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CLINICAL MANIFESTATIONS OF FEMALE GENITAL SCHISTOSOMIASIS AMONG WOMEN OF REPRODUCTIVE AGE IN KOGI STATE, NIGERIA

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Abstract

Female Genital Schistosomiasis (FGS) remains a poorly recognized public health problem in Kogi State and Nigeria at large. A cross-sectional descriptive study focusing on clinical assessment was conducted to determine the prevalence and clinical manifestation of FGS among 222 females (15–49 years) from 13 communities across three LGAs of Kogi State between December 2024 and May 2025. Colposcopy was used to identify lesions consistent with FGS. Clinical examination revealed that 80.2% symptomatic women were positive for FGS. The predominant lesions observed were abnormal blood vessels (51.8%), homogenous sandy patches (24.8%), and grainy sandy patches (23.4%). There was no statistically significant association between age and FGS status ($p = 0.297$). but there was statistical significant difference in the prevalence of FGS across the three LGAs ($p < 0.000001$). Even though other gynecological conditions with similar colposcopic appearances could not be completely excluded, these findings highlight a substantial disease burden, low awareness and knowledge, emphasizing the need for integrated control strategies, targeting community-based health education and inclusion of females of reproductive age in schistosomiasis control programme.

Keywords: Schistosomiasis, Female Genital Schistosomiasis, Public health, Colposcopy and Kogi State

Introduction

Schistosomiasis is a major Neglected Tropical Disease (NTD) caused by parasitic trematodes of the genus *Schistosoma* and remains one of the most widespread helminth infections globally, particularly in sub-Saharan Africa (WHO, 2023). The disease affects over 240 million people worldwide, with more than 700 million at risk in endemic regions lacking adequate water, sanitation and hygiene facilities (WHO, 2022). In Nigeria, the predominant species are *Schistosoma haematobium* and *Schistosoma mansoni*, responsible for urogenital and intestinal schistosomiasis, respectively (WHO, 2023). Transmission occurs through contact with freshwater contaminated with cercariae released by infected freshwater snails, the intermediate hosts of the parasite (Allan *et al.*, 2020). Urogenital schistosomiasis caused by *S. haematobium*

may result in haematuria, dysuria and chronic damage to the urinary tract and reproductive organs (Nelwan, 2019).

Female Genital Schistosomiasis is a chronic complication of urogenital schistosomiasis that occurs when *S. haematobium* eggs become trapped in the female genital tract, leading to inflammation, fibrosis and genital lesions (Bustinduy *et al*., 2021). It is estimated that about 56 million women and girls in sub-Saharan Africa are affected, yet the condition remains largely under-diagnosed and neglected in clinical practice and public health programmes (WHO, 2022). Common clinical manifestations include vaginal discharge, genital itching, dyspareunia, contact bleeding and infertility, while colposcopy may reveal characteristic sandy patches, rubbery papules and abnormal blood vessels (WHO, 2015; Orish *et al*., 2022). FGS has also been associated with increased susceptibility to HIV infection and may contribute to cervical pathology through chronic genital inflammation (Kjetland *et al*., 2006; Christinet *et al*., 2016). In Kogi State, urinary schistosomiasis is endemic in many riverine communities due to frequent contact with contaminated freshwater sources used for domestic, agricultural and fishing activities (NTDs unit, KSMH, 2022). Women and girls are particularly vulnerable because of their regular exposure to rivers and streams. Despite this risk, little information exists on the burden of FGS in the state, as most control programmes focus mainly on school-aged children. Therefore, this study investigated the prevalence and clinical presentation of FGS among women of reproductive age in selected endemic communities of Kogi State, Nigeria. This present paper only contains the clinical examination aspect of the entire study. The research was conducted between December 2024 and May 2025.

Materials and Methods

Study Areas

The study was conducted in 13 schistosomiasis-endemic communities situated near freshwater bodies across Lokoja, Kogi and Ajaokuta Local Government Areas of Kogi State, Nigeria. The State is located in the North-Central geopolitical zone of Nigeria and serves as a key transit and riverine state with diverse ecological and socio-economic characteristics. It has a population of over 4 million people (National Population Commission, 2006) covering Lokoja LGA with headquarters in Lokoja town, lies at the confluence of the Niger and Benue rivers with coordinates of Latitude 7^0 48’8.352” N and Longitude 6^0 44’0.0348” E, while Kogi Local Government Area in Kogi State, Nigeria with its headquarters in Koton-Karfe is situated along on the A2 highway, and at 8^0 06’N and 6^0 48’E. Ajaokuta Local Government Area is located

on the left bank of the Niger River and its headquarters is in Egayin, (6^0 40'11" N and 8^0 48'19" E). The Niger River which flows through these LGAs s and meets the River Benue in Lokoja, forming a confluence (Kogi State Ministry of Information, 2009). The Niger River serves multiple purposes like source of drinking water, farming, fishing, transportation and other domestic uses within the selected communities.

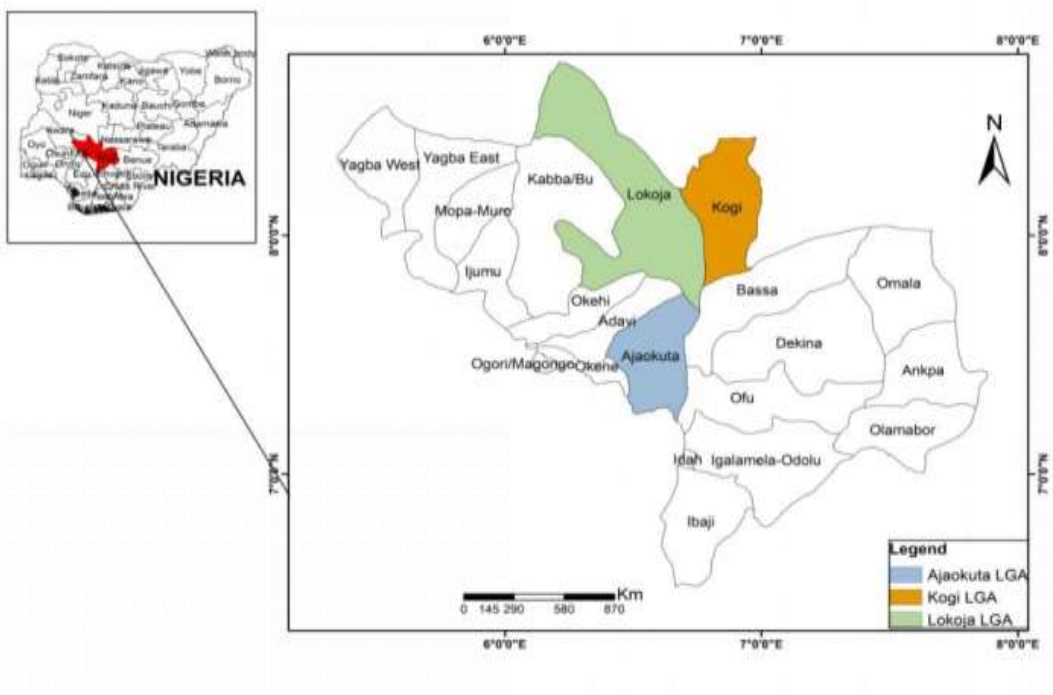

Figure 1: Map of Kogi State showing Ajaokuta, Kogi and Lokoja LGAs

Study Design and Population

A community-based cross-sectional descriptive study was conducted between June 2024 and May 2025 among females aged 15–49 years residing in the selected communities. The study targeted women and adolescent girls of reproductive age because they represent the population most susceptible to Female Genital Schistosomiasis and its associated reproductive health consequences.

Eligible participants were permanent residents who had lived continuously in the community for at least six months prior to data collection. Pregnant women, menstruating women at the time of examination, and individuals who declined to participate were excluded from the clinical assessment.

The sample size was determined using Cochran formula (Cochran, 1963) cited by Opio *et al*. (2021);

$$n = \frac{Z^2 \, x \, P \, (1 - P)}{e^2}$$

The study assumed an expected prevalence of 50.7%, 5% margin of error and 95% confidence limit. A sample size of 384 was obtained.

Sampling Procedure

A two-stage sampling approach was used. First, thirteen communities near major freshwater bodies were purposively selected for their known endemicity of urinary schistosomiasis and frequent human-water contact. Secondly, eligible women in each community were mobilized through community leaders and invited to participate in the study.

A total of 686 women consented to participate and completed the interviewer-administered questionnaire. Participants reporting symptoms suggestive of Female Genital Schistosomiasis, including abnormal vaginal discharge, pelvic pain, painful sexual intercourse, post-coital bleeding, genital itching, or haematuria, were invited to undergo colposcopic examination. Of these, 222 women voluntarily consented to genital examination and formed the population used to determine the prevalence of Female Genital Schistosomiasis.

Data Collection

Data were collected using a structured, interviewer-administered questionnaire designed to obtain information on socio-demographic characteristics, occupational activities, water-contact behaviours, sanitation practices, history of schistosomiasis, awareness and knowledge of schistosomiasis and Female Genital Schistosomiasis, healthcare-seeking behaviour, and self-reported urogenital symptoms. Interviews were conducted in Pidgin, or the local community dialect, according to each participant's language preference, to ensure effective communication and minimize information bias.

Clinical Examination

Individuals who reported urogenital symptoms suggestive of Female Genital Schistosomiasis and consented to further evaluation underwent genital examination using a portable colposcope, performed by a team of gynaecologists at the Oncology Unit, Federal Teaching Hospital, Lokoja.

The cervix and vaginal walls were carefully examined following the guidelines outlined in WHO FGS pocket Atlas (WHO, 2015) for any characteristic lesions (grainy sandy patches, homogeneous yellow sandy patches, rubbery papules, abnormal blood vessels,) and contact bleeding. Participants with one or more characteristic lesions were classified as having Female Genital Schistosomiasis. Under good lightening, each participant was made to lie back on an

examination table, thereafter, each leg was positioned comfortably then a disposable sterile vaginal speculum was used to open the vagina to obtain a good view of the wall and the cervix, then it was cleaned with a cotton wool containing normal saline due to vagina discharge. Thereafter, the cervix and vagina were inspected with the aid of a colposcope, observed images were compare with the WHO FGS pocket Atlas images and observations were recorded.

Data Analysis

Data were entered into Microsoft Excel software and then analyzed using Statistical Package for Social Sciences (SPSS) 23.0 version. Descriptive statistics, (frequencies and percentages) was used to analyze FGS lesions while Chi-square tests was conducted to examine the association between age and FGS status and among the three LGAs. All data analyzed was at 95% confidence interval.

Ethical Clearance

Ethical approval was obtained from Kogi State of Nigeria, Ministry of Health research ethics committee with Ref. (MOH/PRS/465/V.1/081) Lokoja for permission to conduct this study. Prior to data collection, advocacy visits were made to community leaders to secure community entry approval and to facilitate the mobilization of eligible study participants. Written informed consent was obtained from all adult participants before enrolment. For participants under 18, assent was obtained alongside parental or guardian consent. Confidentiality was maintained throughout the study, and participation was entirely voluntary.

Results

Only 222 eligible women consented to colposcopy examination, which may have reduced the statistical power of the study. Reasons for refusing to give consent ranged from fear of a painful examination and or husbands who did not give their consent. Additionally, the younger women were shy, saying the process of examination was too intrusive, while some said they do not believe such disease exist and others were simply not interested. However, among the consenting women, 80.2% (95% CI: approximately 74.9–85.5%) of the women exhibited colposcopic findings consistent with FGS (Table 1). Abnormal blood vessels were the most frequently observed lesion 51.8% (95% CI: 45.2–58.4) among the participants, other lesions include homogenous yellow sandy patches 24.8% (95% CI: 19.1–30.5) grainy sandy patches 23.4%, (95% CI: 17.8–29.0) all of which are characteristic of chronic FGS. Less common findings included rubbery papules 5.0% (95% CI: 2.1–7.8) and contact bleeding 6.3% (95% CI: 3.1–9.5).

The prevalence of FGS among symptomatic women was generally high and difference in the prevalence of FGS among the three LGAs differed statistically. Overall, Kogi LGA recorded the highest prevalence of 89.7%, followed by Lokoja LGA where 85.1% of the women exhibited colposcopic findings consistent with FGS., while Ajaokuta LGA recorded 46.3%. These results indicate a high burden of FGS in the study areas, with notable variation between LGAs (Table 2).

The prevalence of Female Genital Schistosomiasis was highest among participants aged 15–19 years (95.0%; 95% CI: 85.4–100.0) and lowest among those aged 30–39 years (76.7%; 95% CI: 67.8–85.7). Although numerical differences were observed, they were not statistically significant. (Table 3).

Table 1: Female Genital Schistosomiasis Pathology among Participants

FGS pathology	Frequency	Percentage (%)	95% CI (%)
Positive	178	80.2	74.9 – 85.5
Negative	44	19.8	14.6 – 25.1
Grainy sandy patches	52	23.4	17.8 – 29.0
Homogenous yellow sandy patches	55	24.8	19.1 – 30.5
Rubbery papules	11	5.0	2.1 – 7.8
Abnormal blood vessels	115	51.8	45.2 – 58.4
Contact bleeding	14	6.3	3.1 – 9.5

Note: Pathology frequencies exceed total positives because some participant had multiple lesions

Table 2: Prevalence of Female Genital Schistosomiasis According to the Three LGAs, Kogi State

LGA	No. Examined	No. Positive	Pevalence	χ^2	df	P-Value
Ajaokuta	41	19	46.3	36.8128	2	< 0.000001
Kogi	107	96	89.7			
Lokoja	74	63	85.1			
Total	222	178	80.2			

Table 3: Age Group and FGS Status Among Participants

Age (years)	FGS Positive n (%)	FGS Negative n (%)	95% Cl of FGS prevalence	χ^2	p-value
15-19	19 (95.0)	1 (5.0)	85.4-100.0		
20-29	55 (78.6)	15 (21.4)	69.0-88.1		
30-39	66 (76.7)	20 (23.3)	67.8-85.7		
40-49	38 (82.6)	8 (17.4)	71.6-93.5	3.688	0.297

Discussion

All 222 participants who consented were symptomatic for female genital schistosomiasis which may have likely contributed to the observed prevalence in this study, and this may limit the generalization of the findings to the entire population. The high prevalence of Female Genital Schistosomiasis (FGS) observed in this study may be attributed to several interconnected factors. These include the very low level of awareness and knowledge of the disease among the participants, the absence of previous FGS screening programmes in the study communities, and inadequate access to FGS diagnosis and treatment with praziquantel. Furthermore, the frequent contact of participants with freshwater bodies may have increased their risk of repeated exposure to *Schistosoma haematobium* through infected intermediate host snails. Continuous exposure over time may have contributed to the progressive development and accumulation of characteristic genital lesions associated with FGS. As stated by WHO (2015), It is important to note that FGS is a chronic condition in which genital lesions may persist long after active *S. haematobium* infection has resolved or urinary egg excretion has ceased. Consequently, the absence of detectable urinary infection does not necessarily exclude the presence of FGS. It was observed that some individuals had more than one FGS characteristic. This study aligns with findings of Kjetland *et al*., (2012) from Zimbabwe who reported the rates of Female Genital Schistosomiasis prevalence ranging from 40% to over 75% in endemic communities while Makia *et al*., (2023) reported 50.7% in a study from Cameroon; Ekpo *et al*., 2017 reported 70.0% from rural communities in Ogun State, Nigeria while Ibrahim *et al*., (2023) recorded the following 33.3% had rubbery papules, grainy and homogeneous yellow

sandy patches were 22.2% each while abnormal vessels and contact bleeding were 11.1% in women who underwent colposcopy in a study from Zamfarawa community in Gombe State.

Kjetland *et al*., (2012), stated that lesions result from chronic deposition of *Schistosoma haematobium* eggs in the genital tract, triggering mucosal inflammation and tissue changes. Grainy and homogenous sandy patches generally indicate calcified or dead ova embedded in the cervicovaginal mucosa and are considered hallmark signs of FGS (WHO, 2021). Although rubbery papules were less frequent in this study, its reflect granulomatous reactions to viable eggs according to Jourdan *et al*., (2011). Abnormal blood vessels were mostly observed, as mentioned by Kjetland *et al*., (2012) this is due to inflammation and pathological effects of the parasite ova that are deposited in the genital tissues of the individuals and this could increase susceptibility to infections such as human papillomavirus (HPV) and human immunodeficiency virus (HIV).

The present study agrees with the review by Mbwanji *et al*., 2024 who emphasized that FGS is common but under-diagnosed due to limited screening, poor awareness and knowledge, and inadequate diagnostic capacity, this is the same case in Nigeria as very few studies have been carried on FGS prevalence, However, studies on Female Genital Schistosomiasis (FGS) are increasingly being conducted to improve understanding of the disease and raise awareness among affected communities and healthcare providers.

Highest prevalence was recorded in Kogi LGA and Lokoja LGA, likely due to their proximity and heavy involvement with the freshwater bodies in their communities which provide suitable habitats for *Bulinus* snail. These participants are majorly into farming and fish business which always expose them to frequent water contact and this may have increase the risk of repeated infections. As stated by Hotez *et al*., (2019), frequent water contact to schistome infested water body promotes egg deposition in the genital tract and the development of FGS lesions with time. Even though Ajaokuta LGA had a lower prevalence, nearly half of the women were affected, suggesting that FGS remains a public health concern even in areas with low infection rate. As stated by Kjetland *et al*., (2012), lower infection intensity of FGS can be seen where genital lesions persist long after adult worms have died, particularly when treatment is delayed or irregular. The high prevalence in Kogi and Lokoja LGAs calls for serious concern for further investigation about the disease in the remaining communities while the State Ministry of Health and community health workers move into serious health education campaign to all communities in the LGAs mostly relying on river and streams water for their daily activities.

The highest prevalence of Female Genital Schistosomiasis (FGS) was observed among participants aged 15–19 years. Although the sample size for this age category was relatively small, the finding is noteworthy and may reflect intense exposure to *Schistosoma haematobium*-infested water sources during childhood and adolescence. The prevalence observed in this age group is consistent with the findings of Makia *et al*. (2021) in Cameroon, who reported a higher burden of FGS among younger girls in rural fishing communities. This pattern may also be linked to gaps in mass drug administration (MDA) programmes, which predominantly target primary school-aged children (5–14 years), thereby excluding many adolescents in secondary schools who remain vulnerable to urogenital schistosomiasis and its genital complications. Consequently, inadequate or non-treatment coverage among adolescents may contribute to the elevated prevalence observed in this study.

Despite the higher prevalence in the youngest age group, FGS was common across all age categories, and the absence of a statistically significant association between age and FGS status suggests that age is not a major determinant of disease occurrence in the study population. The p-value exceeding the 0.05 significance threshold supports this conclusion. These findings are in agreement with Poggensee *et al*. (2000), who reported a high prevalence of FGS among women of different age groups in northern Tanzania. Their study demonstrated that pathological cervical alterations associated with FGS occurred irrespective of age, supporting the hypothesis that once *S. haematobium* eggs become deposited in genital tissues, the resulting granulomatous lesions may persist as long-term structural changes.

The lack of a significant age–FGS association is further supported by Kutz *et al*. (2023), who reported similar findings in Madagascar. Comparable observations have also been documented by Gabriele *et al*. (2012) and Abovegodwin *et al*. (2024), indicating that exposure and disease burden are not restricted to a particular age group. Furthermore, Nemungadi *et al*. (2022) demonstrated, using Circulating Anodic Antigen (CAA) testing, that FGS lesions may persist even in the absence of active infection because calcified eggs can remain embedded within genital tissues for prolonged periods. Similarly, Lamberti *et al*. (2024), in the MORBID cross-sectional study conducted in Malawi, reported a substantial burden of FGS across women of reproductive age and identified proximity to freshwater bodies and lack of prior praziquantel treatment as important risk factors.

Collectively, these findings highlight the chronic and persistent nature of FGS and reinforce concerns raised by Hotez *et al*. (2019) and Christinet *et al*. (2016) regarding the considerable underestimation of the global burden of the disease. The high prevalence observed across all age groups in this study underscores the need for increased awareness, improved surveillance, and comprehensive control strategies. Public health interventions should not be restricted to specific age categories but should target all women of reproductive age living in endemic communities.

Conclusion

Female Genital Schistosomiasis is prevalent yet underrecognized and understudied in Kogi State. The findings observed occurrence of FGS in the study communities which the State Ministry of Health should act without any further delay in the awareness campaign of FGS in all communities relying on freshwater bodies within the state. This study also calls for more investigation of FGS in other communities in the state that are endemic for schistosomiasis. However, there is need for comprehensive control strategies and expanding access to praziquantel, routine screening services of FGS and most importantly, community health education and improvements of clean water and sanitation infrastructure in all schistosomiasis endemic communities within the state.

Declarations of Authors Contributions

BJA and OVU Conceptualized the study, OVU designed the study, OVU participated in the data collection, BJA and OVU performed the data analysis, OVU interpreted the data, OVU prepared the first draft of the manuscript, reviewed by BJA and AJC. All authors contributed to the development of the final manuscript and approved its submission.

Conflict of interest

None

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