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Morphotaxonomic Assesement of Simulium Damnosum and Onchocerciasis in Hypoendemic Areas, Ijebu- North Local Government, Southwest Nigeria

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***Abstract**: Onchocerciasis (river blindness), a parasitic disease caused by a nematode called Onchocerca volvulus, transmitted by the S. damnosum Theobald complex has been named the third most important cause of preventable blindness in the tropics. Recent studies in Nigeria have indicated that some areas formerly considered to be hypo-endemic may now be endemic due to migration of S. damnosum s.l. This work therefore is to identify the S. damnosum complex in the area and whether they are free from transmission of O. volvulus. Black flies were collected with the help of consented trained fly catchers. A structured questionnaire was also administered. The flies were examined and identified using morphotaxonomic characters. The flies were dissected for parousity and infectivity. A total of 970 S. damnosum complex was caught. Catch was abundant in the hours of 7-8a.m and least around 1-2pm. 60.4% were nulliparous. The highest number of parous and nulliparous flies were found in September and April respectively. Forest flies made up 96% and analysis of the questionnaires indicated that respondents were ignorant about the biology of black flies and the implications of their bites. None of the flies dissected was infected with the L_3 stage which may suggests no transmission of O. volvulus in the communities which may be associated with the effectiveness of Ivermectin microfilaricidal treatment, over the past years.*

***Keywords:** Onchocerciasis, status, transmission, Theobald complex, dissection*.

I. Introduction

Onchocerciasis, also called river blindness due to its most extreme manifestation of blindness, and due to the fact that the blackflies which transmits the disease abound in riverside area. There are main six West African members of the Simulium damnosum complex namely S. Damnosum ss, S. Sirbanum, S. Santipauli, S. Soubrense, S. Yahense and S. Squamosum. Onchocerciasis in Nigeria is nationwide in terms of geographical spread and importance (Edungbola et al., 1987). In the past, prevalence of onchocerciasis can also be ascertained by entomological evaluation and morphotaxonomy in the determination of the parousity, infectivity rate and type.

Aim And Objectives

Hypo-endemic areas could have ongoing O. volvulus transmission that can influence transmission in areas already treated with Ivermectin. Migrating flies carry infections to sites within onchocerciasis eliminated areas from non-treated sites

II. Materials And Method

The study was carried out in Ijebu-North Local Government, southwest Nigeria, located between $6^{o}57'$ N and $4^{o}0'$ E. Blackflies were collected from the study communities with the help of consented fly catchers who were fully informed of the work and the freedom to opt out of the study if they so wished, without any repercussions. Captures were made in shifts by two catches every hour from 7a.m-6p.m at two selected points on two consecutive days every two weeks. The fly catchers exposed their legs and the female simulium seeking a blood meal settles on the exposed legs. Suction tubes were used to catch them before they could bite. A structured questionnaire (which was interpreted in local language) was administered to assess the respondents' knowledge about the insect vector. The focus group discussion data collection technique was also employed to obtain information to guide and help in the study objectives. All participants were encouraged to express their feelings, ideas, perception and opinions freely. Dissection was also done using the dissection microscope and identification using the morphotaxonomic guide (Wilson et al., 1993). The dissected flies' ovaries were examined for parosity, likewise the head, thorax and abdomen to identify the different stages of the O.volvulus.

III. Results

The total number of S.damnosum complex caught during the study (April-November, 2012) was 970. More catch was recorded in April (159) and September (185) while few catch was recorded for November (78). The abundance of flies was observed in the 7-8 hours and least catch was recorded around the 13- 14 hours.

A total of 586 (60.4%) flies were nulliparous. None of the blackflies was found to be infected with the L_3 stage of the O.volvulus. The highest number of parous flies (20.3%) was found in September, while highest number of nulliparous flies (25.4%) was found in April. Forest flies were found to be 96% of the total catch while the remaining 4% were savannah flies.

Table 1.Monthly pattern of blackflies caught per hour in the study Communities

Hour of Catch	Number (%) of flies								Total
	April	May	June	July	August	September	October	November	
7 – 8	35 (22.0%)	29 (27.8%)	31 (30.6%)	28 (24.1%)	25 (21.0%)	40 (21.6%)	25 (23.1%)	11 (14.1%)	224 (23.0%)
8 – 9	24 (15.1%)	26 (25%)	05 (4.9%)	14 (12.0%)	25 (21.0%)	29 (15.6%)	16 (14.8%)	09 (11.5%)	148 (15.2%)
9 -10	20 (12.6%)	07 (6.7%)	10 (9.9%)	17 (14.6%)	20 (16.8%)	25 (13.5%)	10 (9.2%)	07 (8.9%)	116 (11.9%)
10 – 11	20 (12.6%)	07 (6.7%)	07 (6.9%)	09 (7.7%)	06 (5.0%)	21 (11.3%)	10 (9.2%)	07 (8.9%)	87 (8.9%)
11 - 12	16 (10.1%)	05 (4.8%)	09 (8.9%)	09 (7.8%)	08 (6.7%)	09 (4.8%)	06 (6.0%)	07 (8.9%)	69 (7.1%)
12 – 13	10 (6.3%)	06 (5.7%)	05 (4.9%)	10 (8.6%)	05 (4.2%)	10 (5.4%)	05 (4.6%)	05 (6.4%)	56 (5.7%)
13 – 14	05 (3.1%)	05 (4.8%)	06 (6.0%)	05 (4.3%)	09 (7.5%)	09 (4.8%)	05 (4.6%)	06 (7.6%)	50 (5.1%)
14 – 15	07 (4.4%)	07 (6.7%)	06 (5.9%)	05 (4.3%)	06 (5.0%)	13 (7.0%)	09 (8.3%)	09 (11.5%)	62 (6.3%)
15 – 16	11 (6.9%)	05 (4.8%)	09 (8.9%)	10 (8.6%)	06 (5.0%)	09 (4.8%)	12 (11.1%)	07 (8.9%)	69 (7.1%)
16 – 17	11 (6.9%)	07 (6.7%)	13 (12.8%)	09 (7.7%)	09 (7.5%)	20 (10.8%)	10 (9.2%)	10 (12.8%)	89 (9.1%)
Total	**159 (100%)**	**104 (100%)**	**101 (100%)**	**116 (100%)**	**119 (100%)**	**185 (100%)**	**108 (100%)**	**78 (100%)**	**970 (100%)**

Table 2. Monthly parity and infection staus of blackflies in the staudy communities.

Months	Number (%) of blackflies *		
	Nulliparous	Parous	L_3 positive
April	149 (25.4%)	10 (2.6%)	0 (0)
May	81 (13.8%)	23 (6.0%)	0 (0)
June	34 (5.8%)	67 (17.4%)	0 (0)
July	50 (8.5%)	66 (17.2%)	0 (0)
August	83 (14.2%)	36 (9.4%)	0 (0)
September	107 (18.3%)	78 (20.3%)	0(0)
October	57 (9.7%)	51 (13.3%)	0(0)
November	25 (4.3%)	53 (13.8%)	0(0)
Total	**586 (100%)**	**384 (10%)**	**0** (0)

Table 3. Monthly abundance of blackfly types in the study communities in 2012

Months	Number (%) of blackflies examined	
	Savannah type	Forest type
April	19(47.8)	140 (15.0)
May	08 (20.5)	96 (10.3)
June	0 (0)	101 (10.8)
July	0 (0)	116 (12.5)
August	0 (0)	119 (12.8)
Septembe	0 (0)	185 (19.9)
October	07 (17.9)	101 (10.8)
November	05 (12.8)	73 (7.3)
Total	**39 (4.1)**	**931 (95.9)**

IV. Discussion

There was presence of flies in all the catching points and the abundance of flies may be related to the hydrophysical features of the rivers within and around these communities (Crosskey, 1981; Ibeh et al., 2005; Adeleke et at., 2011). This could also be related to the onset of raining season (April) and peaked at the end of the raining season in September. It is possible that the sunny period is greatly responsible for the decline in catch at that period of the day. The abundance of forest flies indicates that the infection with O. Volvulus from this group is not the blinding onchocerciasis, but worrisome is the finding of a few number of the savannah flies which transmits the blinding onchocerciasis. This finding could be attributed to the derived savannah caused by factors such as shifting cultivation, annual bush burning, massive deforestation and some other cultural practices which have combined to degrade the original forest vegetation setting, therefore pontentially creating a conducive environment for the savannah flies. The study also observed a high proportion of nulliparous flies which correlates with a recent previous study by Sam-Wobo et al., (2013) in parts of Oyo and Ogun States. The high proportion of the nulliparous flies may reflect the high productivity of the breeding sites due to no vectoral control as earlier stated by WHO (1995).

Hypoendemicity was recorded in the flies as no L_3 stage larva was seen, thereby suggesting a very low microfilarial load of the residents as a result of the effectiveness of ivermectin microfilariacidal treatment over the past years.

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