Comparative study between direct microscopy and indirect haemagglutination methods used in diagnosis of urinary schistosomiasis

Abstract

Background

Urinary schistosomiasis is a disease caused by infection of people with the parasitic worm Schistosoma haematobium. These worms live in blood vessels around the infected person's bladder and the worm releases eggs which are released in the person's urine. If the urine is passed into ponds or lakes, the eggs can hatch and infect people that are washing or swimming there. Infection can cause blood in the urine and if left untreated can eventually lead to anaemia, malnutrition, kidney failure, or bladder cancer.

Objectives: To compare between direct microscopy and indirect haeagglutination methods.

Materials and methods: Comparative study, 73 urinary schistosomiasis patients were involved in it, both urine and blood were collected and examined by appropriate technique (urine examined by direct microscopy and blood by indirect haemagglutination method).

Direct microscopy:

a. Sensitivity: 100%

b. Specificity: 100%

Indirect haemagglutination method:

1. Sensitivity: 100%

2. Specificity: 95.8%

Discussion: The high sensitivity of directy microscopy is attributed to the intensity of infection among participants whom were moderately and severely infected with urinary schistosomiasis.

Conclusion: Both techniques showed high degree of sensitivity and specificity in endemic area with urinary schistosomiasis.

Recommendations: Further studies are required involving more participants and using more diagnostic methods and including areas with variant endemicity of urinary schistosomiasis.

Key words: urinary schistosomiasis, direct microscopy, indirect haemagglutination, patients, Khartoum, sudan

Research Article

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Introduction

Urinary schistosomiasis is a disease caused by infection of people with the parasitic worm Schistosoma haematobium. These worms live in blood vessels around the infected person's bladder and the worm releases eggs which are released in the person's urine. If the urine is passed into ponds or lakes, the eggs can hatch and infect people that are washing or swimming there. Infection can cause blood in the urine and if left untreated can eventually lead to anaemia, malnutrition, kidney failure, or bladder cancer.[1]

After malaria and intestinal helminthiasis, schistosomiasis is the third most devastating tropical disease in the world, being a major source of morbidity and mortality for developing countries in Africa, South America, the Caribbean, the Middle East, and Asia. More than 207 million people, 85% of who live in Africa, are infected with schistosomiasis, and an estimated 700 million people are at risk of infection in 76 countries where the disease is considered endemic, as their agricultural work, domestic chores, and recreational activities expose them to infested water. Globally, 200,000 deaths are attributed to schistosomiasis annually.[2]

The schistosome life cycle is maintained in a mammalian definitive host and a freshwater snail intermediate host. Humans acquire the infection following direct contact with water sources containing infectious cercariae. The fork-tailed larvae penetrate mammalian skin and enter the circulation via the capillaries and lymphatics. During penetration, they transform into schistosomula and migrate in the

blood circulation. They are then carried around and throughout the body by blood flow for several days before becoming trapped in the hepatic portal vein leading to the liver. During this course of migration, they are found in the lungs in large numbers, as they are temporarily held up in capillaries of the lungs. Within the portal system, the male and female worms sexually mature and pair up, after which they migrate to vesical venous plexuses Schistosoma haematobium, migrate to the pelvic venous plexus. Oviposition takes place around 90 days postinfection. The eggs penetrate the vasculature walls and enter either the bladder to be shed in urine.[3]

In early or light-intensity infections (i.e. low worm burden) the schistosome ova are shed intermittently and in low amounts. Diagnosis may be enhanced by collecting urine between 10 am and 2 pm, when egg excretion is maximal, after first sending the patient to run up and down stairs, if possible. A study in Kenyan schoolchildren indicated that the first urine microscop.[4]

Over the last decades, various serological methods have been developed to detect antibodies against Schistosoma antigens. Different techniques have been applied, including indirect immunofluorescent-antibody tests (IFATs), indirect hemagglutination assays (IHAs), and enzyme-linked immunosorbent assays (ELISAs) using different antigens, such as crude or purified adult worm antigen (AWA), soluble egg antigen (SEA), and cercarial antigen (CA) preparations. Nevertheless, very few studies have addressed the value of serological assays for diagnosis of schistosomiasis in individuals from areas where the disease is not endemic and who are carrying light and/or recently acquired infections; most of those describe single in-house assays and are limited by small sample numbers. [5]

Indirect haemagglutination test is a kind of passive agglutination in which erythrocytes, usually modified by mild treatment with tannic acid or other chemicals are used to adsorb soluble antigen onto their surface, and which then agglutinate in the presence of antiserum specific for the adsorbed antigen.[6]

Justification

There is no clear comparison between direct microscopy and indirect haemagglutination methods applied to diagnose urinary schistosomiasis.

Objectives

To compare between direct microscopy and indirect haeagglutination methods.

Material and methods

Study design: comparative study

Study area: Um usher village, Jabel Aulia governorate, Khartoum state

Study population: urinary schistosomiasis patients

Selection criteria:

Inclusion criteria:

1. Resident in Um usher village, Jabel Aulia governorate, Khartoum state
2. Known patient with urinary schistosomiasis

Exclusion criteria:

1. Resident outside Um usher village, Jabel Aulia governorate, Khartoum state
2. Free from urinary schistosomiasis

Sample size: 73

Type of specimens:

1. Urine for direct microscopy
2. Blood for indirect haemagglutination test.

Methods

Urine specimen is collected according to known collection protocol of urine sample required for diagnosis of urinary schistosomiasis and examined microscopically.

Serum was separated from whole blood and examined for anti Schistosoma haematobium antibodies by indirect haemagglutination method.

Result

Direct microscopy:

1. Sensitivity: 100%
2. Specificity: 100%
3.

Indirect haemagglutination method:

1. Sensitivity: 100%
2. Specificity: 95.8%

Discussion

The high sensitivity of directy microscopy is attributed to the intensity of infection among participants whom were moderately and severely infected with urinary schistosomiasis.

Conclusion

Both techniques showed high degree of sensitivity and specificity in area endemic with urinary schistosomiasis.

Recommendations

Further studies are required involving more participants and using more diagnostic methods and including areas with variant endemicity of urinary schistosomiasis.

Acknowledgment

None.

Conflict of interest

Authors declare no conflict of interest.

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