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Full Length Research Paper

Perception on bioecology of onchocerciasis vectors around Osun River, South-western Nigeria

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Human onchocerciasis still remains one of the public health problems in Africa despite the colossal resources committed by International organizations in combating its menace in the affected communities. The burden of the disease is intense mostly around the riverine areas where the *Simulium* vectors of the disease profusely breed. The proper knowledge of the communities on bioecology of the *Simulium* vectors is imperative towards planning the effective methods of breaking man-fly contact. As part of longitudinal studies on bioecology of black flies along Osun River, the present study utilized structured questionnaires and focus group discussions to assess the perception of the people on bioecology of black flies in three selected communities around the river. All the respondents at the three communities acknowledged that the blackflies bite in their communities but had poor knowledge of the breeding site of the flies as majority of the respondents at Osun Eleja and Osun Budepo (33 and 58%) claimed that the flies breed in tree-holes as compared with stagnant water and flowing river. Though, most of the respondents knew that black flies transmit disease, only 2, 5 and 11% of the respondents at Osun Budepo, Osun Eleja and Osun Ogbere respectively knew that black flies transmit onchocerciasis. The poor knowledge of the respondents on some aspects of bioecology of the flies poses threat to the effective control of onchocerciasis and black flies nuisance at the study communities. There is therefore need for proper health education in order to stem the risk of man-fly contact at the study area.

Key words: Black flies, perception, onchocerciasis, Osun River, Nigeria.

INTRODUCTION

Human onchocerciasis caused by *Onchocerca volvulus* is a severely debilitating disease of major public health problem in many riverine communities of Africa where the black fly vector of the disease abundantly thrive (Post et al., 2003; Adeleke et al., 2010). Onchocerciasis is known to be endemic in many tropical countries and over 37 million people are infected worldwide. About 90 million people are at the risk of the disease. Onchocerciasis is most common in Africa and Nigeria probably has the highest burden of the disease (Oyibo and Fagbenro, 2003).

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Nine sibling species of *Simulium damnosum* complex have been taxonomically identified and documented in West Africa. The species include *Simulium sirbanum, S. damnosum sensu stricto, Simulium dieguerense, Simulium sanctipauli, Simulium soubrense, Simulium squamosum, Simulium yahense, Simulium leonense, Simulium konkorense* (Ibeh et al., 2006). The first three species are known as savanna flies which transmit savanna strain of *O. volvulus* while the rest belong to the forest group and transmit the forest strain of the parasite which causes more of skin disease than blinding disease (Mafuyai et al., 1996; Ibeh et al., 2006).

After successful transition from vector to chemo-therapy, the control of human onchocerciasis in Africa is currently implemented through regimental distribution of

ivermectin by African Programme for Onchocerciasis Control (APOC) (Hodgkin, 2007; Opara et al., 2007). As APOC is gradually preparing to wind-up the activities, the intense biting of the black flies without protection threatens the possibility of recrudesce, even in areas where ivermectin distribution had been successful since the drug does not kill the adult worms. Apart from the fear of recrudesce, the biting nuisance of the *Simulium* flies also imposes colossal socio-economic burden on the affected communities (Adeleke et al., 2010). Therefore, an understanding of the perception of the local communities on *Simulium* flies is important towards breaking-man flies contact and thus, minimizing the risk of disease transmission and recrudesce. The present study evaluates the perception of three communities on bioecology of onchocerciasis vectors around Osun River, Southwestern Nigeria.

MATERIALS AND METHODS

The study area

The study was conducted along Osun River system, Southwestern Nigeria. River Osun lies on the latitude 8° 20' and 6° 30'N and longitude 5°10' and 3° 25'E in the forest zone of Nigeria. Three catching points; Osun Eleja (derived savanna), Osun Budepo (rainforest) and Osun Ogbere (rainforest) were selected along the river course. The details of the study communities had been given in Adeleke et al. (2010b).

Ethical clearance

Written consent was sought and obtained from the Ogun State Ministry of Health before the commencement of the study. Informed consent was also sought and obtained from the communities and subjects used for the study.

Data collection

Structured questionnaires were used for data collection on the perception of the communities on bioecology of onchocerciasis vectors. The questionnaires were complemented with focus group discussion (FGD). The questionnaires which comprised open-ended and closed- ended questions were administered to each participant in each of the three communities. Only participants above 15yr were included in this study. The questions sought information on the age, sex, occupation, knowledge on the fly density, seasonal variation, disease caused by the black fly, protection methods against black flies among others. The questions for focus group discussion contained unstructured questions which sought information on general knowledge of the residents on bio-ecology, attitudes and practice of the residents against black flies. Three group discussions comprising 5 to 7 participants were held in each community. The groups were old men, old women and the youths

Data analysis

The questionnaires were analyzed using Epi- Info software version 6.04 and the results were expressed in percentages.

RESULTS

A total of 117 respondents were interviewed at the three communities. Most of the respondents in Osun Budepo (75%) and Osun Ogbere (63%) were males while females participated more (58%) than males (42%) at Osun Eleja. The majority of the respondents did not have any formal education at Osun Eleja (71%) and Osun Budepo (69%) while most of the respondents at Osun Budepo either had primary school (33%) or secondary school education (37%). Farming was the predominant occupation at the three sites which constituted 84, 90 and 81% of the respondents' occupation at Osun Eleja, Osun Budepo and Osun Ogbere respectively.

The knowledge of the respondents on bioecology of black flies is summarized in Table 1. All the respondents at the three communities acknowledged that the blackflies bite in their communities but differed as to the place of bite of *S.damnosum s.l.* Majority of the respondents at Osun Eleja (37%) believed that blackflies bite mostly at the farm sites relative to riverside (34%) and any other part of the community (24%). Most of the respondents at Osun Budepo (48%) were of the opinion that black flies bite in every part of the community while 32, 2 and 15% believed that blackflies bite more at the farm sites, riverside and village respectively. Similar observations were also recorded at Osun Ogbere with majority of the respondents (59%) believed that blackfly bite can be received in any part of the community.

The majority of the respondents are of opinion that black flies are abundant during the wet season, 11% in the dry season and 13% in both seasons at Osun Eleja and Osun Budepo respectively. Whereas, every respondent in Osun Ogbere agreed that blackflies bite only in wet season. The opinions of the respondents were also corroborated during focus group discussions with most of the groups agreeing that black flies bite throughout the day but more in the morning and evening than afternoon. All the groups agreed that blackflies were problems during the wet season alone and almost disappear during bush burning in the dry season. All the respondents and focus group discussions also believed that black flies constitute nuisance and greatly affect their productivity.

Most of the respondents at Osun Eleja (39%) and Osun Budepo (54%) believed that blackflies breed in tree holes relative to flowing and stagnant water. However, the majority of the people at Osun Ogbere believed that blackflies breed in flowing water followed by tree- holes (19%) and stagnant water (11%). Only 7% did not know their breeding sites. The responses of all the focus group discussions held at Osun Eleja and Osun Budepo were also consistent with the claim of the residents that black flies breed in tree holes. Itching/scratching and malaria/ headache are the common effects of the black fly bite acknowledged by most of the respondents. Only 5% (Osun Eleja), 2% (Osun Budepo), 11% (Osun Ogbere)

Table 1. Summary of the knowledge of the respondents on bioecology of *Simulium damnosum* complex at the study sites.

Parameter	Osun Eleja	Osun Budepo	Osun Ogbere
Sex			
Male	42	75	63
Female	58	25	37
Educational status			
Primary	26	25	33
Secondary	3	6	37
Others	0	0	11
No formal education	71	69	19
Preferred biting site			
Farm	37	48	22
River side	34	32	8
Village	5	5	11
Any place	24	15	59
Biting period			
Morning	21	29	15
Afternoon	13	0	11
Evening	5	31	0
Anytime	61	40	74
Biting seasons			
Dry season	0	0	0
Wet season	90	87	100
Both	10	13	0
Preferred biting parts			
Leg	74	83	89
Any exposed part	26	17	11
Breeding sites			
Tree holes	40	54	19
Stagnant water	1	6	11
Flow water	29	3	63
Not known	30	37	7
Effect of fly bite			
Hitching/scratching	68	77	74
Blindness	5	2	12
Malaria	11	19	7
Headache	14	2	7
Others	2	0	0

Values are presented in percentages.

attributed blackflies to blindness. During focus group discussion, the majority argued that blindness is mostly caused by witchcraft or old age.

Most of the respondents usually have close contact with River Osun to fetch water for domestic uses (Table 2). Moreover, 21% (Osun Eleja), 21% (Osun Budepo) and 7% (Osun Ogbere) normally visit the river for bathing. Only few respondents visit the water for fishing, and sand dredging was common at Osun Ogbere alone (33%). The residents at Osun Budepo and Osun Eleja said they solely dependent on River Osun because it is the only river available for their domestic use, while the

Table 2. Human activities of the respondents around Osun River at the study area.

Communities	Fetching	Fishing	Bathing	Washing	Sand dredging
Osun Eleja	45	8	21	26	0
Osun Budepo	35	2	21	42	0
Osun Ogbere	35	7	7	11	33

Values are presented in percentages.

Table 3. Methods of prevention of *S. damnosum s.l* bites by the respondents at the study communities during the period of the study.

Communities	Covering the body with cloth	Using cream	Rubbing plant extract	Rubbing other chemicals	No protection method
Osun Eleja	50	5	8	29	8
Osun Budepo	75	6	4	4	0
Osun Ogbere	67	19	4	11	0

Values are presented in percentages.

residents at Osun Ogbere said they only utilized the river during the dry season, there are bore holes and wells for water supply during the wet season.

Table 3 shows the responses of the residents on the methods of prevention of blackfly bite. At the three communities, 50, 75 and 66.7% of the respondents normally wear clothes that cover their body during the peak of black fly bite at Osun Eleja, Budepo and Ogbere respectively. Some respondents also used chemicals like the mixture of diesel oil, kerosene and palm oil, body lotion and plant extracts as repellants. The orange lime, *Ocimum spp* and orange peel were the common plant repellants used in the study communities. When asked on the prevention of black flies during focus discussion, majority of the people including females said that they normally wear long sleeve shirts and long trousers to cover themselves. The respondents opined that the use of kerosene as repellent is irritating and harsh to the skin.

DISCUSSION

The evaluation of the perception of the three communities on bioecology of the black flies showed that the residents are conversant with the black fly bite. The impressive knowledge of the participants that *S. damnosum* bite mostly along the river course or farmland close to the rivers corroborates the scientific findings that people working close to the rivers are at the high risk of *Simulium* biting nuisance and onchocerciasis (Akogun and Onwuliri, 1991; Abdullahi and Oyeyi, 2003). Avoiding such high biting areas of *Simuliium* is important in controlling onchocerciasis, as it will help to reduce man-fly contact. However, despite their knowledge of the high biting areas, the residents solely depend on the river for some domestic activities and occupational demands. These frequent exposures to *Simulium* biting areas portend the high risk of the residents to onchocerciasis.

The knowledge of the residents at the study communities that blackflies bite more during the wet season and preferred lower limbs than any other exposed parts is in agreement with the biting behaviours of *S. damnosum s.l* earlier observed at the study communities (Adeleke et al., 2010b). However, the poor knowledge of the residents at Osun Budepo and Osun Eleja on the breeding sites of *S. damnosum s.l* is worrisome having recognized that *S. damnosum s.l* bites more around the river course. The poor knowledge of the endemic communities on the ecology of *S. damnosum s.l* had also been documented in many parts of Nigeria (Anosike and Onwuluri, 1995; Ukpai and Ezeji, 2003; Dozie et al., 2004). The poor knowledge of the residents on the breeding sites of *S. damnosum s.l* could increase their risk to onchocerciasis as majority of the residents did not have accurate knowledge of their breeding sites. The relatively high knowledge of the breeding sites of black flies recorded at Osun Ogbere may not be unconnected to the high level of education of the residents and their closeness to semi urban areas such as Ogbere Township and Ijebu Ode.

The large proportion of the residents attributed hitching/scratching to black flies bite. Some even confessed to the use of hard materials such as stones and sticks to scratch their body after being bitten by black flies. Hitching is one of the recognized early manifestations of onchocerciasis and could in many severe conditions, lead to skin lesions and disfigurement in affected individuals (Adewale et al., 1999; Ukpai and Ezeji 2003).

The failure of most of the respondents to associate *Simulium* bite to blindness at Osun Eleja and Osun Budepo showed that the residents of the community need public health enlightenment on the consequences of

black flies bite. Instead of blindness, some respondents associated malaria to black flies bite but linked blindness to the handiwork of witch crafts. Moreover, despite the relatively high level of awareness on onchocerciasis claimed by the residents of Osun Ogbere, only few people could link blindness to *Simulium* bite, many respondents still believed that blindness is a result of old age and witchcrafts. This wrong perception could serve as retardation in achieving effective control programme.

The wearing of long garments and socks as a means of protection against *S. damnosum* bite is a welcoming idea as this will reduce the risk of man-fly contact. However, despite these wide affirmations by most of the respondents at the study communities, some residents were observed wearing only knickers, the practice that is common among the farming population at the three sites and sand-dredgers at Ogbere. Their reasons for this habit were premised on the fact that the shirts normally disturb them at work and sometimes cause excessive heat. This behavioural habit is dangerous as this could enhance the risk of disease transmission. The resort of the residents to the use of chemical compounds, such as mixture of kerosene, palm oil and diesel is of great economic burden since these products are meant for domestic use.

The rubbing of the extract of *Ocimum* leaves, lime and orange bark by few respondents in the study communities could be a good omen at man-fly contact. The extracts of the three plants mentioned by the residents have produced promising results when used as protectants and repellants against insects (Don-Pedro, 1985, Usip et al., 2006). According to Usip et al. (2006), the uses of *Ocimum spp* conferred over ninety percent protecttion against black flies and repel the infected flies in the test subjects in an endemic area.

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