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Prevalence of female genital schistosomiasis among fishing communities in north central Nigeria

Abovegodwin, G. O.*, Badaki, J. A., Ngwamah, J. S., Atawodi, J.C., and Umar, V.

Department of Zoology, Federal University Lokoja, Kogi State, Nigeria.
*Corresponding Author email:valeriewhite887@gmail.com

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ABSTRACT: Female Genital Schistosomiasis (FGS) is an emerging public health concern linked to *Schistosoma haematobium* infection acquired through skin contact with contaminated freshwater. This study assessed the prevalence of Female Genital Schistosomiasis (FGS) in three fishing communities; Echewu, Gbobe, and Shintakwu in Bassa Local Government Area (LGA), Kogi State. The prevalence of FGS infection was generally high across the three communities Echewu (12.3%), Gbobe (9.6%) and Shintakwu (16.4%). FGS self-reported symptoms included blood in urine, vaginal discharge, genital itching, and painful intercourse. Participants aged 14–19 years had the highest occurrence of blood in urine (9.5%), while those aged 20–49 years had the highest occurrence of genital itching (8.2%) and 10.9% of the participants in the latter age group also reported the highest occurrence of painful intercourse. Risk factors identified were water contact and proximity to water bodies. Fifty-seven per cent (57.2%) of infected individuals lived ≤ 100m from rivers, while 42.8% lived farther away. Among water activities, washing and swimming carried the highest FGS infection risks, at 39.2% and 25.0% respectively.The most frequently identified pathologies of FGS were vaginal discharge (21.2%), pre-contact bleeding (17.8%), rubbery papules (1.3%), grainy sandy patches (4%), and abnormal blood vessels (8.2%). Vaginal discharge and abnormal blood vessels were significantly recorded across all age categories. The findings reveal FGS prevalence in the study area, emphasizing the necessity for routine Praziquantel treatment among school-aged children, adolescent girls, and reproductive-age women in Bassa LGA. Additionally, enhancing access to affordable diagnostic services is crucial for early detection and proper management of FGS.

Keywords: Schistosomiasis, female genital schistosomiasis, prevalence, bassa, north central
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INTRODUCTION

Female Genital Schistosomiasis (FGS) is an emerging public health gynecological manifestation of *Schistosoma haematobium* infection that is acquired by skin contact with freshwater contaminated with schistosomecerceriae. It is usually characterized by the deposition of schistosome eggs in the genital tract of adolescent girls and women (Nour, 2010; Kjetland *et al.,* 2012; Hotez *et al.,* 2019). Due to the nature of the signs and symptoms of FGS, women tend to approach health services with complaints of infertility or symptoms of sexually transmitted infections (WHO, 2015). Health-care professionals are generally unaware of FGS because it is not described in the medical textbooks or nursing curricula in any of the countries where schistosomiasis is endemic (WHO, 2015). Hence, laboratory diagnostics are inadequate (WHO, 2015). Therefore, for young girls and women of reproductive age living in areas where *S. haematobium* is endemic, FGS remains highly prevalent and under-diagnosed due to a low index of suspicion among health-care professionals (WHO, 2015). FGS can be present without *S. haematobium* (WHO, 2015). Female genital Schistosomiasis mostly affects impoverished and rural communities, particularly agricultural and fishing populations. Women performing domestic chores such as washing clothes in cercariae infested water are also at risk of FGS infection (WHO, 2015). FGS usually starts in childhood and can become a chronic debilitating disorder. Women who have been treated with praziquantel at least once before age 20 years are 50% less likely to develop FGS later in life

(WHO, 2017). *S. haematobium* is the only species of the genus that causes disease in the urinary tract aptly called urinary schistosomiasis due to its migration and deposition of the eggs in the bladder and urethra, often resulting in gross haematuria among infected individuals (Barsoum, 2013; Ghieth and Lotfy, 2017; Nelwan, 2019). At least, up to 150 to 450 million adolescent girls and women are estimated to be at risk of FGS (Hotez *et al.,* 2019; WHO, 2021) and about 16 to 56 million women are living with FGS, with the majority of these estimates occurring in sub-Saharan Africa (WHO, 2021). Diagnosis of FGS can be challenging due to different transformation stages of the *S. haematobium* parasite and immune response in the affected tissues. In cases where the infected patient is asymptomatic, the disease may be mistaken for sexually transmitted diseases (STDs) or cervical cancer (Kjetland *et al.,* 2014). The study reports on the level of Female Genital Schistosomiasis in Bassa local government area of Kogi State, Nigeria.

MATERIALS AND METHODS

Description of study area

The study was conducted in Shintakwu, Gbobe and Echewu communities located along the shoreline of the lower Niger-Benue River in Bassa Local Government Area of Kogi State and it covers an area of 1925 square kilometers. Bassa Local is situated at longitude 7°54'N and latitude 7°03'E with a population size of 188,600. Bassa Local Government consists of three (3) tribes the Bassa-Komo, Bassa-Nge and Ebira-Koto. Domestic and agricultural water are sourced from the lower reaches of the Niger Benue Confluence River. The majority of people living in these areas are mainly fishermen and women, and farmers; some are civil servants or engage in other forms petit trade. Due to the lack of good road networks and sanitation in these communities, uncontrolled open defecation/urination is observed around the home, inside, and along the riverbanks of the study area. Secondly, the lack of water sources for drinking and other household chores has led residents to rely on the contaminated, shallow freshwater triturates/streams that flow through the communities. The choice of the region was the result of socio-economic activity in the study area. Several canals are dug to irrigate farms during the dry season. These canals contain water together with the shallow perennial rivers which create permanent freshwater channels that promote the growth of aquatic vegetation from which various schistosomes host snails thrive on and thereby consequently predisposing the inhabitants to infection.

Sample size determination

$[(Z_{1-}?)^2 P (1-P)]/ d^2$ where: $Z_{1-}?^2$ = level of confidence (1.96), P= expected prevalence (0.4), d^2 absolute error or precision (0.05).

Ethical approval

Ethical clearance was sought and obtained from the Kogi State Ministry of Health (appendix 1) and the study participants were enrolled into the study only after permission was granted by the community Head together with individual consent from participants was sought for. Information obtained were kept discrete, confidential and used only for this research.

Development of data collection tools

A semi- structured questionnaire that sought information on the socio-demographic characteristics of participants and their knowledge of FGS was designed and pre-tested in a community outside the study area. The finding from the pre-test was used to refine the tools for easy comprehension, and time duration in administration of questionnaires and cultural acceptability. An epidemiological form was equally designed to record the test result for each participant.

Questionnaire administration

The community Dispensary Assistant (DA) provided study information in the participant's languages. A questionnaire containingquestions regarding demographics, water contact, and genital symptomswas administered. Those that are illiterate were given oral interview to obtain their socio-demographic data and knowledge of female genital Schistosomiasis while the literate participants were given questionnaire.

Community approach and sensitization

A visit was made to the communities to give them a general information and recruitment of School aged female children, teenage girls and young adults for laboratory examinations, treatment, and gynecological inspection for FGS. The first meeting with the traditional Head, traditional birth attendants (traditional midwives), and community health care personnel focuses on the importance, benefits, and possible negative health implications of FGS. The Participants for this study were contacted within the community through their traditional Head, traditional birth attendants (traditional midwives), and community health care personnel. Dates for sensitization visits were approved by the community Head and narratives were obtained using interpreters who explained to the participants in their own dialect. Unstructured open-ended discussions were conducted within the communities and they were educated on the health implications of Female Genital Schistosomiasis.

Sample collection and data aanalysis

Clinical examination was carried out on consented participants by traditional birth attendants and health care professional through visual inspection of the cervix or vaginal to identify lesions on the cervix or vaginal surfaces following guidelines outlined in the WHO FGS pocket atlas. Specifically identifying five clinically visible manifestations: vaginal discharge, pre-contact bleeding, rubbery papules, grainy sandy patches and abnormal blood vessels (WHO, 2015). Each participant was given a code and were asked to present the code when the test results was returned to the community health care centre. These identification codes were used to distribute results to participants.Following guidelines in the outline of the WHO FGS pocket atlas reference, positive diagnosis was confirmed on the presence of at least one or two of these five main clinically visible manifestations of: vaginal discharge, pre-contact bleeding, rubbery papules, grainy sandy patches and abnormal blood vessels.

Statistical analysis

Data were grouped and stored in Microsoft excel database and then imported into SPSS 20.0 (Chicago, Illinois, USA) and 23.0 (Armonk, NY, USA) for statistical analysis.Analyses for the prevalence of infection were carried out using one-way ANOVA; Categorical variables were summarized using frequency and percentage. Significant level was taken as $P < 0.05$.

RESULTS

Demographic and socioeconomic status

A total of 479 females from three communities in Bassa Local Government Area of Kogi State were recruited into the study. 216 (45.1%) of the study population were between the age of 5-13 years, 121 (25.2%) were between the age range of 14-19 years while 142 (29.6%) were between 20-49 years. The occupational status of the study population includes fishing, farming, irrigation farming, fishing and farming and others. Fishing was the most predominant (39.6%) occupation amongst the population as shown in (Table1). Majority (74.3%) of the study participants were single, while (23.7%) are married and (1.8%) divorced. The population is comprised of literate individuals with more than half (56.1%) having had primary school education. Others had Secondary (21.7%) and Tertiary (12.3%) and those with no formal education were just 9.8% (Table1).

Knowledge of FGS

A total of 359 (74.9%) of the studied population indicated a lack of awareness regarding FGS. from the three communities studied, 120 (25.1%) indicated they have heard of FGS and their source of information were family member, health personal or journals (Table 2).

Water contact activities

Table3 provides an overview of activities of participants involved in water contact periodically. As many as 152 of the participants (31.7%) reported that they usually access the river daily, 29.4% access the river only during the weekend, 18.8% yearly, 6.1% monthly and 5.2% hourly to check their fishing traps.

Occurrence of female genital

Of the 479 participants,73 females consented to be examined for FGS by visual inspection. The overall prevalence of FGS was 38.3% (Table 3). The analysis revealed that there is no significant difference among the study area. The proportion of infection with FGS was 12.3%, 9.6% and 16.4% across the three communities (Echewu, Gbobe and Shintakwu) respectively. The data was dis-segregated into different age group and the analysis revealed that there was no significant difference among the data but the age group with the highest rate of FGS infection was age 20-49 (24.6%) with age ranging from 5-13 years old being the least (4.1%) infected (Table 4). The highest infectionof FGS was recorded in Shintakwu (16.4%) followed by Echewu(12.3%) infection rate while the least reported was for Gbobe with (9.6%) infection rate (Table 5).

Self-Reported and clinical manifestation of FGS

Although the participants reported symptoms such as blood in urine, vaginal discharge, genital itching, and painful sexual intercourse, only two symptoms (blood in urine and genital itching) were significantly reported across all the age categories. Female participants within age range of 14–19 years had the highest occurrence of blood in urine 24.9%, while those within age range of 20–49 years had the highest occurrence of genital itching 21.4% (Table 6).The highest of painful intercourse (28.5%) was found among participants in age group 20-49 years old.After the visual examination of vaginal walls, the most frequently identified pathologies of FGS were vaginal discharge (21.8%), pre-contact bleeding (17.8%), rubbery papules (1.4%), grainy sandy patches (4.1%) and abnormal blood vessels (8.2%) with Vaginal discharge and Abnormal blood vessels being significantly recorded across all the age categories (Table 7).

Potential risk factors associated with FGS

Associated risk factors such as proximity to the river and

Table 1: Demographic and Socioeconomic Status of Participants.

Variables	Gbobe n= 155 (%)	Echewu n= 145 (%)	Shintakwu n=179 (%)	Total N =479(%)
Age Group				
5-13yrs	70 (45.1)	66 (45.5)	80 (44.6)	216(45.1)
14-19yrs	37 (23.8)	30 (20.7)	54 (30.1)	121(25.2)
20-49yrs	48 (30.9)	49 (33.8)	45 (25.1)	142(29.6)
Occupation				
Fishing	64 (41.2)	48 (33.1)	78 (43.5)	190 (39.6)
Farming	43 (27.7)	57 (39.3)	49 (27.3)	149 (31.1)
Irrigation farming	15 (9.6)	7 (4.4)	18 (10.0)	40 (8.3)
Fishing and farming	31 (20.0)	33 (22.7)	30 (16.7)	94 (19.6)
No activity	2 (1.2)	0 (0.0)	4 (2.2)	6 (1.2)
Marital Status				
Married	46 (29.6)	29 (20.0)	39 (21.7)	114 (23.7)
Single	102 (65.8)	116 (80.0)	138 (77.0)	356 (74.3)
Divorce	7 (4.5)	0 (0.0)	2 (1.1)	9 (1.8)
Level of Education				
Primary	96 (61.9)	82 (56.5)	91 (50.8)	269 (56.1)
Secondary	27 (17.4)	34 (23.4)	43 (24.0)	104 (21.7)
Tertiary	21 (13.5)	15 (10.3)	23 (12.8)	59 (12.3)
No formal education	11 (7.0)	14 (9.6)	22 (12.2)	47 (9.8)

Table 2: Participants knowledge FGS.

Female Genital Schistosomiasis		Awareness	
Community	Sample size	Yes %	No%
Echewu	145	18 (3.8)	127 (26.5)
Gbobe	155	40 (8.4)	115 (24.0)
Shintakwu	179	62 (12.9)	117(24.4)
Total	479	120 (25.1)	359 (74.9)

Table 3: Frequency of water contact activities by participants (N=479).

Activities	Frequency					
	Hourly	Daily	Weekly	Weekend	Fourth nightly	Yearly
Fishing	25(5.2%)	54(11.3%)	15(3.1%)	5(1.0%)	0(00%)	79(22.8%)
Irrigation	0(00%)	14(2.9%)	7(1.5%)	15(3.1%)	3(0.6%)	3(0.6%)
Swimming	0(0.0%)	52(10.9%)	6(1.2%)	40(8.4%)	6(1.3%)	8(1.7%)
Washing	0(0.0%)	37(7.7%)	22(4.6%)	81(16.9%)	7(1.5%)	0(00%)
Total	25(5.2%)	152(31.7%)	50(10.4%)	146(30.4%)	16(3.3%)	90(18.8%)

water contact activities were considered within the communities of study, it was observed that 57.1% out of the study participants who were infected with FGS are living within proximity of ≤ 100m while 42.8% lived ≥ 100m away from the river. Water contact activities such as washing of clothes and swimming were reported to have the highest risk of occurrence of infection with 39.2% and 25.0% respectively (Tables 8 and 9).

DISCUSSION

Information on the prevalence and distribution of any disease is necessary for determining its public health importance and the subsequent planning of any controlprogramme. Reports on the distribution of Female genital schistosomiasis in Bassa Local Government Area (LGA) of Kogi State are rather scanty. This study presents baseline prevalence data for Female Genital Schistosomiasis in Bassa Local Government Area (LGA) of Kogi State. The present study reveals high infection rates of Female Genital Schistosomiasi in Bassa Local Government Area (LGA) of Kogi State. Of the 479 participants in this study, only 73 consented to be examined for FGS by visual vaginal examination. The overall prevalence of FGS was high (38.4%).

Table 4: Occurrence of female genital schistosomiasis infection in the study area.

Community	Number Examined	Number Infected (%)	Prevalence (%)	F.cal	Df	P value	F.crit
Echewu	22	9 (40.9)	12.3	1.447	2	0.306	5.143
Gbobe	20	7 (35.0)	9.6				
Shintakuw	31	12 (38.7)	16.4				
Total	73	28	38.3				

Table 5: Occurrence of female genital schistosomiasis infection across Agegroups

Age Group	Number Examined	Number Infected (%)	Prevalence (%)	F.cal	Df	P value	F.crit
5-13yrs	11	3 (27.3)	4.1	1.827	2	0.240	5.143
14-19yrs	21	7 (33.3)	9.6				
20-49yrs	41	18 (40.9)	24.6				
Total	73	28	38.3				

Table 6: Occurrence of female genital schistosomiasis infection in communities of study.

Community	Age	Number Examined	Number Infected (%)	Prevalence (%)	F.cal	Df	P value	F.crit
Echewu	5-13yrs	3	2 (9.1)	2.7	1.960	2	0.02*	5.143
	14-19yrs	8	2 (9.1)	2.7				
	20-49yrs	11	5 (22.7)	6.8				
Total		**22**	**9 (40.9)**	**12.2**				
Gbobe	5-13yrs	4	0 (0.0)	0.0	1.880	2	0.232	2.462
	14-19yrs	5	2 (10.0)	2.7				
	20-49yrs	11	5 (25.0)	6.8				
Total		20	7 (35.0)	9.5				
Shintakwu	5-13yrs	4	1 (3.2)	1.4	0.414	2	0.81	1.432
	14-19yrs	8	3 (9.7)	4.1				
	20-49yrs	19	8 (25.8)	10.9				
Total		31	12 (38.7)	16.4				

*significant at P<0.05

Table 7: Self-Reported and Clinical Manifestation of FGS amongst 73 Females Examined.

	5-13yrs	14- 19yrs	20- 49yrs
Symptoms			
Vaginal Discharge	0 (0.0%)	4 (14.2%)	7 (24.9%)
Blood in Urine	4 (14.2%)	7 (24.9%)	5 (17.8%)
Painful Intercourse	0 (0.0%)	1 (3.5%)	8 (28.5%)
Genital Itching	3 (10.7%)	4 (14.2%)	6 (21.4%)
Total	7 (24.9%)	16 (56.8%)	26 (92.6%)
Symptoms of FGS			
Vaginal Discharge	3 (10.7%)	5 (17.8%)	8(28.5%)
Pre-contact bleeding	0 (0.0%)	4 (14.2%)	9 (32.1%)
Rubbery tubercles	0 (0.0%)	1 (3.5%)	0(0.0%)
Grainy sandy patches	0 (0.0%)	1(3.5%)	2 (7.1%)
Abnormal blood vessels	1(3.5%)	3 (10.6%)	2 (7.2%)
Total	4 (5.4%)	14 (19.2%)	21 (28.8%)

Similarly, studies by Makia *et al.* (2021) revealed that amongst 58 consenting adult women in Cameroon, 58.6% were positive for FGS which is line with this current study. Furthermore, in a pilot study conducted by Ekpo *et al.* (2017) on 20 adult women to verify FGS directly, Fourteen (70·0%) women presented FGS (Ekpo *et al.,* 2017). The present study is also in conformity with the rates of FGS infection reported in Abuja (13.9%)

Table 8: Risk factors associated with female genital schistosomiasis (FGS) amongst infected individuals within the study area.

Age	Fishing	Fishing and Farming	Irrigation	Swimming	Washing	Total
5-13yrs	0(0.0%)	0 (0.0%)	1 (3.6%)	4(14.2%)	0(0.0%)	5(17.8%)
14-19yrs	1(3.5%)	0(0.0%)	0(0.0%)	2 (7.1%)	3(10.7%)	6(21.4%)
20-49yrs	3(10.7%)	2 (7.1%)	3(10.7%)	1 (3.5%)	8(28.6)	17(60.7%)
Total	4(14.2%)	2 (7.1%)	4(14.2%)	7 (25.0%)	11(39.2%)	28(99.9%)

Water Contact Activity (%).

Table 9: Proximity of the infected Individuals to the Water Bodies.

Age	Proximity	
	≤ 100(%)	≥100 (%)
5-13yrs	3 (10.7)	1(3.6)
14 19yrs	5(17.9)	6(21.4)
15 49yrs	8 (28.6)	5(17.8)
Total	16 (57.1)	12(42.9)

Bature *et al.,* (2022), 70% in Zambia (Wall *et al.,* 2018) and 58% in Zimbabwe (Kjetland *et al*., 2005).When data on FGS infection was disaggregated by age, the highest number of FGS cases was recorded amongst age 20-49 years (40.9%) while 5-13 years had the least infection (27.3%).There was a slight spike in infection rate with Female Genital Schistosomiasis amongst young women in their 20s to 40s which is consistent with other studies (Ekpo *et al.,* 2017; Sturt *et al.,* 2020). However, a Cameroonian study reported that FGS is more prevalent among younger women between the ages 15-30 years old (Makia *et al.,* 2021). The age group 20 to 40 years was found to consist mostly of young married women that are actively involved in household chores for the family, thus having more contact with water, and with a history of these activities from a much younger age, as revealed by their responses to the question regarding their activities.

All of the self-reported symptoms of FGS, blood in urine and genital itching were significantly reported across all the age categories. However, participants, who accepted to undergo the visual examination for FGS, had clinical manifestations of FGS with the presence of vaginal discharge (21.6%), pre-contact bleeding (17.8%) abnormal blood vessels in the genitals (1.4%), presence of grainy sandy patches (4.1%). The presence of rubbery papules (8.2%) was the least. The present findings are in conformity with Ekpo *et al.* (2017) who reported that one third of study participants had vaginal discharge. Similarly Bature *et al.,* (2022) reported that 28% of women positive for FGS had vaginal discharge, abnormal blood vessels in the genitals (31.3%), rubbery papules (25.0%), grainy, sandy patches (12.5%) and contact bleeding (6.3%) respectively. In a study by Kjetland *et al*., (2005), genital homogenous sandy grainy patch was found in 46% of women with schistosomiasis, also mucosal bleeding and abnormal blood vessels were found.

Concerning the knowledge of Schistosomiasis and FGS, there was a low level of schistosomiasis awareness among the participants in the study area. This finding does not align with the study conducted by Yirenya-Tawiah *et al.,* (2016) who reported 88.7% of female respondents were aware of schistosomiasis as a disease. Other studies elsewhere have also regarded high level of awareness of schistosomiasis and FGS (Patel, 2022). This is not surprising because the communities surveyed were very rural, an overlooked populations with no government presence.In relation to water contact activities, activities such as washing of clothing, swimming, irrigation activity, fishing and farming/fishing at the water bodies were higher in ages 20-49. In contrast with these findings are reports by Kapito-Tembo *et al.,* (2009) and Angelo *et al.,* 2019 who observed a more frequent contact among the 6-14years old, although water contact of economic nature peaked in 20-30yr olds. Similarly, Kanwai *et al.* (2011) observed higher frequency of water contact in young children who indulged in washing and bathing. However, the present study conforms with Studies by Folefac *et al.,* 2018; Ekpo *et al.,* 2017; Sturt *et al.,* 2020 who reported that age 20-49 years old had more frequent contact with water for activities such as washing, irrigating their farming, fetching water, fishing and even recreation. This is not surprising given that these women handle domestic duties including washing utensils, laundry, and farm products, and thus have more exposure time in the water bodies than children. On the other hand, Grimes *et al.,* (2015) Mushi *et al.,* (2022) observed that children and adolescents who engage in domestic chores recorded a higher water contact exposure than older peoples. They attributed their findings to the time spent by younger people washing, fishing or swimming. There was high contact with the transmission points especially during the

dry season as well as the offset of the raining season due to the high temperature during this period. The frequency of water contact with cercariae infected water bodies either during irrigation activities washing of clothing, swimming, fishing and farming/fishing placed the subjects constantly at risk of infection (Njoku *et al.,* 2014).

Conclusion

These studies showed that female genital schistosomiasis with *S. haematobium* were prevalent in young adolescent girls and women of reproductive age in the three communities (Echewu, Gbobe and Shintakwu) of Bassa LGA of Kogi State. The presence study of female genital schistosomiasis amongst the age range 20-49 years was higher than that of age 5-13 years falls which under low category whereas moderate amongst age 14-19 years.

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Contribution to Knowledge

✓ This study identifies water contact activity and proximity to the water bodies as the potential risk factors associated with Female Genital Schistosomiasis.
✓ This present study established a baseline prevalence data for Female Genital Schistosomiasis in Bassa Local Government Area (LGA) of Kogi State.
✓ This study also revealed that there was a low level of FGS awareness among the participants in the study area.

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