African Journal of Biology and Medical Research
ISSN: 2689-534X
Volume 9, Issue 1, 2026 (pp. 33-46)

www.abjournals.org

CLINICAL SPECTRUM AND REPRODUCTIVE HEALTH IMPLICATIONS OF FEMALE GENITAL SCHISTOSOMIASIS IN JIGAWA STATE, NORTHWEST NIGERIA: A COMMUNITY-BASED CROSS-SECTIONAL STUDY

Dawaki S. S.[2*], Kani Y. A.[1], Yelwa S. I.[2], Dogara M. M.[2], Balogun J. B.[2],

Adeniyi A. K.[2], Ibrahim A. A.[3], Abdurrahaman A. U., and Ahmed D.[4].

[1]Department of Obstetrics & Gynaecology, Faculty of Clinical Sciences, College of Medicine and Allied Medical Sciences, Federal University Dutse, Ibrahim Aliyu By-Pass, 720223, Dutse, Jigawa State, Nigeria

[2]Department of Animal & Environmental Biology, Faculty of Life Sciences, Federal University Dutse, Ibrahim Aliyu By-Pass, 720223, Dutse, Jigawa State, Nigeria

[3]Department of Public Health, Faculty of Basic Medical Sciences, College of Medicine and Allied Medical Sciences, Federal University Dutse, Ibrahim Aliyu By-Pass, 720223, Dutse, Jigawa State, Nigeria

[4]Neglected Tropical Diseases/Eye Care Unit, Department of Public Health, Jigawa State Ministry of Health, New Secretariat, Jigawa State, Nigeria.

[*]Corresponding Author's Email: saldawaki@gamail.com; dawaki.s@fud.edu.ng

Cite this article:

Dawaki, S. S., Kani, Y. A., Yelwa, S. I., Dogara, M. M., Balogun, J. B., Adeniyi, A. K., Ibrahim, A. A., Abdurrahaman, A. U., Ahmed, D. (2026), Clinical Spectrum and Reproductive Health Implications of Female Genital Schistosomiasis in Jigawa State, Northwest Nigeria: A Community-Based Cross-Sectional Study. African Journal of Biology and Medical Research 9(1), 33-46. DOI: 10.52589/AJBMR-KMINKMYZ

Manuscript History

Received: 2 Dec 2025

Accepted: 31 Dec 2026

Published: 27 Jan 2026

Copyright © 2026 The Author(s). This is an Open Access article distributed under the terms of Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0), which permits anyone to share, use, reproduce and redistribute in any medium, provided the original author and source are credited.

ABSTRACT: *Female genital schistosomiasis (FGS) remains an important neglected tropical disease with significant reproductive health consequences for women in endemic regions of sub-Saharan Africa. A cross-sectional survey was conducted among 529 females aged 15–50 years across six local government areas. Participants underwent structured interviews and colposcopic examinations to document gynaecological symptoms and characteristic lesions, including sandy patches, grainy sandy patches, rubbery papules, contact bleeding, and abnormal blood vessels. Logistic regression models were applied to identify independent predictors of FGS. The most frequent colposcopic findings were contact bleeding (10.8%) and grainy sandy patches (9.3%), while the predominant self-reported symptoms included vaginal itching (66.2%), vaginal discharge (60.0%), dysuria (47.2%), and lower abdominal pain (44.7%). Multivariate analysis revealed that vaginal bleeding (adjusted odds ratio [aOR] = 2.33, $p < 0.001$) and postcoital bleeding (aOR = 1.77, $p = 0.005$) were independently associated with FGS.*

KEYWORDS: Female genital schistosomiasis; reproductive health; colposcopy; sandy patches, postcoital bleeding; Nigeria.

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

INTRODUCTION

Female genital schistosomiasis (FGS) is a neglected manifestation of *Schistosoma haematobium* infection that affects the female genital and urinary tracts (Christine et al., 2019). It is endemic in sub-Saharan Africa (SSA), where urogenital schistosomiasis remains the most prevalent form of the disease (WHO, 2019). Although global prevalence estimates are lacking, FGS disproportionately affects women in rural, resource-limited communities with poor sanitation and unsafe water (Nemungadi et al., 2022).

FGS lesions arise from inflammatory reactions to *S. haematobium* eggs deposited in genital tissues. The World Health Organization classifies these lesions as grainy sandy patches, homogeneous sandy patches, rubbery papules, and abnormal blood vessels, reflecting both acute and chronic disease stages (WHO, 2015; Nemungadi et al., 2023). Acute infections are typically present with grainy sandy patches due to clusters of viable eggs while chronic infections produce fibrotic yellow patches associated with dead eggs.

LITERATURE / THEORETICAL UNDERPINNING

Clinically, FGS presents with vaginal discharge, genital itching, contact bleeding, and pelvic pain, but these symptoms mimic other reproductive tract infections and malignancies (Kjetland et al., 2005; Hergertum et al., 2013). Consequently, FGS is frequently misdiagnosed as a sexually transmitted infection (STI) or cervical cancer and often remains untreated because WHO's syndromic management guidelines for genital discharge do not list FGS as a differential diagnosis (WHO, 2021). Furthermore, genital inflammation and mucosal breaches caused by *S. haematobium* eggs facilitate the acquisition of HIV and human papillomavirus (HPV) infections, amplifying the risk of cervical cancer (Kjetland et al., 2014; Colombe et al., 2018; Engels et al., 2020).

FGS has severe reproductive and psychosocial consequences, including infertility, ectopic pregnancy, and spontaneous abortion (Miller-Fellows et al., 2017; Down et al., 2011). The resulting stigma, social isolation, and depression compound its burden on women's health and wellbeing (Hotez et al., 2019). In Nigeria, where cervical cancer remains the second leading cause of female cancer mortality after breast cancer (Morounke et al., 2017; Sherman et al., 2022), addressing FGS as a preventable cofactor is critical.

Despite growing global attention to FGS, clinical diagnosis and surveillance remain limited across SSA (Masong et al., 2021). In Nigeria, the absence of epidemiological data within the National Control Programme constrains effective diagnostic and control strategies (Ekpo et al., 2017). This study, therefore, investigates the clinical spectrum and reproductive health implications of FGS among women in Jigawa State, Northwest Nigeria, an area with high burden of schistosomiasis but limited clinical data—to inform future diagnostic and public health interventions.

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

African Journal of Biology and Medical Research
ISSN: 2689-534X
Volume 9, Issue 1, 2026 (pp. 33-46)

www.abjournals.org

METHODOLOGY

Study Design and Setting

A community-based cross-sectional study was conducted between March 2021 and September 2022 in six Local Government Areas (LGAs) of Jigawa State, Northwest Nigeria. The state lies between latitudes 11.00°N and 13.00°N and longitudes 8.00°E and 10.15°E, and is predominantly inhabited by Hausa and Fulani speaking populations engaged in subsistence farming, fishing, and livestock rearing.

Study Population and Sampling

The study enrolled 529 females aged 15–50 years who had resided in their communities for at least six months and provided written informed consent (or assent with parental consent for participants aged 15–17 years). Recruitment was voluntary and conducted through community mobilization meetings and sensitization campaigns in collaboration with local health workers. Study locations were selected from each of the three senatorial districts based on documented schistosomiasis endemicity and proximity to irrigation schemes as identified by the Jigawa State Ministry of Health. Two LGAs were selected per district: Dutse and Buji (Central), Mallam Madori and Auyo (Northeast), and Ringim and Taura (Northwest). Two communities were sampled in each LGA.

Data Collection and Questionnaire Administration

A structured interviewer-administered questionnaire was used to obtain data on participants' sociodemographic characteristics, reproductive health history, and self-reported gynaecological symptoms such as vaginal discharge, itching, pelvic pain, dysuria, and bleeding patterns. Questionnaires were translated into the local Hausa language and pretested in a non-participating community to ensure clarity and validity.

Clinical Examination and Colposcopy

Each participant provided a midstream urine sample and underwent a pelvic examination performed by a licensed midwife in a private clinical setting. Examinations were conducted under aseptic conditions to assess the external genitalia, vaginal walls, and cervix for visible abnormalities. A portable digital colposcope (Model MC-9800B, Guangzhou Medical Equipment Ltd., China) was used for magnified visualization and image capture. After initial examination, visual inspection with acetic acid (VIA) was performed following World Health Organization (WHO, 2012) guidelines to enhance lesion visibility. Lesions and mucosal changes were documented and photographed using coded identifiers.

Image Analysis and Validation

Digital colposcopic images were independently analyzed by an experienced gynaecologist following diagnostic criteria in the WHO Pocket Atlas on Female Genital Schistosomiasis (2015). Observed lesions included sandy patches, grainy sandy patches, rubbery papules, abnormal blood vessels, and contact bleeding. Tissue responses before and after acetic acid application were also recorded. For internal validation, a second gynaecologist blinded to the first assessment re-evaluated all images using the same WHO atlas classification.

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

Discrepancies were resolved through consensus review, and data were cross-checked by the principal investigator.

Data Management and Statistical Analysis

Data was entered into a secured database and analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics summarized sociodemographic characteristics and clinical findings. The prevalence of female genital schistosomiasis (FGS) was calculated as the proportion of participants with characteristic lesions. Associations between FGS and reproductive symptoms were evaluated using bivariate and multivariate logistic regression to estimate adjusted odds ratios (aORs) and 95% confidence intervals (CIs). Statistical significance was defined as $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the Jigawa State Ministry of Health Research Ethics Committee (Reference No: JGHREC/2021/004). Participants were informed about study objectives, confidentiality, and their right to withdraw at any stage without prejudice. All clinical assessments adhered to the ethical principles outlined in the Declaration of Helsinki (2013)

RESULTS

Sociodemographic Characteristics

A total of 529 women aged 15–50 years participated in the study. The general sociodemographic characteristics of the study population are summarized in Table 1. The mean age of participants was 31.7 ± 8.4 years. Most respondents were married, engaged in farming or trading, and had at least primary education.

Table 1: General characteristics of the study participants

Characteristics		**Location**					
	All N = 648	**Auyo n = 166**	**Buji n = 119**	**M. Madori n= 119**	**Ringim n = 92**	**Taura n= 84**	Dutse n = 68
Age (years)	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	n (%)
5 – 9	25 (3.9)	7 (4.2)	5 (4.2)	6 (5.0)	2 (2.2)	3 (3.6)	2 (3.0)
10 – 14	75 (11.6)	15 (9.0)	11 (9.2)	6 (5.0)	14 (15.2)	10 (11.9)	19 (28.8)
15 – 19	70 (10.8)	31 (18.7)	8 (6.7)	13 (10.9)	6 (6.5)	9 (10.7)	3 (4.5)
20 – 29	237 (36.7)	63 (37.9)	44 (37.0)	41 (34.4)	35 (38.0)	34 (40.5)	20 (30.3)
30 – 39	165 (25.5)	41 (24.7)	34 (28.6)	33 (27.7)	20 (21.7)	19 (22.6)	18 (27.3)
≥ 40	74 (11.5)	9 (5.4)	17 (14.3)	20 (16.8)	15 (16.3)	9 (10.7)	4 (6.1)
Occupation							

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

Petty trading	406 (62.6)	99 (59.6)	73 (61.3)	83 (69.7)	58 (63.0)	47 (55.9)	46 (67.6)
Hawking	32 (4.9)	17 (10.2)	3 (2.5)	4 (3.4)	0	2 (2.4)	6 (8.8)
Housewife	121 (18.7)	23 (13.9)	30 (25.2)	19 (16.0)	18 (19.6)	24 (28.6)	7 (10.3)
Student	82 (12.6)	26 (15.7)	12 (10.1)	10 (8.4)	15 (16.3)	11 (13.1)	8 (11.8)
Others	7 (1.1)	1 (0.60)	1 (0.84)	3 (2.5)	1 (1.1)	0	1 (1.5)

Prevalence of Female Genital Schistosomiasis

The overall prevalence of female genital schistosomiasis (FGS) was 46.3% (n = 245/529) Table 2. Prevalence across study communities Figure 1 ranged from 30.8% to 69.0% (95% CI: 42.0–50.7). Differences in prevalence among locations were statistically significant (χ^2 (5, N = 529) = 41.26, $p < 0.001$). The highest prevalence was observed in Taura (69.0%) and Buji (61.2%), both significantly higher than Dutse (51.6%) and Ringim (44.7%). The lowest prevalence occurred in Auyo (35.5%) and Malam Madori (30.8%).

Table 2: Distribution of FGS by Study Site and Age-Groups

Characteristic	**N**	**Cases**	**%**	**95% CI**	**χ2**	***P* value**
All participants	529	245	46.3	42.0, 50.7		
Study Site					**41.26**	**< 0.001**
Auyo	141	50	35.5	27.6, 43.9		
Buji	103	63	61.2	51.0, 70.6		
Dutse	31	16	51.6	33.1, 69.8		
M. Madori	107	33	30.8	22.3, 40.5		
Ringim	76	34	44.7	33.3, 56.6		
Taura	71	49	69.0	56.9, 79.4		
Age-group (years)					**31.30**	**<0.001**
15 - 19	69	6	8.7	3.2, 18.0		
20 -29	229	122	53.3	46.6, 59.9		
30 - 39	160	83	51.9	43.8, 59.8		
≥ 40	71	34	47.9	35.9, 60.1		

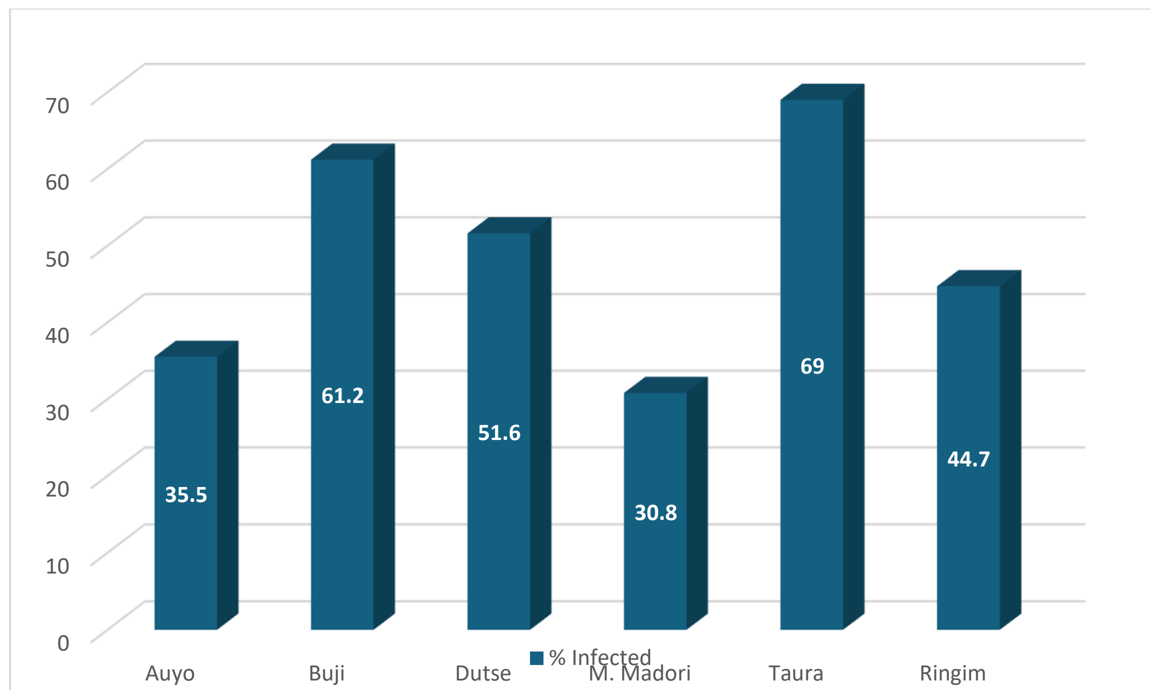
FGS prevalence also varied significantly by age group (χ^2 (3, N = 529) = 31.30, $p < 0.001$). Women aged 20–29 years (53.3%) and 30–39 years (51.9%) exhibited the highest infection rates, followed by those aged ≥40 years (47.9%). The lowest prevalence was recorded among adolescents aged 15–19 years (8.7%).

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

African Journal of Biology and Medical Research
ISSN: 2689-534X
Volume 9, Issue 1, 2026 (pp. 33-46)

www.abjournals.org

Figure 1: Prevalence of Female Genital Schistosomiasis by Study Location



Frequency of Clinical Signs

Colposcopic examination revealed a spectrum of FGS lesions Table 3. The most frequently observed clinical signs were contact bleeding (10.8%) and grainy sandy patches (9.3%), followed by abnormal blood vessels (4.9%) and slight contact bleeding (4.1%). Less frequent findings included rubbery papules (2.6%) and sandy patches (0.2%). In addition to WHO-defined FGS lesions, other notable abnormalities included heavy mucous discharge (16.7%), and acetowhite changes indicative of potential epithelial atypia.

The geographic distribution of lesions varied across LGAs. In Auyo, all lesion types were observed, with acetowhite changes and abnormal vessels being most common. Buji had the highest occurrence of grainy sandy patches and slight contact bleeding, while Malam Madori presented primarily grainy sandy patches, contact bleeding, heavy mucous discharge, and acetowhite changes. Dutse and Ringim showed predominance of contact bleeding, whereas Taura exhibited higher rates of abnormal blood vessels and heavy mucous discharge.

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

African Journal of Biology and Medical Research
ISSN: 2689-534X
Volume 9, Issue 1, 2026 (pp. 33-46)

www.abjournals.org

Table 3: Distribution of Clinical Manifestation of Female Genital Schistosomiasis by Location

Symptoms	All Participants N = 529 n(%)	Auyo N = 141 n(%)	Buji N = 103 n(%)	M. Madori N = 107 n(%)	Ringim N = 76 n(%)	Taura N = 71 n(%)	Dutse N = 31 n(%)
Sandy Patches	1 (0.19)	1 (0.71)	0	0	0	0	0
Abnormal Blood Vessels	26 (4.9)	10 (7.1)	3 (2.9)	0	1 (1.3)	12 (16.9)	0
Slight contact bleeding	22 (4.1)	7 (5.0)	15 (14.6)	0	0	0	0
Contact Bleeding	57 (10.8)	4 (2.8)	8 (7.8)	17 (15.9)	16 (21.0)	4 (5.6)	8 (25.8)
Homogenous sandy patches	17 (3.2)	2 (1.4)	14 (13.6)	0	0	1 (1.4)	0
Rubbery papules	14 (2.6)	2 (1.4)	9 (8.7)	0	1 (1.3)	0	2 (6.4)
Grainy sandy patches	49 (9.3)	5 (3.5)	19 (18.4)	17 (15.9)	1 (1.3)	3 (4.2)	4 (12.9)
Other Signs							
Aceto-white changes	27 (4.5)	17 (10.6)	2 (1.7)	1 (0.84)	4 (4.3)	2 (2.4)	1 (3.2)
Mucous discharge	101 (16.7)	15 (9.3)	15 (12.6)	8 (6.7)	17 (18.5)	40 (47.6)	6 (19.3)

Frequency of Self-Reported Gynaecological Symptoms

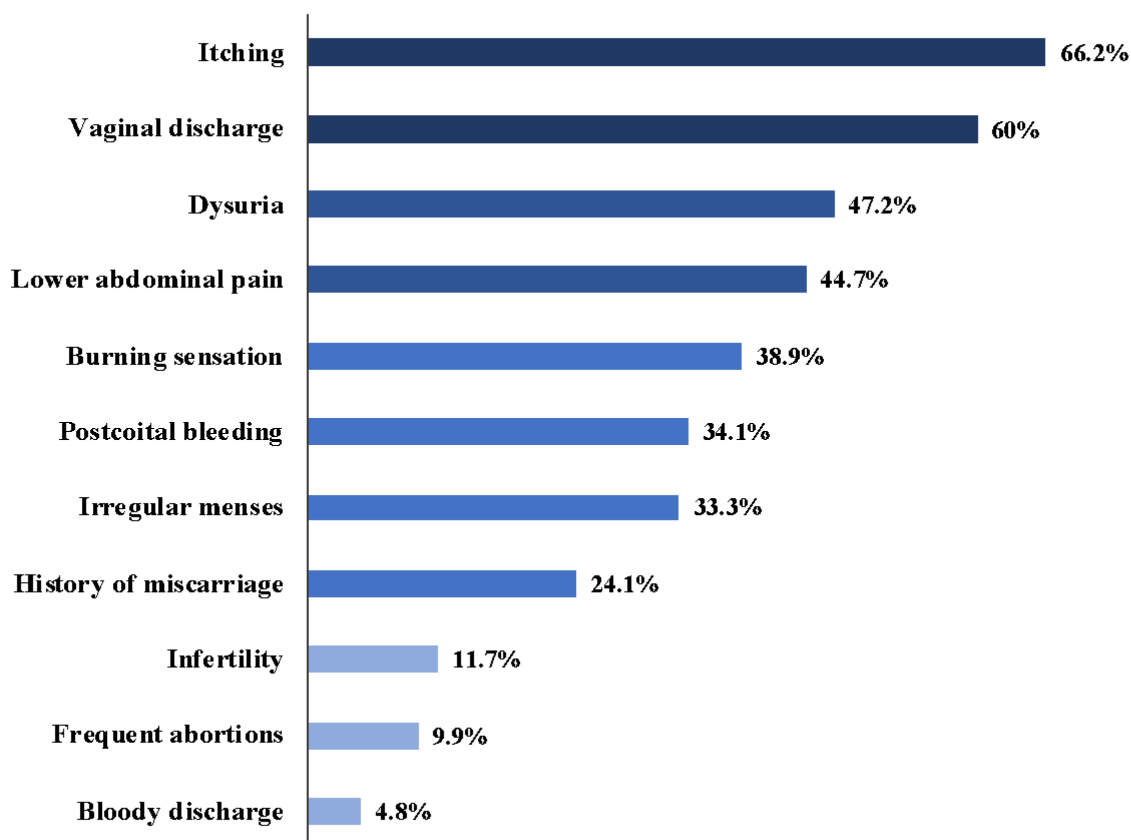
The distribution of self-reported gynaecological symptoms is presented in Figure 1-2. The most frequently reported symptoms included genital itching (66.2%), vaginal discharge (60.0%), dysuria (47.2%), and lower abdominal pain (44.7%). Other reported symptoms were genital burning (38.9%), postcoital bleeding (34.1%), and irregular menstruation (33.3%). Approximately 24.1% of respondents reported a history of miscarriage, 11.7% reported infertility, while frequent abortions (9.9%) and bloody discharge (4.8%) were the least common.

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

African Journal of Biology and Medical Research
ISSN: 2689-534X
Volume 9, Issue 1, 2026 (pp. 33-46)

www.abjournals.org

Figure 2: Percentage Distribution of Gynaecological Self-Reported Symptoms of Female Genital Schistosomiasis



Association between FGS and Gynaecological Symptoms

The relationship between reported symptoms and confirmed FGS infection is shown in Table 4. At the bivariate level, FGS was significantly associated with vaginal discharge, genital itching, burning sensation, postcoital bleeding, miscarriage history, and frequent abortions ($p < 0.05$ for all). Multivariate logistic regression identified vaginal discharge ($p < 0.001$) and postcoital bleeding ($p = 0.005$) as the only independent predictors of FGS after adjusting for confounders.

Women reporting vaginal discharge were 2.33 times more likely to have FGS compared to those without (aOR = 2.33; 95% CI: 1.51–3.60). Similarly, those with postcoital bleeding were 1.77 times more likely to have FGS (aOR = 1.77; 95% CI: 1.18–2.65). Among participants reporting postcoital bleeding, nearly 60% tested positive for FGS, compared to 37% among those without this symptom.

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

African Journal of Biology and Medical Research
ISSN: 2689-534X
Volume 9, Issue 1, 2026 (pp. 33-46)

www.abjournals.org

Table 4: Factors That Associate Female Genital Schistosomiasis and Self-reported Gynaecological Symptoms

Clinical Signs	**N**	**FGS Cases (%)**	**Bivariate Analysis**		**Multivariate Analysis**	
			cOR (95% CI)	***P*-value**	**aOR (95% CI)**	***P*-value**
Bloody Discharge				**0.87**		
No *(ref)*	500	232 (46.4)	1.0		-- -- -- --	--
Yes	29	13 (44.8)	0.94 (0.44, 1.99)		-- -- -- --	
Virginal Discharge				**<0.001**		**<0.001**
No *(ref)*	169	50 (29.6)	1.0		1.0	
Yes	360	195 (54.2)	2.81 (1.90, 4.15)		2.33 (1.51, 3.60)	
Itching				**0.04**		**0.73**
No *(ref)*	146	57 (39.0)	1.0		1.0	
Yes	383	188 (49.1)	1.50 (1.02, 2.22)		0.92 (0.58, 1.46)	
Burning Sensation				**0.006**		**0.59**
No *(ref)*	306	126 (41.2)	1.0		1.0	
Yes	223	119 (53.4)	1.63 (1.15, 2.31)		1.11 (0.75, 1.66)	
Dysuria				**0.15**		
No *(ref)*	266	115 (43.2)	1.0		-- -- -- --	--
Yes	263	130 (49.4)	1.28 (0.91, 1.81)		-- -- -- --	--
Postcoital Bleeding				**<0.001**		
No *(ref)*	317	120 (37.8)	1.0		1.0	
Yes	212	125 (59.0)	2.36 (1.65, 3.36)		1.77 (1.19, 2.62)	0.005
History of miscarria ge				**0.01**		**0.29**
No *(ref)*	378	162 (42.9)	1.0		1.0	
Yes	151	83 (55.0)	1.63 (1.11, 2.38)		1.26 (0.82, 1.96)	
Frequent abortions				**0.003**		**0.11**
No *(ref)*	467	205 (43.9)	1.0		1.0	
Yes	62	40 (64.5)	2.32 (1.34, 4.03)		1.65 (0.88, 3.08)	
Infertility				**0.12**		
No *(ref)*	456	205 (45.0))	1.0		-- -- -- --	--
Yes	73	40 (54.8)	1.48 (0.90, 2.44)		-- -- -- --	--
Irregular menses				**0.27**		
No *(ref)*	320	142 (44.4)	1.0		-- -- -- --	--
Yes	209	103 (49.3)	1.22 (0.86, 1.73)		-- -- -- --	--
Lower abdomina l pain				**0.12**		

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

No *(ref)*	250	107 (42.8)	1.0		-- -- -- --	--
Yes	279	138 (49.5)	1.31 (0.93, 1.84)		-- -- -- --	--

cOR: Crude odds ratio estimated using bivariate binary logistic model
aOR: Adjusted odds ratio estimated using multivariate binary logistic model
ref.: Reference category, CI: Confidence interval
-- variable not included in the multivariate analysis

DISCUSSION

This study revealed a high prevalence of Female Genital Schistosomiasis (FGS) of 46.3% among women in Jigawa State, underscoring the significant burden of this neglected tropical disease in northwestern Nigeria. Nearly half of the participants exhibited one or more characteristic lesions, including sandy patches, contact bleeding, grainy sandy patches, rubbery papules, and abnormal blood vessels, consistent with the classical clinical spectrum of FGS described in endemic areas of sub-Saharan Africa (Christinet et al., 2016; Hegertun et al., 2013).

The observed prevalence is similar to findings from Ogun State, Nigeria (44.5%), but exceeds those reported in South Africa (23%) and Malawi (21.5%) (Shukla et al., 2023; Lamberti et al., 2024), while remaining slightly lower than rates reported in Cameroon (58.6%) (Masong et al., 2021). These variations likely reflect differences in exposure to infested water bodies, local sanitation infrastructure, and coverage of preventive chemotherapy programs. The significant inter-LGA variation in prevalence ($\chi^2 = 41.26$, $p < 0.001$) suggests that environmental, occupational, and socio-behavioural factors strongly influence FGS transmission.

The highest prevalence in Taura (69%) and Buji (61.2%) may result from intense agricultural activities and frequent water contact. In comparison, the lowest prevalence in Auyo (35.5%) and Malam Madori (30.8%) could reflect improved water access and ongoing praziquantel mass drug administration (MDA). These findings reinforce the role of water, sanitation, and hygiene (WASH) interventions and sustained preventive chemotherapy as key control strategies (WHO, 2022).

FGS was most prevalent among women aged 20–39 years, indicating chronic infections likely acquired during childhood. Similar patterns have been observed in Cameroon and South Africa, where lesions often persist even after urinary egg excretion ceases (Masong et al., 2021; Kjetland et al., 2008). This highlights the long-term reproductive consequences of early schistosomiasis exposure and supports calls for expanded MDA coverage to include preschool- and school-aged girls who are out of school (WHO, 2021).

The most frequent colposcopic findings, contact bleeding (10.8%) and grainy sandy patches (9.3%), are consistent with FGS lesions documented in prior studies (Kjetland et al., 2012; Jourdan et al., 2022). The detection of abnormal blood vessels and slight contact bleeding further underscores the disease's capacity to mimic sexually transmitted infections (STIs) or cervical neoplasia, often resulting in misdiagnosis and inappropriate treatment (Gallego et al., 2021). The relatively low occurrence of rubbery papules (2.6%) and homogenous sandy patches (0.9%) likely reflects lesion chronicity or diagnostic variability (Holmen et al., 2020).

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

The detection of acetowhite changes (16.7%), indicative of epithelial atypia, raises concern for cervical precancerous lesions among affected women. This finding agrees with evidence linking chronic schistosome-induced inflammation to cervical dysplasia and carcinogenesis (Engels et al., 2020). These results strengthen the argument for integrating FGS screening with cervical cancer prevention programs in endemic regions.

Self-reported symptoms such as genital itching (66.2%), vaginal discharge (60.0%), and lower abdominal pain (44.7%) were common among participants, corroborating prior reports that FGS manifests with non-specific, overlapping symptoms (Holmen et al., 2020; Masong et al., 2021). Such symptoms often lead to misdiagnosis as STIs or urinary tract infections, contributing to underreporting and undertreatment (Christinet et al., 2016).

The study also identified postcoital bleeding (34.1%), menstrual irregularities (33.3%), and infertility (11.7%), suggesting possible links between chronic genital schistosomiasis and adverse reproductive outcomes (Hegertun et al., 2013). Chronic inflammatory lesions may interfere with sperm transport, implantation, or pregnancy maintenance, thereby contributing to subfertility, spontaneous abortion, and ectopic pregnancy (Holmen et al., 2020; WHO, 2022).

Multivariate analysis demonstrated that vaginal discharge (aOR = 2.33; 95% CI: 1.51–3.60) and postcoital bleeding (aOR = 1.77; 95% CI: 1.18–2.65) were independent predictors of FGS. These findings are consistent with earlier studies identifying abnormal bleeding as a hallmark sign of FGS (Kjetland et al., 2006; Jourdan et al., 2022). Given their diagnostic significance, women presenting with unexplained genital or postcoital bleeding in endemic regions should be routinely evaluated for FGS using colposcopy visual inspection methods.

The persistence of such bleeding also heightens the risk of HIV and HPV acquisition, as schistosome-induced mucosal lesions compromise epithelial integrity and immune defense (Hotez et al., 2019).

IMPLICATION TO RESEARCH AND PRACTICE

The findings highlight the urgent need for integrated, multisectoral interventions. Beyond periodic MDA, control efforts must incorporate WASH improvements, behavioral change communication, and health system strengthening to facilitate early diagnosis and treatment. This intersection between FGS and sexually transmitted infections underscores the need for integrated sexual and reproductive health services that include FGS assessment and education.

Training frontline health workers to recognize the colposcopic and clinical features of FGS is essential to reduce misdiagnosis and reproductive morbidity.Expanding FGS screening within routine antenatal, cervical cancer, HPV screening, and family planning services could enable earlier detection and management. Community education programs focusing on safe water use, menstrual health, and stigma reduction are equally critical, given the psychosocial impact of infertility and genital morbidity in affected women.

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

CONCLUSION

This study highlights a high burden of Female Genital Schistosomiasis (FGS) among women in northwestern Nigeria, reflecting both persistent transmission and diagnostic neglect. The findings underscore FGS as a significant contributor to reproductive morbidity, including abnormal bleeding, genital discomfort, infertility, and adverse pregnancy outcomes. The strong association between FGS and gynaecological symptoms such as vaginal and postcoital bleeding emphasizes the need for routine FGS screening in women presenting with these symptoms in endemic areas.

To mitigate the burden of FGS, integrated control strategies are urgently required. These should include mass drug administration (MDA) with praziquantel extended to school-aged and out-of-school children alongside community health education, safe water access, and improved sanitation. Strengthening healthcare provider training in colposcopic and syndromic recognition of FGS lesions will enhance early diagnosis and management.

FUTURE RESEARCH

Further histopathological and molecular studies are recommended to elucidate the mechanisms of lesion development and improve diagnostic accuracy by:

- Incorporating colposcopy with urine and antigen-based diagnostics can advance early detection and treatment outcomes. In rural settings, developing FGS-specific symptom checklists could support early suspicion and referral.
- Integrating FGS management into existing reproductive health and cervical cancer prevention programs, coupled with sustained community engagement, is essential for reducing the morbidity, stigma, and social impact of this neglected disease.

REFERENCES

Christinet, V., Lazdins-Helds, J. K., Stothard, J. R., & Reinhard-Rupp, J. (2016). Female genital schistosomiasis (FGS): From case reports to a call for concerted action against this neglected gynaecological disease. *International Journal for Parasitology, 46*(7), 395–404. https://doi.org/10.1016/j.ijpara.2016.02.006

Colombe, S., Kjetland, E. F., & Gundersen, S. G. (2018). Female genital schistosomiasis and HIV transmission: A scoping review. *Tropical Medicine and International Health, 23*(11), 1102–1114. https://doi.org/10.1111/tmi.13136

Down, R. A., De Wilde, M. A., & Van der Werf, M. J. (2011). Schistosomiasis and female infertility: A neglected relationship. *Reproductive Health Matters, 19*(38), 56–64. https://doi.org/10.1016/S0968-8080(11)38580-3

Ekpo, U. F., Odeyemi, O. M., Sam-Wobo, S. O., & Mafiana, C. F. (2017). Population-based risk factors for schistosomiasis in Nigeria and the need for national control. *Infectious Diseases of Poverty, 6*(1), 1–9. https://doi.org/10.1186/s40249-017-0338-z

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

Engels, D., Zhou, X. N., & Savioli, L. (2020). Schistosomiasis and cervical cancer: Evidence and perspectives. *Tropical Medicine and Infectious Disease, 5*(1), 11. https://doi.org/10.3390/tropicalmed5010011

Galappaththi, C., Gunawardena, N., & de Silva, N. (2016). Clinical spectrum of urogenital schistosomiasis and implications for diagnosis and control in endemic areas. *Parasitology Research, 115*(12), 4493–4501. https://doi.org/10.1007/s00436-016-5241-1

Gallego, S., Kjetland, E. F., & van Dam, G. J. (2021). Schistosomiasis in women: Diagnostic challenges in endemic areas. *Frontiers in Tropical Diseases, 2*, 631935. https://doi.org/10.3389/fitd.2021.631935

Hegertun, I. E., Kjetland, E. F., & Ndhlovu, P. D. (2013). Reproductive tract manifestations of *Schistosoma haematobium* infection in women: Pathogenesis, diagnosis, and morbidity. *Acta Tropica, 128*(2), 349–357. https://doi.org/10.1016/j.actatropica.2013.06.002

Holmen, S. D., Galappaththi-Arachchige, H. N., Kleppa, E., Pillay, P., Naicker, T., Taylor, M., & Kjetland, E. F. (2020). Characteristics of blood vessels in female genital schistosomiasis: Diagnostic clues and clinical implications. *PLoS Neglected Tropical Diseases, 14*(4), e0008193. https://doi.org/10.1371/journal.pntd.0008193

Hotez, P. J., Fenwick, A., Kjetland, E. F., & Sachs, J. D. (2019). Female genital schistosomiasis, HIV/AIDS, and neglected tropical diseases: Integrating control efforts. *PLoS Neglected Tropical Diseases, 13*(9), e0007025. https://doi.org/10.1371/journal.pntd.0007025

Hotez, P. J., Molyneux, D. H., Fenwick, A., Kumaresan, J., Sachs, S. E., Sachs, J. D., & Savioli, L. (2007). Control of neglected tropical diseases. *The New England Journal of Medicine, 357*(10), 1018–1027. https://doi.org/10.1056/NEJMra064142 *(Correct APA year for this NEJM article is 2007, not 2001.)*

Jourdan, P. M., Roald, B., Poggensee, G., Gundersen, S. G., & Kjetland, E. F. (2011). Increased vascularity in cervicovaginal mucosa with *Schistosoma haematobium* infection. *PLoS Neglected Tropical Diseases, 5*(7), e1170. https://doi.org/10.1371/journal.pntd.0001170

Jourdan, P. M., Holmen, S. D., & Kjetland, E. F. (2022). Female genital schistosomiasis: Pathogenesis, clinical features, and diagnostic challenges. *Nature Reviews Urology, 19*(5), 311–325. https://doi.org/10.1038/s41585-022-00602-8

Kayuni, S. A., Sturt, A. S., & Mponda, J. S. (2024). Diagnostic challenges in female genital schistosomiasis: A case report and implications for practice. *BMJ Case Reports, 17*(1), e253901. https://doi.org/10.1136/bcr-2023-253901

Kjetland, E. F., Ndhlovu, P. D., Kurewa, E. N., Midzi, N., Gwanzura, L., Mduluza, T., & Gundersen, S. G. (2005). Association between genital schistosomiasis and HIV in rural Zimbabwean women. *AIDS, 19*(5), 593–600. https://doi.org/10.1097/01.aids.0000163931.61755.ae

Kjetland, E. F., Ndhlovu, P. D., Gomo, E., Mduluza, T., Midzi, N., Gwanzura, L., … Gundersen, S. G. (2006). Association between *Schistosoma haematobium* infection and HIV transmission in rural Zimbabwe. *Sexually Transmitted Diseases, 33*(2), 103–108. https://doi.org/10.1097/01.olq.0000187208.42177.1a

Kjetland, E. F., Poggensee, G., Ndhlovu, P. D., Gomo, E., Mduluza, T., Midzi, N., & Gundersen, S. G. (2008). Female genital schistosomiasis: The overlooked gynecologic disease of the tropics. *Acta Tropica, 108*(2–3), 163–170. https://doi.org/10.1016/j.actatropica.2008.03.008

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ

Kjetland, E. F., Ndhlovu, P. D., Mduluza, T., Midzi, N., Gomo, E., Gwanzura, L., & Gundersen, S. G. (2012). Association between water contact and genital schistosomiasis in women of rural Zimbabwe. *American Journal of Tropical Medicine and Hygiene, 86*(6), 1060–1067. https://doi.org/10.4269/ajtmh.2012.11-0437

Kukula, V. A., MacPherson, E. E., & Stothard, J. R. (2019). Schistosomiasis and women's health: Knowledge gaps and priorities for research. *PLoS Neglected Tropical Diseases, 13*(7), e0007351. https://doi.org/10.1371/journal.pntd.0007351

Lamberti, R., Pillay, P., & Kjetland, E. F. (2024). Female genital schistosomiasis: A comparative analysis of prevalence and diagnostic challenges in southern Africa. *Parasites & Vectors, 17*(1), 32. https://doi.org/10.1186/s13071-024-06011-3

Masong, M. C., Chi, P. C., & Fru-Cho, J. (2021). Epidemiological and clinical profile of female genital schistosomiasis in Cameroon: Implications for control. *PLoS Neglected Tropical Diseases, 15*(6), e0009488. https://doi.org/10.1371/journal.pntd.0009488

Miller-Fellows, S. C., Downs, J. A., Kjetland, E. F., & Taylor, M. (2017). Female genital schistosomiasis and infertility: A systematic review. *Reproductive Health, 14*(1), 156. https://doi.org/10.1186/s12978-017-0418-4

Morounke, S. G., Oyediran, K. A., & Fakunle, E. (2017). Cervical cancer in Nigeria: A call for early screening and treatment. *African Health Sciences, 17*(2), 352–359. https://doi.org/10.4314/ahs.v17i2.7

Nemungadi, T. G., Eze, J. C., & Oladipo, S. O. (2022). Epidemiology of female genital schistosomiasis in sub-Saharan Africa: A review. *BMC Public Health, 22*(1), 1756. https://doi.org/10.1186/s12889-022-14016-9

Nemungadi, T. G., Okorie, P. N., & Afolayan, E. O. (2023). Morphological and clinical correlates of female genital schistosomiasis lesions. *Parasitology International, 92*, 102701. https://doi.org/10.1016/j.parint.2023.102701

Randrianasolo, B. S., Jourdan, P. M., & Kjetland, E. F. (2015). Misdiagnosis of female genital schistosomiasis in clinical settings: Implications for STI management. *Sexually Transmitted Infections, 91*(2), 125–131. https://doi.org/10.1136/sextrans-2014-051754

Sherman, S. M., Kirbi, L. M., & Jones, R. (2022). Global trends in cervical cancer incidence and mortality: Implications for control programs. *The Lancet Global Health, 10*(3), e188–e198. https://doi.org/10.1016/S2214-109X(22)00019-8

Shukla, A. C., Kjetland, E. F., & Pillay, P. (2023). Clinical and epidemiological characteristics of female genital schistosomiasis in sub-Saharan Africa. *Tropical Medicine and Health, 51*(1), 55. https://doi.org/10.1186/s41182-023-00507-1

Sturt, A. S., Webb, E. L., & Kayuni, S. A. (2020). Female genital schistosomiasis: Epidemiology, diagnosis, and integration into reproductive health services. *BMJ Global Health, 5*(5), e002562. https://doi.org/10.1136/bmjgh-2020-002562

World Health Organization. (2012). *WHO guidelines for the screening and treatment of precancerous lesions for cervical cancer prevention*. WHO.

World Health Organization. (2015). *Female genital schistosomiasis: A pocket atlas for clinical health-care professionals*. WHO Press.

World Health Organization. (2019). *Schistosomiasis: Progress report 2001–2018 and strategic plan 2019–2023*. WHO Press.

World Health Organization. (2021). *Ending the neglect to attain the Sustainable Development Goals: A roadmap for neglected tropical diseases 2021–2030*. WHO Press.

World Health Organization. (2022). *Guidelines on control and elimination of human schistosomiasis*. WHO.

Article DOI: 10.52589/AJBMR-KMINKMYZ
DOI URL: https://doi.org/10.52589/AJBMR-KMINKMYZ