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# *Schisotosoma haematobium* and Urinary Tract Infection (UTI) in Some Part of Jos, Plateau State, Nigeria

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***Abstract:***
*Urinary tract infection and urinary schistosomiasis still remain a public health problem to man with a focal prevalence. Schistosoma haematobium and other Urinary tract infections are chronic diseases that affect the urinary tract system. A total of 1,024 urine samples from volunteers attending Victory Clinic in Nabor village, a rural community in Jos North local government area and The Nigeria Air Force hospital were analyzed using sedimentation concentration and reagent strip techniques. Of the 1,024 examined, 58(5.7%) were found infected with S. haematobium. The severity of infection was recorded as light (< 50), moderate (>50- 100) and heavy (>100) ova /10ml of urine. Following macroscopic observation, 266 samples of urine were cultured on nutrient agar, 144(54. 2%) had Nitrogen reducing bacteria. Staphylococcus aureus, Escherichia coli and a fungus, Candida albicans were isolated. Of these, 20(13.6 %) had co-infection with S. haematobium and other UTI the difference was significant at ($p<0.05$) between the age group <20yrs and adults >20yrs. There was no significant difference between males (8.5%) and females (4.2%). Infection according to main source of water contact revealed a higher prevalence with stream (6.7%) and least with rain water. This suggests the use of more than one major source of water. Control measures both in attitude and treatment can reduce the incidence of the co-infections. More effort is needed from government, non government organizations, (NGOs) and individuals in tackling urinary tract infections problems to bring it to the barest minimum.*

***Keyword:*** *Schistosoma haematobium, Urinary tract, infection, Jos, co-infection.*

## 1. Introduction

Urinary schistosomiasis is a chronic parasitic infection of circulatory system caused by *Schistosoma haematobium* which occurs most often in the venous plexus of the bladder and subsequently affects the urinary tract of man. Its effect is due to the deposition of eggs in the bladder and ureter which elicits chronic granulomatous injury and is relatively common in developing countries especially in the continent of Africa and China (Gouda *et. al* 2007). More than 207 million people are infected and estimated 700 million are at risk of infection in 76 countries endemic with schistosomiasis, 85% who live in Africa. For most agricultural work, domestic chores and recreational activities expose them to infected water (WHO 2010).

Four trematode species in the genus *Schistosoma; Schistosoma mansoni, S. haematobium, S. japonicum and S. melkongi* cause series of related diseases in human referred to as *schitosomiasis. Schistosoma intercalatum* is a parasite of cattle in West Africa which also occasionally causes disease in humans. Only *S. haematobium* produces urinary tract disease (Minai *et.al.* 2003). *Bulinus globosus* and *B. africanus* are the intermediate hosts for *S. haematobium* and *S, intercalatum* (Sturrock, 2001). According to Mott *et.al* (1990), schistosomiasis is largely an infection found in rural areas, but urban infection is an increasing problem in many countries. Contaminated fresh water is the major risk factor and sources such as streams, ponds, lakes, man made reservoirs and irrigation systems are mostly implicated. Population growth and migration have contributed to the spread. World Health Organization (2002) stated that the main risk groups are school children, specific occupational groups such as fisher men, irrigation workers, women and other groups using infested water for domestic purposes.

Infection with *S. haematobium* may begin in child-hood as early as 6 months of age and peaks up between the ages of 40 - 49, but Bacelar *et al* (2007) reported cases of patients 27- 29years age with advanced prostrate cancer associated with the presence of multiple *S. haematobium* eggs which induced a chronic inflammation and irritation in the bladder that seems to be associated with increased initiation of cancer at the site of inflammation. This also gives rise to response around the eggs, also gives rise to genotoxic factors and products that may cause genomic instabilities of host cells leading to modification in the regulation of tumor suppressing genes and oncogenes (Rosein et al 1994a, 1994b). The End stage complication may persist or worsen (Mwanakasale et.al. 2009, Nawal 2010).
According to Leutcher *et al* (2008), among women with *S. haematobium* infection, 35% may have co-infection with sexually transmitted infections compared with 17% in men mainly in younger population, 15 - 24years.
Urinary tract schistosomiasis has been identified as a major social and medical problem that may facilitate the spread of some sexually transmitted diseases such as Human Papilloma Virus (HPV) and Human Immunodeficiency Virus (HIV) infection (Mosunjac et *al* 2003). Genital lesions may include ulceration, hypertrophic lesion or nodular lesions of the cervix, vulva, vagina or vesico-vaginal fistula (external vulva). Perianal lesion may include uterine enlargement, menstrual disorders, cervicitis, and infertility with dysuria, urinary frequency, haematuria, fever and rash with eosinophilia. These may also be associated with the presence of other Urinary Tract Infections (UTI).

## 2. Materials and Method

### *2.1. Study Area*

Jos North and south local Government areas of Plateau state are situated to the North of the state which is in the central part of Nigeria. It lies between latitude 9° 0/-9°35/ N and 8°0/ - 8°05/ E.
The major source of economic activity was tin mining but has gradually been replaced with subsistence farming due to the availability of small ponds, man made dams, burrow pits and rivers developed from tin mining. Many of these serve as the sources of water for agricultural purposes most of which are snail-infested.

### *2.2. The Study Population*

This was made up of patients who were attending two hospitals; Nigerian Air Force Hospital (NAFH) and Victory Clinic (VC) a primary Health centre with patients complained of UTI symptoms and referred to the laboratories. Ethical clearance was obtained from the medical directors and the consent of each person was sought and obtained to use their urine samples for analysis. Urine samples were collected in pre-labeled bottles and information on their ages, sex, and main source of water supply were obtained.

### *2.3. Sample Collection*

Using the labeled sterile bottles, early morning midstream urine samples were collected, macroscopic and microscopic examination carried out. Parasite eggs were sought for using concentration and sedimentation method employed by (Amali 1994, Cheesbrough, 2000). Each urine sample was shaken, poured into a centrifuge bottle and centrifuged for 2mins at 1200rpm. Using a 10ml syringe, the supernatant was drawn and discarded, leaving about *I -2ml* deposit. It was then shaken and a drop placed on a clean, grease free slide, a drop of Lugol's Iodine added and covered with a cover slip. It was then viewed under 10 microscopes for identification of the *S. haematobium* eggs.
The egg count indicated the severity of the infection as + Light, ++ medium and +++ heavy infection (<50, 50-100, and > 100 eggs/ml respectively). Dip stick was employed to determine haematuria as described by Cheesbrough (2000).

### *2.4. Urine Culture Analysis*

Sterile wire loop was dipped into each urine sample, inoculated into the labeled nutrient agar plate and incubated for 24hours. The plates were observed for significant, non-significant or no growth at all to identify UTI organisms. The results were interpreted. Two Hundred and sixty-six urine samples were cultured after Cheesbrough (2000).

### *2.5. Statistical analysis*

Chi-square test was used to determine the significant difference between infection rates, Gender and age groups. Chi-square showed that there was no significant difference in infection with *S. haematobium* between males and females. ($\chi^2$ =0.621, df = 1023, p = 0.331)
Chi-square test showed there was no significant difference between co-infections
($\chi^2$ 0.417, df = 265, p = 0.031)

**3. Results**

A total of 1,024 volunteers were examined and 58(5.7%) were found infected with *Schistosoma haematobium,* 20 (2.0%) had co-infection and 144 (14.06%) had urinary tract infection. Of these, 704 (68.73%) had clear urine while 320 (31.3%) had one form of coloration or the other.

| Age group (years) | No. examined | No. Infected | % Infected |
|---|---|---|---|
| 1-20 | 338 | 24 | 10.1 |
| 20-40 | 540 | 22 | 4.1 |
| 41-60 | 100 | 2 | 2.0 |
| 61-80 | 46 | 0 | 0.0 |
| Total | 1024 | 58 | 5.7 |

*Table 1: Prevalence of Schistosoma haematobium in different age groups*

| Gender | No. examined | No. Infected (%) *S. haematobium* | No cultured | No. Infected (%) UTI | Co-Infection (%) |
|---|---|---|---|---|---|
| Male | 352(34.38) | 30(8.52) | 74 | 38(51.35) | 12(3.41) |
| Female | 672(65.62) | 28(4.17) | 192 | 106(55.21) | 8(1.19) |
| Total | 1024 | 58(5.6) | 266 | 144(54.4) | 20(1.95) |

*Table 2: Gender-related occurrence of Schistosoma haematobium, UTI and Co-infections*

| | | NAPH | | | VL | | | Totals | |
|---|---|---|---|---|---|---|---|---|---|
| Growth observed | No Cultured | No. Infected | % Infected | No. Cult. | No. Infected | Infected | No. Examine | No. % Infected | Infected |
| *Escherichia coli* | 266 | 66 | 31.7 | 58 | 14 | 24.1 | 266 | 80 | 30.1 |
| *Staphylococcus aureus* | 266 | 32 | 15.4 | 58 | 6 | 10.3 | 266 | 38 | 14.2 |
| *Candida albicans* | 266 | 8 | 3.85 | 58 | 2 | 3.45 | 266 | 10 | 3.7 |
| *Schistosoma mansoni* | 266 | 8 | 1.92 | 58 | 0 | 0 | 266 | 4 | 1.5 |
| Klebsella species | 266 | 10 | 4.81 | 58 | 0 | 0 | 266 | 10 | 3.7 |
| *Trichomonas vaginalis* | 266 | 0 | 0 | 58 | 2 | 3.45 | 266 | 2 | 0.75 |
| Total | 266 | 120 | 57.7 | 58 | 24 | 41.4 | 266 | 144 | 54.1 |

*Table 3: Growth observed from cultured urine*

| Co-existing infection | No. cultured | No of the Infected | % Infected | % of the culture |
|---|---|---|---|---|
| *Schistosoma haematobium* and *E coli* | 266 | 12 | 60 | 4.5 |
| *S. haematobium* and *Salmonela aureus* | 266 | 6 | 30 | 2.3 |
| *S. haematobium* and *Candida abicans* | 266 | 2 | 10 | 0.8 |
| Total | | 20 | 100 | |

*Table 4: S. haematobium, UTI, Co-infection and urine coloration*

**4. Discussions**

A total of 1,024 subjects whose urine samples were examined, 58 (8.66%) were infected with *S. haematobium.* This is relatively low. This agrees with the report of Mott *et al* (1990) that urinary schistosomiasis is largely an infection found in rural areas, Jos is an urban area. According to WHO (2002), schistosomiasis is an emerging urban problem too, therefore the prevalence in this study is suggestive that there was contact with infected water.

The result showed that infection with Schistosoma was highest in the younger age group (1-20years), the older age groups (>40yrs) were almost without infection either due to development of immunity or having little contact with contaminated water while the younger ones enjoyed the streams and ponds which could be contaminated and serve as source of infection. This agrees with the findings of Leutscher *et. al.* (2008) who observed higher infection in 15-24 year olds than in older people. Also, Vennervald and Dunne (2004) reported that of those infected, a small proportion developed serious chronic disease after varying durations of exposure. In persons older than 19years living in endemic areas, prevalence of active infection and egg counts slowly reduced and this may be reflecting that the individuals have an increased host immune response or decreasing exposure to contaminated water, but differs from Bacelar *et. al.* (2007) who reported that infection with *S. haematobium* begins early in life and peaks between ages 40-49.

Though more females were observed, a higher percentage of the males were found infected but there was no significant difference. Infection with UTI was seen to be higher in females (55.2%) than in males (51.4%). This might be because older females go through physiological changes during menstruation, pregnancies and nursing of children that make them more susceptible to infections.

Of the two hundred and sixty-six (266) urine samples cultured, 54.1% were found to be infected with one or more micro organism. This shows that many of the people that walk into the hospitals with symptoms of UTI were infected. The highest observed was *Eichericha coli* with 30.1%. The rarest observed organism is *Trichomonas vaginali* (0.75%). The number with co-infection with *Schistosoma haematobium* and UTI was higher in males (3.41%) than in females (1.19%). This differs from the report of Leustcher *et. al* (2008) who worked in Madagascar and observed that co-infection was higher in females (35%) than in males (17%). This is suggestive of a higher exposure of men to UTIs and increased participation in activities that predispose them to schistosomiasis.

Of the 266 urine samples cultured, 80 (30.1%) showed growth with *Escherichia coli* and the least was *Candida albicans* with 10 (3.7%) infected patients. Other organisms observed were *Trichomonas vaginalis,* (0.75%) and *Schistosoma mansoni* (1.5%) which might have come from poor anal hygiene. There is the need for serious preventive and control measures to bring infection with S. haematobium and other UTI to the barest minimum.

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