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# Prevalence of *Schistosoma Haematobium* among Vesico-Vaginal Fistula (VVF) Patients Attending National Obstetric Fistula Centre, Babbar-Ruga, Katsina

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## Abstract

*Schistosoma haematobium* (*S. haematobium*) infection has been identified as an uncommon contributor to VVF, potentially hindering the healing process of urogenital tissues. The study was conducted at the National Obstetric Fistula Centre, Katsina (NOFICK) to determine the prevalence of *S. haematobium* among VVF patients. Direct and catheterized urine collection methods were employed to collect about 10–15 ml of urine sample and examined microscopically for the presence of *S. haematobium* eggs. A cross-sectional study was conducted on 297 patients. An overall prevalence of 2.36% was observed. The results obtained revealed that patients from rural areas have a higher prevalence of 85.7% than those from urban areas, with 14.3%. The occurrence related to age revealed that patients aged between 16-20 years have the highest prevalence of 57.1%, compared to 21-30 age groups with 28.6%. Prevalence was notably lowest in individuals older than 30 years, accounting for just 14.3%. However, a chi-square test of independence showed that there was no significant association between age group and Schistosomiasis infection, $X^2 = 0.1655$, $p = 0.921$. Patients with only primary school level of education were found to be more infected, with a prevalence of 57.1%, than those with no formal level of education, with a prevalence of 28.6%. Furthermore, the study also revealed that patients who utilize rivers for their domestic activities were more prone to infection than those that engage dams, wells, taps, and ponds for such purposes. The research strongly advocated the need for all VVF patients to be screened for possible Female Genital Schistosomiasis (FGS), which can interfere with the wound healing of urogenital tissues and eventual treatment failure.

**Keywords**: - Schistosomiasis, VVF patients, Prevalence, Babbar-Ruga, Katsina.

## Introduction

Schistosomiasis is an infection caused by the stool/urine-water borne parasite that is transmitted when larval forms of the parasite – released by freshwater snail – penetrate the skin of a person during contact with infested water (Santos *et al*., 2021). It is caused by the members of the genus Schistosoma, commonly known as blood flukes. Out of the nearly 25 species of Schistosoma, most human infections are caused by *S. haematobium, Schistosoma mansoni, Schistosoma japonicum S. mekongi, S. intercalatum, and S. guineensis,* (Nash, 1982; Webster *et al*., 2006; Uchendu *et al*., 2017; WHO, 2022). The microscopic adult worms live in the veins draining the urinary tract and intestines. Most of the eggs they lay are trapped in the tissues and the body's reaction to them can cause massive damage on the host (Lucas *et al*., 2013; Anouk, 2018).

Schistosomiasis is one of the most prevalent and devastating tropical parasitic infections in man, globally, second only to malaria in terms of socio-economic and public health significance in several developing countries (Ross *et al*., 2002; Gryseels *et al*.,2006; Walz *et al*., 2015). It is one of the neglected tropical diseases, predominantly found in the rural areas of Africa, South America, the Caribbean and the Middle East, in poor

communities that have no potable water and adequate sanitation. Schistosomiasis affects more than 78 countries, and nearly 700 million people are exposed to the disease globally with around 240 million people infected, and 90% of these infections occur in Africa (Steinmann *et al*., 2006; Brindley *et al*., 2017; Hotez, 2017). Around 4,400 to 200,000 people die from Schistosomiasis each year (VOS *et al.*, 2016; Ejike *et al*., 2017; De Leo *et al*., 2020; WHO, 2021). Urogenital Schistosomiasis occurs in both males (male genital Schistosomiasis) and females (female genital Schistosomiasis). Both happen when the eggs are lodged in the genital tract thereby causing inflammation and lesions of the urinary and reproductive organs (Anouk, 2018).

In Nigeria, roughly 101.3 million are at risk of infection with 29 million of the people being infected (Hotez *et al*., 2009). However, by the year 2017 the number of people at risk of infection reduced to roughly 24 million people, with a prevalence of almost 9.5% (Bishop, 2017). Urogenital Schistosomiasis is endemic in Nigeria and one which continues to pose a public health problem particularly among school-age children in rural communities (Onyekwere *et al*., 2022).

A VVF is an abnormal opening between the urinary bladder and the vagina in female patients which results in urine leaking out uncontrollably through the vagina (urinary incontinence). It commonly occurs in the developing countries usually because of prolonged, obstructed labour (Stamakos *et al*., 2014). During obstructed labour, the soft tissues of the pelvis undergo necrosis from lack of blood supply. This necrosis results in an abnormal opening between the vagina and the bladder and/or rectum with subsequent incontinence of urine and/or faeces (Sachdev *et al*., 2009; Kalilani-Phiri *et al*., 2010). It poses not only physical but also psychological problems for the women as such patients are usually looked down upon or may be even abandoned by their husbands and society due to the smell and shame of urine leakage (Kayondo *et al*., 2011). Given the nature of the signs and symptoms of the female genital schistosomiasis infection, women tend to approach health facilities with complaints of infertility or symptoms of sexually transmitted infections (WHO, 2015). A few case studies have identified the relationship between schistosomiasis and VVF; however, none specifically detail an association between schistosomiasis and Obstetric Fistula (Tilstra *et al*., 2001; Richter *et al*., 2008). Given that the presence of *S. haematobium* in the bladder could lead to inflammation, fibrosis, rupture, ulceration, and potentially fistula (Stamatakos *et al*., 2009), it could also be associated with formation of Obstetric Fistula or with delays in healing from VVF repair surgery.

Female genital Schistosomiasis may be a common Gynaecological condition in Schistosomiasis-endemic areas like Nigeria. In most cases the disease remains undiagnosed. Clinicians are mostly unaware of Female genital Schistosomiasis because it is rarely described in the medical textbooks or nursing curricula in any of the countries where Schistosomiasis is endemic (WHO, 2015).

Laboratory diagnosis is insufficient, and for adult women living in areas that are endemic for *S. haematobium*, Female genital Schistosomiasis remains highly widespread and under-diagnosed due to less suspicion among health-care professionals. A high index of suspicion will allow a diagnosis of Female genital Schistosomiasis pre-operatively and avoid unnecessary radical surgery and misdiagnosis of sexually transmitted infections.

The disease has been acknowledged as a rare cause of VVF which can interfere with the wound healing of urogenital tissues. This makes it to be potentially associated with an increased rate of obstetric fistula among women who experience obstructed labour and/or in a greater rate of fistula repair failure. Research of this nature in this hospital will give us a guide on the more effective ways in the pre-operative treatment of VVF patients. The main aim of this research is to determine the prevalence of *S. haematobium* infection among VVF patients, and to correlate the prevalence of *S. haematobium* with the social demography of the VVF patients at NOFICK.

## Methods

**Study Area and Sampling Site**: National Obstetric Fistula Centre, Babbar- Ruga is located some 3 kilometres along Katsina – Batsari road. It is on the coordinates $12^0$ 57`N and $7^0$ 34`E. The hospital has a bed capacity of 160. It covers an area of 112,547$m^2$.

**Sample Size**: After acquiring ethical approval from the ethics committee of the hospital for the conduct of the study, a total of 297 diagnosed VVF patients (convenient sampling) who consented to participate in the research were recruited.

**Samples Collection:** Direct urine and catheterized urine collection methods were employed. A clean, dry, sterile, screw capped urine container was given to each participant. Each was well informed on how to collect about 10-15ml of urine sample (Shepherd, 2017; Drew *et al*., 2018). The samples were then sent to the laboratory and subsequently examined for the presence of *S. haematobium* eggs. The urine specimen was centrifuged at 2000 rpm for 5 minutes, a drop of the sediment was transferred unto a clean, grease-free glass slide, covered with a cover slip and examined microscopically (using ×10 objectives) for presence of *S. haematobium* eggs (WHO, 1991; Cheesbrough, 2010; Drew *et al*., 2018).

## Results

Out of the 297 urine samples examined, 7 turned out to be diagnosed *with S. haematobium* infection. This gave the overall 2.36% prevalence of Schistosomiasis among the VVF patients examined. Patients within the age bracket of 16-20 years showed higher prevalence (57.1 %) than other age groups. Age group of ≥31 years was the least affected, with a prevalence of 14.3%. A chi-square test of independence showed that there was no significant association between age group and Schistosomiasis infection ($X^2 = 0.1655$, $p = 0.921$) as shown in table 1.

**Table 1; Prevalence of *S. haematobium* among Age Groups**

| Age Group (Years) | *S. haematobium* Negative, N=290 | *S. haematobium* Positive, N=7 | Total N (%) |
|---|---|---|---|
| 16- 20 | 146(50.3) | 4 (57.1) | 150(50.5) |
| 21- 30 | 104 (35.9) | 2 (28.6) | 106 (35.7) |
| =31 | 40 (13.8) | 1 (14.3) | 41 (13.8) |
| Total | 290 (100) | 7 (100) | 297 (100) |

Majority of the patients (89.56 %) were from rural areas, while the remaining (10.44%) came from urban communities. Among the 7 positive patients, only 1 came from urban community. All other 6 positive patients were from rural settlements, giving a prevalence of 85.7% (see Table 2).

**Table 2: Prevalence of *S. haematobium* between Communities**

| Community | *S. haematobium* Negative, N=290 | *S. haematobium* Positive, N=7 | Total N(%) |
|---|---|---|---|
| Urban | 30(10.3) | 1 (14.28) | 31(10.4) |
| Rural | 260(89.7) | 6 (85.7) | 266(89.6) |
| Total | 290 (100) | 7 (100) | 297((100) |

Schistosomiasis infection was observed to be highest in those that utilise water from river for domestic activities. The prevalence of 42.85 % was observed in those that fetch the river water for drinking purposes, while those that exploit river for bathing and laundry had a prevalence of 57.14% each. None of the patients that go to ponds for bathing and laundry was found to be infected with the disease. Incidentally, 1 (with 14.28 % prevalence) patient that use tap water for both drinking, bathing and other domestic purposes was found to be diagnosed with *S. haematobium* infection. Equally, only 1 patient out those that employ dam for domestic activities was found to be infected with the disease. The prevalence of Schistosomiasis in patients that use well water for drinking was 28.57% and 14.28% prevalence was each obtained for those that utilise the well water for bathing and laundry (See table 3).

**Table 3: Domestic Activities among the Subjects**

| | Drinking | | | Bathing | | | Laundry | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Neg, N=290** | **Pos. N=7** | **Total N (%)** | **Neg, N=290** | **Pos. N=7** | **Total N (%)** | **Neg. N=290** | **Pos. N=7** | **Total N (%)** |
| Well | 227(78.27) | 2(28.57) | 229(77.1) | 202(69.66) | 1(14.28) | 203(68.3) | 202(69.66) | 1(14,28) | 203(68.35) |
| River | 4(1.38) | 3(42.85) | 7(2.36) | 14(4.83) | 4(57.14) | 18(6.1) | 14(4.83) | 4(57.14) | 18(6.06) |
| Tap | 58(20.0) | 1(14.28) | 59(19.86) | 65(22.41) | 1(14.28) | 66(22.2) | 65(22.4) | 1(14,28) | 66(66.0) |
| Dam | 1(0.34) | 1(14.28) | 2(0.67) | 6(2.07) | 1(14.28) | 7(2.4) | 6(2.07) | 1(14.28) | 7(2.36) |
| Pond | 0 | 0 | 0(0) | 3(1.03) | 0(0) | 3(1.0) | 3(1.03) | 0(0) | 3(1.01) |
| **Total** | **290** | **7** | **297(100)** | 290 | 7 | **297(100)** | **290** | **7** | **297(100)** |

Most of the patients (57.91 %) had no formal education, with the Schistosomiasis prevalence of 28.6%. Patients with only primary school education (31.65%) had the highest Schistosomiasis prevalence of 57.1%. Out of the total patients, 8.08% attended secondary schools and had a Schistosomiasis prevalence of 14.3%. The infection was not detected in all the patients that had a level of post-secondary school education (2.36%) (See Table 4).

**Table 4: Level of Education Among the Patients**

| **Category** | ***S. haematobium* Negative, N=290** | ***S. haematobium* Positive, N=7** | **Total N (%)** |
|---|---|---|---|
| None | 170 (58.6) | 2(28.6) | 172(57.9) |
| Primary | 90 (31.0) | 4(57.1) | 94 (31.65) |
| Secondary | 23 (7.9) | 1(14.3) | 24(8.08) |
| Post Secondary | 7 (2.4) | 0 (0) | 7(2.36) |
| **Total** | **290 (100)** | **7** | **297(100)** |

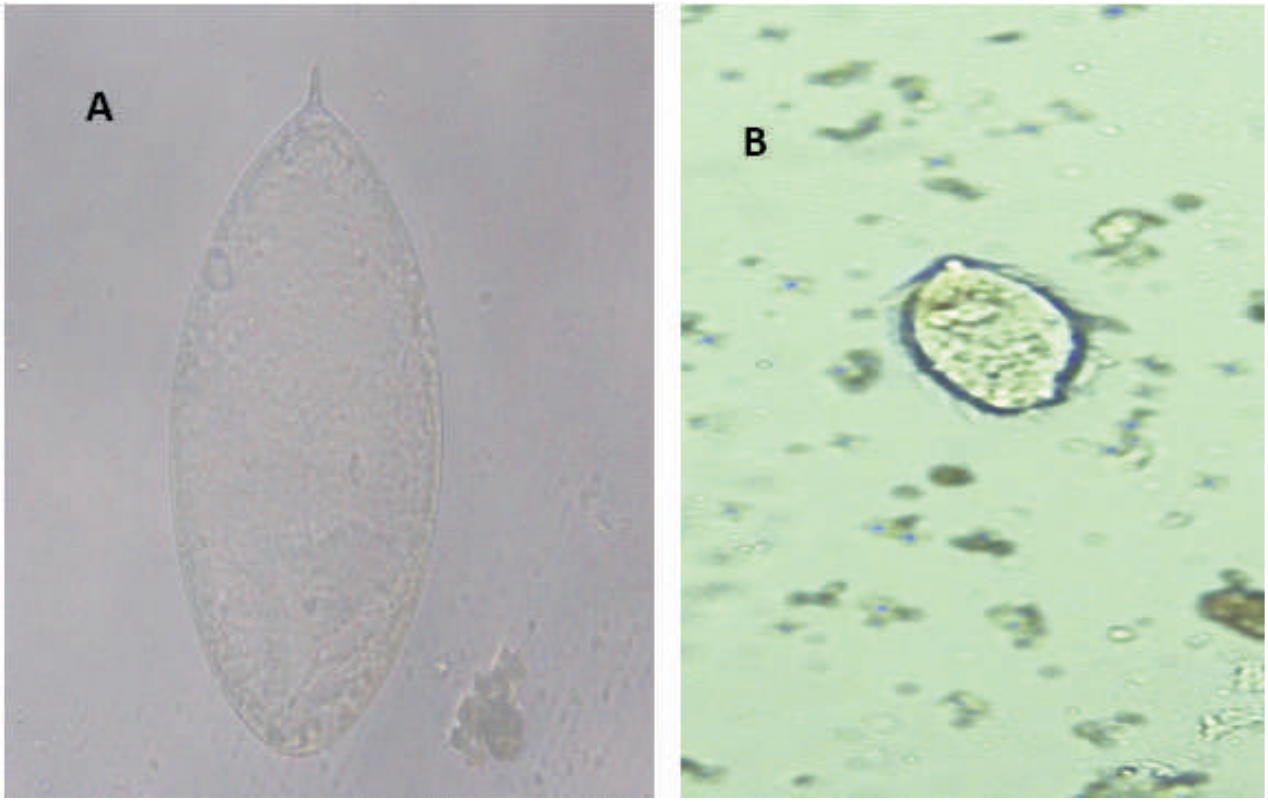


**Figure 1: *S. haematobium* egg X40 (A) and miracidium X10 (B)**

**Discussion**

This research recognized the occurrence of *S. haematobium* among patients in the Obstetric Fistula Centre in NOFICK, with a prevalence of 2.63%. This agrees with the research findings by Drew *et al*. (2018), which found female genital Schistosomiasis among obstetric fistula patients in Lilongwe, Malawi, with the prevalence of 2.0%. The research also agrees with the findings by a pervious report which did not find an association between urinary Schistosomiasis infection and Obstetric fistula, despite the biologic probability of *S. haematobium* contributing to Obstetric Fistula (Tilstra *et al*., 2011).

Younger adults are more infected with the disease than older ones as shown in table 1. This may not be unconnected with the routine domestic activities they involved themselves, such as fetching water, laundry and engaging in some aspects of life that may expose them to be in contact with the contaminated water as indicated in table 3. This agrees with the work of Downs *et al. (*2011) and Ekpo *et al*. (2017), who separately found that Schistosomiasis prevalence was higher in younger subjects than adults.

Individuals residing in rural areas where the predisposing factors are prominent become more prone to Schistosomiasis infection when compared to urban dwellers as expressed in table 2. The findings confirmed the work of Klohe *et al*. (2021), where the team identified that rural communities exposed to the predisposing elements became more infected than the urban dwellers. The only positive patient from the urban community migrated from rural settlement, where the patient confessed to have used pond water for their domestic purposes. Probably, the subject might have contracted the infection while residing in that rural community. The patient experienced urinary incontinence, dysuria and uraemia.

The remaining positive patients underwent VVF surgeries of various types, including Right ureteric reimplantation, 4$^{th}$ degree repair, urethrization and fixation. Follow up showed that none of the positive patients that underwent surgery had a post-operative leaking, an indication that the infection might not have affected their wound healing. Contrary to some theories on positive relationship between

Schistosomiasis infection and obstetric VVF development or unsuccessful VVF repair (Drew *et al*., 2018).

**Conclusion**

Water sources, especially river and dam for domestic usage and occupation were identified as the most important determining epidemiological factors in the prevalence of the disease. Although *S. haematobium* has the potential to be a risk factor for obstetric VVF formation, the prevalence of the infection was not very alarming among the VVF patients in NOFICK.

**Recommendations**

1. Serological screening tests (Rapid Diagnostic Tests) for urinary Schistosomiasis among VVF patients in NOFICK should be employed to identify cases early and provide timely treatment.
2. More advanced diagnostic methods, such as Histological method of *S. haematobium* identification should also be advocated
3. Further research should be encouraged to understand the factors contributing to the prevalence of urinary Schistosomiasis in VVF patients and monitor changes in prevalence over time.
4. Public health education to raise awareness about urinary Schistosomiasis, its transmission, and preventive measures in the community should also be promoted.

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