***Original Research Article***

**Assessment of Indigenous Knowledge and Practices on Black flies (Diptera: Simuliidae) prevention in Ibarapa Communities of Oyo State, Nigeria**

ABSTRACT

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| **Aims:** Black flies (Diptera: Simuliidae) is known to transmit onchocerciasis a filarial disease caused by *Onchocerca volvulus*. Onchocerciasis negatively affects both animals and humans. Awareness on onchocerciasis, prevention and control would be helpful for health planners and educators, providing basic information to focus on its prevention and control. The objective of this study was to assess indigenous knowledge and practices on black flies’ prevention and control in Ibarapa communities of Oyo State, Nigeria.  **Study design:** Community based cross sectional study design was employed through systematic sampling technique.  **Place and Duration of Study:** The study was conducted in Ibarapa region of Oyo State, Nigeria, between February and April 2023.  **Methodology:** The data were collected from every seven houses after randomly selecting the first house from 1 to 7 until calculated sample size was reached. A total of 199 respondents were sampled across study locations. Interview guide was used and data collected were analysed using descriptive statistical tools.  **Results:** Findings showed that out of 199 respondents; 101(50.7%) were male and 98(49.3%) were female, with average mean age of 42 years across the study areas. The study showed that all of the respondents knew about black flies and its harmful effect. A little above average (60.3%) of the respondents assert that black flies majorly caused skin rashes. Over 70% of the respondents got informed on black flies as a result of experience and knowledge gained over time in their environment. Various indigenous control measures were used to mitigate black flies’ infestation in the study area; wearing of covered cloth (25.9%), use of lemon (25.4%), kerosene (18.9%), *aboniki balm* (13.4%) and *Milicia excelsa* extract (12.9%).  **Conclusion:** The study concluded that respondents sampled can identify black flies, majority of them assert that the fly is harmful. However, many of the respondents’ source of information on black fly is from personal experience and knowledge gained over time in their environment. Also, skin rashes were perceived as the major disease caused by black flies in the study area. The respondents rely on locally available materials, non-scientific methods to control black flies, reflecting a dependence on indigenous knowledge and household resources. |

*Keywords: Black flies, Ibarapa region, Indigenous Knowledge, Mitigating Practices*

1. INTRODUCTION

Arthropods borne diseases in tropical countries are major health threat responsible for great morbidity and possible mortality*. Simulium* spp*,* a dipteran fly of the family Simuliidae is of both medical and veterinary significance. *Simulium* popularly known as black flies are the vector of filarial nematode of the genus *Onchocerca*, mainly *Onchocerca volvulus* and other diseases transmitted among wild animals and livestock (Crosskey, 1990; Adler et al., 2004). It has been hypothesized that *Simulium* spp evolved from cool and mountainous environments (Adler et al., 2010). They are known to breed in fast ﬂowing streams and rivers (Asfaw et al., 2005) in various continents, except Antarctica (Adler, 2020). The larvae however are dominant inhabitants of unpolluted streams and rivers over a wide range of altitudes (Currie and Adler, 2008). The female black fly has the capacity to parasitise humans and animals present outdoors via massive attacks (Braverman, 1994). Massive black flies’ attacks, especially in agriculture and tourism areas, may lead to large economic losses; resultant effect of limitation of outdoor activities for residents and tourists (Gray et al., 1996; Sariozkan et al., 2014).

Onchocerciasis is an important public health parasitic disease of high geographic spread, with about 125 million people globally estimated to be at risk of the infection. Over 90% of the people at risk of the disease are resident in Africa. It has been reported in over 30 countries of tropical Africa; six countries of Latin and Central America and a country in the Arabian Peninsula (WHO, 1995; Etya’ale, 2001). West Africa is regarded as perhaps the worst endemic area of onchocerciasis in the World and WHO (1987) maintains that Nigeria is the country with the largest number of infected persons in the whole of Africa. The disease is also referred to as river blindness and it is ranked the second aetiology of infectious blindness (Adler et al., 2010). It is a debilitating vector-borne disease caused by *Onchocerca volvulus* (Etya’ale, 2002; WHO, 2007) and transmitted by the bite of black ﬂy. The adult worm of *Onchocerca volvulus* dwells in subcutaneous nodule, from where fertilized females produce millions of microfilariae which live and freely migrate in the intercellular spaces of the skin tissues (Buck, 1974). The disease is a slowly progressive and chronic disease, characterised by severe itching skin, serious eye lesion and blindness. Initial infection often takes place in childhood, and remains latent for long periods. Onchocerciasis is a major health issue among rural communities living closely to rivers in Sub-Saharan African countries (WHO, 1995).

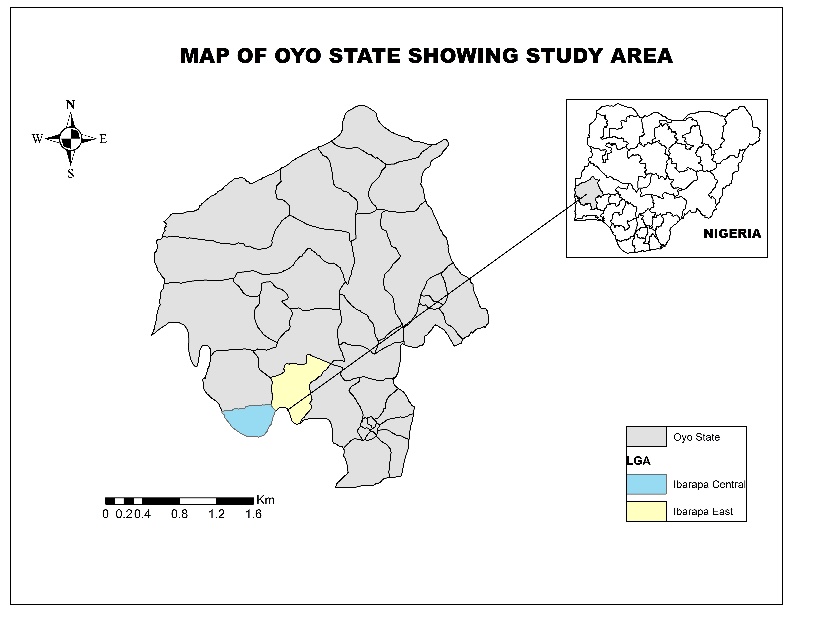
It is of utmost importance to protect humans and animals against the bite of black flies, in order to control onchocerciasis. The control of arthropod borne diseases is primarily based on prevention of vector-host contacts, elimination of vector larvae and destruction of adult parasite in host’s body (Usip et al. 2006). Different control approach of black flies such as the use of different synthetic chemicals (Tesfaye et al., 1998) and essential oil from plant extract as repellents (Kamaraj et al., 2010; Hazarika et al., 2012) have been adopted in different areas in India to control black flies but little work has been done on indigenous preventive methods. However, active participation of the target communities is vital to any control programme and this involves a dynamic process with all the main stakeholders. Based on the stated background, this study was designed particularly to assess the indigenous knowledge and practices on black flies prevention in Ibarapa communities of Oyo State, Nigeria with high prevalence of black flies in relation to socio-cultural factors that are associated with the epidemiology and control of black flies. Therefore, the specific objectives of the study were as follow:

1. To describe the socio-economic characteristics of the respondents.
2. To identify the current respondent’s indigenous knowledge on black flies.
3. To identify available control measures of black flies among the respondents.

2. material and methods

The study was carried out in Ibarapa communities of Oyo State, Nigeria, comprising of three Local Government Areas; Ibarapa East, Ibarapa Central and Ibarapa North (Fig 1). The study population comprised of rural household within the study area with previous experience of black flies’ attack. To arrive at sampling size of 199 respondents, multi-stage sampling procedure was used. In the first stage; twenty percent (20%) of blocks in Ibadan/Ibarapa zone of Agricultural Development Programme were selected using purposive sampling technique for the first stage. The blocks selected were Ibarapa Central, Ibarapa North and Ibarapa East blocks. In the second stage of the sampling procedure, 50% of the block (Ibarapa Central, Ibarapa North and Ibarapa East) were further selected purposively and stratified based on areas known for high presence of black flies’ activities. Furthermore, two villages each at highly infested and vulnerable riverine location were randomly selected from the selected blocks, namely: Araromi and Tobalaogbo villages from Ibarapa Central block while, Abule Salako and Idi-Ata villages were selected from Ibarapa East Block. At the third stage of the sampling procedure, identified villages were sample to size, using systematic sampling techniques and data were collected from every seven houses after randomly selecting the first house from 1 to 7 until the calculated sample size was reached; to have 46, 37, 49 and 67 respondents from Araromi, Tobalaogbo, Abule Salako and Idi-ata villages respectively, with a total sample size of 199 respondents.

Data were collected by the use of an interview schedule consisting of series of questions to be answered by respondents. The interview included both open and close ended questions.The data collected were described with descriptive statistical tools. The descriptive statistics used were frequency count, percentage distribution and mean score.



**Fig 1: Map of study area**

3. results and discussion

Result in (Table 1) shows the socio-economic characteristics of the respondents in the study area. It was revealed that majority (87.4%) of the respondents are between age ranges of 21 – 60 years with a mean age of 42 years. Based on these, it can be inferred that respondents sampled are adults and are able to reason with local experience they have gotten over-time on activities of black flies in their various communities. This supports Olukosi et al. (2020), who observed that older farmers often dominate agriculture due to their expertise. Furthermore, 50.4 percent of the respondents sampled were male, consistent with Akinyemi et al. (2021), who noted that women in sub-Saharan Africa often face challenges in accessing land, credit, and training. Also, 55.8 percent, were Christians while 61.8% were married with average household size of 5. Also, livelihood activity of the respondents in the study area is majorly (62.8%) farming.

**Table 1: Socio-economic Characteristics of the Respondents (n = 199)**

|  |  |  |
| --- | --- | --- |
| **Characteristics** | **Frequency (Percentage)** | **Mean** |
| **Age** |  | 42 |
| ≥20 | 8 (4.0) |  |
| 21 – 40 | 96 (48.3) |  |
| 41 – 60 | 78 (39.2) |  |
| 61 Years Above | 17(8.5) |  |
| **Gender** |  |  |
| Male | 101(50.7) |  |
| Female | 98 (49.3) |  |
| **Religion** |  |  |
| Christian | 111(55.8) |  |
| Islam | 84 (41.7) |  |
| Traditionalist | 4 (2.01) |  |
| **Marital status** |  |  |
| Married | 123 (61.8) |  |
| Single | 23 (11.6) |  |
| Others (Widow/Divorced) | 53 (26.6) |  |
| **Household size** |  | 5 |
| ≥5 | 140 (70.4) |  |
| 6 – 10 | 55 (28.1) |  |
| 11 – 15 | 4 (2.0) |  |
| **Livelihood activities** |  |  |
| Farming | 125 (62.8) |  |
| Trading | 57 (28.6) |  |
| Civil Servant | 17 (8.5) |  |

Table 2 below revealed the various information and knowledge the respondents have about black flies. All (100%) the respondents sampled can identify black flies; this shows widespread awareness and recognition of the insect, likely due to its prevalence in the area. Majority (76.6%) of the respondents assert that the fly is harmful; this perception is likely to come from experiences of bites or disease associated.

Majority (77.8%) of the respondents’ source of information on black fly is from personal experience and knowledge gained over time in their environment while few (28.4%) of them obtained their information through inter group discussion; which form the major basis of their practices and information on black flies.

The study further revealed that a little below average (42.5%) of respondents believe that the information on black flies is useful while 26.4% of the respondents agreed that the information gathered over time on black fly has helped them on indigenous control measures of the fly. Few (24.9%) of the respondents has personal encounter with black fly infestation; this may likely help them to learn how to handle or recognize infestation. Also, 34.8 percent of the respondents experience is through second party identification of black fly infestation; this is likely to be learn from friends or community members.

In addition, majority (60.3%) of the respondents identified skin rashes as the perceived disease caused by black flies in the study area while others (16.4%, 15.9% and 3.5%) respondents mentioned eye problem, blood disease and malaria respectively as the perceived disease caused by black flies in the study area. This findings corroborate the report of Abiose (1998), which stated that black fly infestation can cause severe itching of the skin, eye lesions and blindness. This is a proof that the respondents genuinely know the implications of bites from black flies.

**Table 2: Information and Indigenous Knowledge of Black flies in the study area (n = 199)**

|  |  |
| --- | --- |
| **Variables** | **Frequency (Percentage)** |
| **Identification of black fly** | |
| Yes | 199 (100) |
| **Is the insect harmful** | |
| Yes | 154 (76.6) |
| **Source of Information on black fly** | |
| Experience/ knowledge over time | 155 (77.8) |
| Previous research/ Present research | 7 (3.5) |
| Radio | 8 (4.0) |
| Inter-group discussion | 57 (28.4) |
| **Has information on black fly been useful in anyway** | |
| Yes | 85 (42.5) |
| **If Yes to the above question, in what way** | |
| Intervention on local control measure | 53 (26.4) |
| **Personal encounter with black fly infestation** | 50 (24.9) |
| **Second party identification of black fly infestation** | 70 (34.8) |
| **Perceived disease caused by black fly** | |
| Blood Diseases | 32 (15.9) |
| Eye Problem | 33 (16.4) |
| Skin Rashes | 120 (60.3) |
| Malaria | 7 (3.5) |

Findings from this study (Table 3) shows the various control measures used by the respondents in mitigating against black flies in the study area. A quarter of the respondents indicated that they wear protective clothing while, 25.4 percent of the respondents use lemon to rub the exposed part of their body to mitigate against bite from black flies. It was further revealed that 18.9 percent, 13.4 percent and 12.9 percent of the respondents indicated that they use kerosene, *aboniki* balm and *Milicia excelsa* extract respectively to rub the exposed part of their body to mitigate against the bite of black flies. Also, few (10.0%) of the respondents indicated that they use petrol and palm oil as control measures to mitigate against bite from black flies. This study indicates that respondents rely on locally available materials, non-scientific methods to control black flies, reflecting a dependence on indigenous knowledge and household resources. This study corroborates the findings of Masresha et al., (2019) which stated that majority of respondents had very poor practice about black fly disease prevention and control.

**Table 3: Control measures used in mitigating against black flies across the study area**

|  |  |  |
| --- | --- | --- |
| **S/N** | **Control Measure** | **Frequency (Percentage)** |
| 1 | Use of Petrol | 20 (10.0) |
| 2 | Use of Kerosene | 38 (18.9) |
| 3 | Use of Lemon | 51 (25.4) |
| 4 | Use of “*aboniki balm*” | 27 (13.4) |
| 5 | Use of *Milicia excelsa* extract | 26 (12.9) |
| 6 | Wearing of covered clothes | 52 (25.9) |
| 7 | Use of Palm oil | 20 (10.0) |

4. Conclusion

The study assessed the indigenous knowledge and practices on black flies prevention in Ibarapa communities of Oyo State, Nigeria. The findings reveal that all the respondents sampled can identify black flies; this shows widespread awareness and recognition of the insect, likely due to its high prevalence in the area. Also, majority of the respondents assert that the black fly is harmful; this perception is likely to come from experiences of bites or disease associated.

However, many of the respondents’ sources of information on black fly is from personal experience and knowledge gained over time in their environment while few of them obtained their information through inter group discussion; which form the major basis of their practices and information on black flies. Also, skin rashes were perceived as the major disease caused by black flies in the study area followed by eye problem. This study indicates that respondents rely on locally available materials, non-scientific methods to control black flies, reflecting a dependence on indigenous knowledge and household resources. The study recommends further research on scientific intervention on black flies’ prevention and control program in the study area.

Consent

All potential participants were adults above 18 years and the purpose and benefits of the study were explained to respondents. They were informed that participation was voluntary. Oral consent was obtained from each participant considering the fact that many of them could not read or write. The Confidentiality of the respondents was maintained by using number codes on the questionnaire without any use of individual names. Oral consents obtained were documented in the project record book against the respective respondents’ codes.

Ethical

The ethical clearance for the study protocols was obtained from the Ministry of Health, Ethical Review Board with the approval number NHREC/OYOSHRIEC/10/11/22.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, manuscript.

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