Validation of Haematuria as a Rapid Diagnostic Tool for Urinary Schistosomiasis

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Abstract

In investigating the significance of haematuria in the diagnosis of urinary schistosmiasis a total of 3,504 persons from 37 communities in four Local Government Areas of Imo Sate Nigeria, namely Okigwe, Ohaji/Egbema, Oguta and Owerri West, were randomly examined for the presence of *Schistosoma haematobium* eggs and screened for haematuria in their urine between May 1998 and September 2000. Using haematuria to identify cases of urinary schistosomiasis a sensitivity rate of 58.3% and a specificity rate of 86.0% were recorded. There was a close association ($R = 0.80$, $P < 0.01$) between occurrence of haematuria and presence of haematobium eggs in urine. Haematuria is therefore strongly recommended for possible use as an index in rapid community diagnosis of urinary schistosomiasis.

Keywords: Urinary schistosomiasis, Haematuria, Diagnosis, Nigeria.

Introduction

Urinary schistosomiasis, a chronic disease caused by *Schistosoma haematobium* is mainly diagnosed through detection of the presence of the worm's eggs in the urine. About 200-300 million people suffer from the disease globally, with another 600-700 million being at risk (WHO, 1991). The disease is highly endemic in Nigeria and has been inadequately reported, with its status in large areas of the country remaining unknown (Udonsi, 1990; Akogun et al, 1994; Agi, 1995; Anosike et al, 2001).

Although urine filtration for detection of *S. haematobium* eggs is one of the diagnostic methods for urinary schistosomiasis infection, it is usually cumbersome, costly and time consuming. Common clinical signs associated with schistosomiasis include visible haematuria (blood in urine), supra pubic pain as well as painful micturition. These symptoms are commonly reported by some of the persons positive for *S. haematobium* eggs. Some workers have reported haematuria as the most striking and common manifestation of urinary schistosomiasis (Savioli and Mott, 1989; Lengeler et al, 1991; Ekanem et al, 1995). Anosike et al, (2001) reported the specificity and sensitivity of visible haematuria in the assessment of urinary schistosomiasis among 1,173 volunteers in Abia state Nigeria. They concluded that lack of haematuria is a valid indicator of the absence of urinary schistosomiasis. It is however, necessary to validate these results using a larger sample size obtained over a wider study area in the same geographical zone of the country.

The present study reports a field evaluation of the use of specificity and sensitivity of haematuria as basis for the diagnosis of urinary schistosomiasis among 3,504 rural dweller in four Local Government Areas of Imo State, Nigeria.

Materials and methods

Three thousand five hundred and four (3,504) persons randomly drawn from four Local Government Areas of Imo State, namely Okigwe, Ohaji / Egbema, Oguta and Owerri West, were screened for haematuria and also examined for the presence of eggs of *S. haematobium* in their urine using urine filtration technique to determine the infection rate for the area. In each visit to a community, mid-day, midstream urine samples were collected from each individual in labelled sterile screw cap bottle. These were sent to the laboratory within 5 hours of collection.

The urine specimens were thoroughly shaken and 10 millimeters of each collected with sterile disposable syringe and transferred into a centrifuge tube for centrifugation for 5 minutes at 2,000rpm. After discarding the supernatant, 0.1ml of the sediment was re-suspended in the remaining urine and thereafter poured into a petri dish for examination of eggs of *S. haematobium* using x 10 scanning objective and x 10 eyepiece of the microscope (WHO, 1980). The eggs were counted and their numbers in each specimen recorded. Haematuria (blood in the urine) was assessed using chemical strips (Medi-Test Combi-9), which registers urinary blood as negative or positive. (Mott *et al,* 1983). Data generated was analyzed using descriptive statistics such as means and percentages. These were further subjected to simple correlation statistics to determine possible relationships between haematuria and the presence of *S. haematobium* ova in the urine (StatView Version 4.5,1996).

Results

The status of urinary schistosomiasis in the four Local Government Areas of Imo State Nigeria is shown in Table 1. Of the 3,504 persons screened, 880(25.1%) were found to harbor *S. haematobium* in their urine. Three hundred and sixty seven (10.5%) were positive for *S. haematobium* eggs without haematuria while 515 (14.6%) had haematuria. Oguta Local Government Area had predominantly more persons manifesting haematuria (20.8%) and those infected without haematuria (18.2%).

Table 2 highlighted the cross tabulation of haematuria result with that of urine filtration of those infected without blood in their urine. The proportion of the sample population examined, and found to manifest haematuria as well as harbouring *Schistosoma* eggs in the urine (true positive) was 14.6%. The proportion that was correctly observed as not being infected due to absence of haematuria (true negative) on the other hand was 64.4%.

To assess the validity of haematuria presence in establishment of urinary schistosomiasis infection in each of the communities, sensitivity and specificity of haematuria were equally calculated (Table 2). The accurate identification of persons with the disease (sensitivity) by haematuria observation was found to be 58.3%, while it's ability to correctly sort out all those without the disease was 86.0%. There was a close association between haematuria and the presence of *S. haematobium* ova in the urine (R = 0.80, P<0.01).

Table 1: Total haematuria assessments in communities of four Local Government Areas in Imo State, Nigeria

LGA	No of Communities	No of persons examined	No (%) infected and with haematuria	No (%) infected and without haematuria
Okigwe	10	810	100(12.3)	25(3.1)
Ohaji/Egbema	9	487	35(7.2)	20(4.1)
Oguta	10	648	342(20.8)	300(18.2)
Owerri West	8	559	36(6.4)	22(3.9)
Total	37	3504	513(14.6)	367(10.5)

Table 2: Contingency cross tabulation of the presence of *S. haematobium* eggs in urine (Filtration Method) with haematuria.

Parameter	Eggs +ve	Eggs -ve
Haematuria +ve	513 (14.6 %)	367 (10.5%)
Haematuria -ve	367 (10.5 %)	2,257 (10.4 %)
Total	**880 (25.1 %)**	**2,624 (75.0 %)**

True positive rate = 14.6%, True negative = 64.4%, False positive rate = 10.5%, False negative rate = 10.5%, Confirmation rate = 58.3%, Sensitivity of screening test = 58.3%, Specificity of screening test = 86.0%, Coefficient of Association = 0.80%

Discussion

Results from this study show that haematuria could be reliably employed in the community diagnosis of urinary schistosomiasis in endemic areas prior to mass treatment of people. There was a rather high sensitivity rate of 58.3%, which is much higher than the 41.0% earlier recorded by Anosike *et al,* (2001) in neighboring Abia State. These results should perhaps be of interest to health workers who insist on the usually time consuming and costly investigation of cases based on eggs in urine. In areas of high endemicity however, these results may not be of much significance since control drugs are usually given to almost all eligible persons in such communities.

The findings of this study agree with the published reports of Okpala, (1961), Pugh et. al. (1980), Lengeler et al, (1991), Ekanem et. al. (1995) and Okoli and Iwuala, (2004) that haematuria is one of the major manifestations of urinary schistosomiasis. Close association between visible haematuria and the presence of S.haematuria ova in the urine in this study

(C=0.80, P<0.01) is similar to the reports of Mott et.al. (1983), Lengeler et.al. (1991), and Anosike et.al. (2001), who recorded values of coefficient of association in the range of 0.86 and 0.88. In chronic cases, of the disease however, examination of urine is not very reliable since so many eggs become encapsulated in the tissue, and do not escape regularly (WHO, 1993; Anosike et.al., 2001), while the few that pass out are mostly found dead, blackened or surrounded by cells and fuzzy coat of cells. This probably could be the reason for the low sensitivity rate (Chandler and Read, 1961).

The report of Jordan and Webbe (1982) had earlier highlighted the fact that villagers in most other endemic areas already associate blood in the urine with schistosomiasis. Thus, if persons in the endemic areas are taught to associate haematuria with schistosomiasis, a dependable basis for community diagnosis that is simple, cheap and also rapid could be developed. This would make possible the survey of large areas of schistosomiasis endemicity by field workers within a short period using this simple index.

The present study therefore recommends large-scale use of haematuria as a tool in community diagnosis of urinary schistosomiasis. However, some measure of age-dependent bias was observed, as values of haematuria tended to decrease with age. It may thus be more practicable to restric the use of haematuria as an indicator of urinary schistosomiasis among persons within the first two decades of life as they represent the majority of subjects with this symptom.

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