most common age group was between 21-30 years old (43.5%), with patients from Khartoum state having the highest distribution (65%), followed by west Sudan (18%) and El Gezira state (11%). Haematuria (70.2%) and dysuria (79.4%) were the most common symptoms. Dipstick tests showed haematuria in (61.8%) of patients, while microscopy showed ova in only (3.1%). (Figure. 1) The majority of patients had no pathology on ultrasound scan (68%), minor pathology in (1%) and severe pathology in (31%). (Figure.2) The most common ultrasound finding was increased bladder wall thickness (27.5%) followed by bladder masses (14.5%). All

presenting patients had positive findings on cystoscopy; the most common findings were sandy patches (89.3%), followed by granuloma in (23.7%) patients and inflammatory polyps in (15.3%) patients. Management of the patients was medical in (75.6%) of patients, surgical in (2.3%) and (22.1%) of patients received both medical and surgical treatment. Surgical treatment for established bladder pathology was in form of bladder mass biopsy in (12.2%) of patients, ureteric dilatation in (5.3%), DJ fixation in (3.1%) of patients and bilateral ureteric re-implantation of the ureters in (1.5%) of patients.

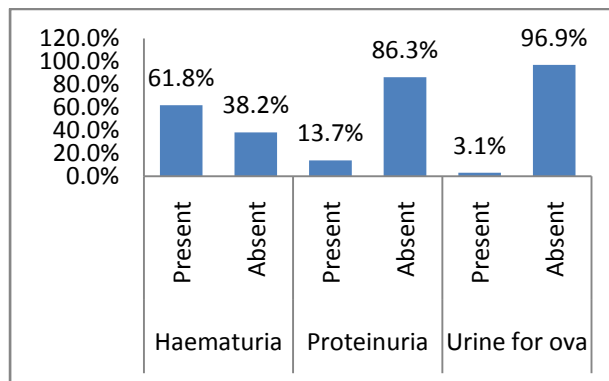


Figure 1 : The findings of urinalysis in patients with schistosomiasis

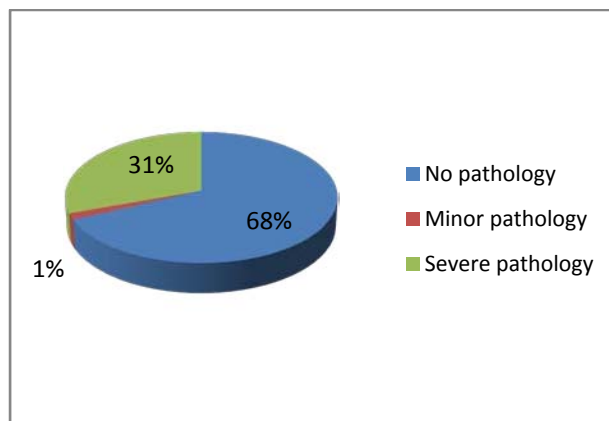


Figure 2 : Severity of bladder pathology on ultrasound scan among patients presenting with urinary schistosomiasis

Table 9 : Cystoscopic findings in patients presenting with urinary schistosomiasis

Cystoscopic finding	No	%
Sandy patches	117	89.3%
Granuloma	31	23.7%
Inflammatory polyps and erythematous lesions	20	15.3%
Ureteric orifice stenosis	14	10.8%
Bladder mass	7	6.9%
Vesical stones	1	0.8%

V. DISCUSSION

In this study the majority of patients were males (85.5%), the commonest age distribution among males was between 21-30 years, younger males 11-20 years were the second largest age group (16.1%). This was in contrast to recent data which suggest that school children are at higher risk of infection due to high rates of water activities and variation in blood supply of genitourinary structure and immunological factors.^(2, 17, 18, 19)

In a Kenyan study of spatial patterns of urinary schistosomiasis in the highly endemic lake area the difference for prevalence between sexes was only significant for those more than 21 years old indicating younger age groups frequent the lakes more. The intensity of infection was not significantly different between males and females of any age groups.⁽²⁰⁾

Khartoum state had the highest distribution of patients (65%) followed by west Sudan (18%), the least number of patients presented from the North. Since all the three hospitals are referral hospitals that receive patients from all areas of Sudan, these findings correlate with the new data that shows Khartoum state as a new endemic area for Schistosomiasis, although Elgezira is known to be the highest endemic area, it was third in distribution (11 %). Various areas in the provinces of Kordofan and Darfur are known to be endemic, a recent study in 2011 indicated *S. haematobium* to be endemic in Elsafia and Abu Selala in S.Darfur, and this combined with lack of specialized urology centres in those areas leads to the patient's referral to Khartoum and explains their appearance as a high risk group in the study.^(1,4)

The characteristic clinical presentation of urinary schistosomiasis is terminal haematuria associated with increased frequency of micturition and dysuria⁽²¹⁾, in a large cross sectional study on an untreated African population infected with *S. haematobium* micro-haematuria was reported in (41-100%) and gross haematuria in (0-97%),⁽²²⁾ this correlates with this study's findings, terminal haematuria was found in (79%) of patients and dysuria in (70%) which represent the characteristic clinical presentation of the disease. Haematuria and dysuria are the main symptoms of early disease, the disease can present as a chronic infection which is more common than acute infection, the severity of the disease depends on the intensity of infection, most of the patients with a few worms, especially in adults remain asymptomatic, although (80%) of the infected children show early symptoms and signs of the disease.⁽¹⁰⁾ The very low rate of detecting bilharzial ova in the urine maybe due to the timing and method of collection of the urine sample, the number of samples taken or it could result from the substantial day-to-day variation of egg output.⁽¹⁸⁾ Signs of disease can be present in the true absence of egg excretion.

Urinary schistosomiasis has typical sonographic features; however, it may also occur without. In a study of ultrasound findings in an endemic area for *S. haematobium* infection, (17%) of patients with vesicalschistosomiasis had hydronephrosis these lesions were seen in (10%) of infected children even in areas of low endemicity.⁽²³⁾

In this study ultrasound abnormalities were found in only 32% of patients, the lower number of positive findings ultrasound on maybe explained by lower intensity of infection, this was proven by the cystoscopic findings of sandy patches rather than hyperaemia which is a sign of early and active infection. The ultrasound studies were performed by different radiologist with different interpretations of the bladder pathology and no specific diagnostic criteria or guidelines were used to reach diagnosis or classify the disease making ultrasound scans a less reliable operator dependant diagnostic tool.

An Egyptian study correlating cystoscopic findings to the intensity of infection in children found hyperaemia to be present in all cases and greater in heavily infected children.⁽²⁴⁾ Sandy patches were in 60% of heavily infected cases and 33% of all cases. Tubercles in (18%) of all cases and (33%) of heavily infected patients and mostly over the posterior wall. A higher frequency (100 %) was reported from post-mortem study of cases older than 10 years, sandy patches was regarded as a record of schistosomal activity rather than a sign of activity, they represent old calcified eggs buried under the a thin covering, while tubercles have a high diagnostic value in dubious cases and are an indication of active infection. Hyperaemia is an important cystoscopic sign of early and active infection, tubercles are related to active infection and ulcers and polyps may be related to heavy load of eggs deposition at the site of the lesion.⁽²⁴⁾

In this study cystoscopic findings of the disease were detected in all patients, sandy patches were the main bladder pathology seen in schistosomal infection, they were found in (89.3%) of patients, granuloma were in (23.7%) and inflammatory polyps were found in (15.3%). This indicates the chronicity of the disease in this study group; bladder hyperaemia and inflammatory polyps the signs of acute active infection were found in only (15%) of patients.

VI. CONCLUSION

In this study cystoscopy was found to be the most reliable investigation for diagnosing urinary schistosomiasis, in comparison to urine analysis and ultrasonography. Dipstick tests came second followed by ultrasonography, while urine for schistosomal ova was the least diagnostic test.

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