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Full Length Research Paper

An assessment of the knowledge of blackfly in onchocerciasis transmission among students and workers of a tertiary institution in Ogun State, Southwestern Nigeria

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This study assessed the knowledge of the role of blackfly in onchocerciasis transmission among the students and workers of a tertiary institution in Ogun State, southwestern Nigeria. One hundred and fifty (72 males, 78 females) volunteers were recruited for the study which occurred between July and September, 2009. Samples of the blackfly caught on the institution's campus and preserved in a clean transparent unlabelled bottle containing 70% ethanol, and an unnamed coloured photograph of the fly were shown to the respondents each of which was guided to fill a carefully-structured questionnaire. 40% of the respondents correctly identified the insect as blackfly. Among those that had spent ≥ 1 year, 95.1% (98/103) answered that the insect bites man. The commonest body reaction to blackfly bite was skin swelling (38.7%), followed by skin swelling + itching (P < 0.001). 3.3% of the total respondents answered correctly that the fly transmits the causative agent of onchocerciasis, while 96.7% (145/150) answered incorrectly or non-affirmatively (P < 0.001). This study showed the need to adequately educate the members of the tertiary institution on the vectorial role of blackfly, and study the population dynamics of the fly in the study area towards working out cost-effective control strategies.

Key words: Onchocerciasis, blackfly, knowledge, body reactions, health education.

INTRODUCTION

Onchocerciasis (river blindness) is a serious debilitating disease of great public health importance in 37 countries in tropical Africa, the Arabian Peninsula and parts of South and Central America. In West and Central Africa, the causative parasitic filarial nematode, *Onchocerca volvulus*, is transmitted mainly by *Simulium damnosum* complex, while *S. neavei* complex are the main vectors in East Africa (WHO, 1987; Whitworth, 2001).

The serious negative socio-economic impact often associated with onchocerciasis has stimulated several efforts towards controlling/eradicating the disease. Much of the control efforts include the use of larvicide (temephos) and large-scale Mectizan (ivermectin) distribution (Thylefors and Alleman, 2006; Boatin, 2008; Traore et al., 2009).

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Despite the substantial level of success in the global control of the disease, there are indications that the blackfly vectors still persist in many endemic areas including Nigeria (Ndyomugyenyi et al., 2007; Opara et al., 2008; Matthews et al., 2009; Oluwole et al., 2009). This implies that transmission of *O. volvulus* still occurs in such areas. Health education has long been advocated as an integral part of onchocerciasis control programme (WHO, 1987).

Since a holistic integrated approach is expected to yield the desired results, a regular appraisal of all the components of the control programme is imperative. In view of this, the present study was designed to assess the level of knowledge and understanding of the role of blackfly in onchocerciasis transmission among the students and workers of a tertiary institution in southwestern Nigeria, where blackfly populations exist. The decision to use a tertiary institution for this study was based on the fact that members of such an academic community are ordinarily expected to be adequately knowledgeable of their immediate

Table 1. Age distribution of respondents recruited into the blackfly knowledge study in a Nigerian tertiary institution.

Age group (years)	No. of respondents	% of respondents
16-20	15	10.0
21-25	116	77.3
26-30	8	5.3
31+	5	3.3
Unspecified	6	4.0
Total	150	100

Table 2. Ability to identify blackfly among the students and workers of a Nigerian tertiary institution.

Name	No. of respondents	% of respondents
Blackfly	60	40.0
Bean weevil	4	2.7
Sunfly	25	16.7
Termite	2	1.3
Bee	5	3.3
Tsetse fly	14	9.3
Unknown	40	26.7
Total	150	100

environment.

MATERIALS AND METHODS

Study area and population

The tertiary institution used for this study was the Abraham Adesanya Polytechnic (AAP) located in Ijebu-Igbo, Ogun State, Southwestern Nigeria. Ijebu-Igbo lies in the tropical rain forest belt, and it is the headquarters of Ijebu North Local Government Area. AAP is a relatively new public non-residential tertiary institution sited on the outskirts of Ijebu-Igbo and flanked by a number of villages. Most of the students and workers of the institution reside in Ijebu-Igbo town-ship but, due to tight daily schedule, have to be on the AAP campus till about 16.30 h during the week. Traditionally, AAP manage-ment educates new students and, sometimes, newly-employed workers during orientation programmes about the challenges of the institution especially vis-à-vis its peculiar location. Free Mectizan distribution has been done twice in the tertiary institution.

Questionnaire administration

One hundred and fifty (72 males, 78 females) volunteers of AAP were recruited for the study which occurred between July and September 2009. The students were visited, during lecture-free periods, in their lecture halls, while the workers were visited in their offices. The students and workers were adequately enlightened and educated on the purpose of the study and how to answer the questions provided on the questionnaire appropriately. However, adequate precautions were taken to avoid providing clues to the correct answer of any of the questions. Some samples of the blackfly (previously identified at the Cocoa Research Institute of Nigeria, Ibadan, Oyo State), caught on AAP campus and preserved in a clean transparent unlabelled bottle containing 70% ethanol, and an unnamed coloured photograph of the fly were shown to each respondent. Afterward, with guidance when necessary, each respondent was requested to fill in the questionnaire which was returned to the research team immediately. The information obtained through the questionnaire include previous encounter with the insect, the name of the insect, whether it bites or not, which period of the day it bites (if it does), and any known disease(s) transmitted by the insect.

The percentages of the analyzed data thus generated were compared, where necessary, using the chi-square (χ^2) test.

RESULTS

One hundred and fifty respondents filled the questionnaire and their age distribution is summarized in Table 1. 21 - 25 years has statistically highest percentage among the age groups ($P < 0.001$). 20% (30) of the respondents were workers. Apart from one newly-employed staff, all respondents had been in AAP for at least three months with 69.1% (103/149) of them having spent ≥ 1 year. 92.0% (138/150) of the respondents indicated having seen the insect before while 8.0% (12/150) had no previous encounter with the insect ($P < 0.001$). Table 2 summarizes the ability of the respondents to identify blackfly. 40% (60/150) of the respondents correctly-identified the insect as blackfly while statistically higher percentage (60%, 90/150) could not identify blackfly ($P < 0.05$).

Among those that had spent ≥ 1 year in AAP, 95.1% (98/103) answered that the insect bites man while 4.9% (5/103) answered negatively ($P < 0.001$). Among those that answered positively, the indicated biting periods were morning and/or evening (88.8%, 87/98), afternoon (5.1%, 5/98), and anytime of the day (6.1%, 6/98). These were statistically different ($P < 0.001$). 97.9% (46/47) of those that had spent less than 1 year responded that the insect bites, and that the biting periods were morning and/or evening (47.8%, 22/46), afternoon (26.1%, 12/46), and anytime of the day (26.1%, 12/46) ($P < 0.01$).

Out of the pooled total number of respondents that answered that the insect bites man, 21.5% (31/144) indicated having experienced body reactions to the insect's bites. Table 3 gives the recorded frequency of body reactions to blackfly's bites among the respondents. The commonest body reaction was skin swelling (38.7%), followed by skin swelling+itching ($P < 0.001$). One of the victims used a mixture of palm-oil and kerosene to ward off the insects.

Disease transmission knowledge of the fly among the respondents is summarized in Table 4. 3.3% (5/150) of the total respondents answered correctly that the fly transmits the causative agent of onchocerciasis, while 96.7% (145/150) answered incorrectly or non-affirmatively ($P < 0.001$).

Table 3. Frequency of body reactions to blackfly bites among students and workers of a Nigerian tertiary institution.

Body reaction	No. affected*	Frequency (%)
Swelling	12	38.7
Itching	04	12
Swelling + itching	08	25.8
Pain	01	3.2
Pain + itching	02	6.5
Weakness	01	3.2
Swelling + itching + weakness	01	3.2
Depression	02	6.5

*Total no. = 144.

Table 4. Knowledge of the disease transmitted by blackfly among students and workers of a Nigerian tertiary institution.

Disease transmitted	No. of respondents	% of respondents
River blindness	5	3.3
Colour blindness	2	1.3
Malaria	16	10.7
Typhoid	11	7.3
Cholera	2	1.3
Elephantiasis	28	18.7
None	50	33.3
Unknown	36	24.0
Total	150	100

DISCUSSION

The inability of most of the respondents to correctly identify blackfly in this study is worrisome. This is because most claimed having seen the insect before. The matter is worsened by the fact that only a negligible proportion (3.3%) of the study population knew that blackfly transmits *O. volvulus*. This observation may be due to the possibility of some respondents having mistaken blackfly for some other insects which reflected in the different and diverse incorrect names such respondents called blackfly in this study. Similar studies demonstrated high level of ignorance on the vectorial capabilities of anthropophilic mosquitoes and *Culicoides* (Agbolade et al., 2006, 2008). This shows that the age-old problem of ignorance on parasitic infections transmission (Ukoli, 1992) is yet to be adequately addressed.

The observation that most of the respondents claimed that the insect bites attests to their being familiar with the behaviour of the insect. This is further strengthened by the fact that most of them correctly gave the biting periods of the insect as morning and/or evening. Previous studies in Nigeria had revealed the bimodal biting activity of *S. damnosum* complex (Adewale et al., 1999; Opara et al., 2008).

The occurrence of body reactions and associated psychological disturbances due to blackfly's bites gives an additional insight into the havocs of the fly on humans. Much of the psychological disturbances might have been elicited by the painful bites of the fly (Whitworth, 2001) and the associated swelling and itching. Similar observations were noted for anthropophilc *Culicoides* (Agbolade et al., 2006).

In this study, many of the bitten human victims reported being often disturbed from their routine academic or vocational schedules during body reaction episodes. Although only one respondent indicated appli-cation of palm-oil + kerosene mixture to ward off blackfly, observations showed that many more used the mixture, while some few others (including females) were compelled to wear trousers and socks during periods of high abundance of the fly. During some of the working visits to the study site, some specimens of female blackfly identified as *S. damnosum* complex were collected both indoor and outdoor when they perched on human body for blood meal. The specimens were collected between 10.00 and 11.30 hours (Agbolade, unpublished observation).

It is laudable that Mectizan distribution has been done twice in the institution visited in this study. However, the results of this study showed the need to adequately educate the members of the tertiary institution on the vectorial role of blackfly. We believe this will enhance widespread practice of personal protection against the fly whose bites and transmitted disease (onchocerciasis) have serious negative socio-economic impacts (Akinboye et al., 2010). To the best of our knowledge, blackfly control has never been done in the study area. Many previous studies have demonstrated that blackfly control with larvicide should normally complement Mectizan distribution in onchocerciasis control progammes (Thylefors and Alleman, 2006; Traore et al., 2009). Therefore there is urgent need to study the population dynamics of the fly in the study area and map out workable cost-effective strategies towards its control.

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