

Full Length Research Paper

Impregnation of mosquito net with Neem seed (*Azadirachta indica*) oil and its insecticidal action

Adewole Adekanmi* and Oderinde Abdulazeez

Department of Science Laboratory Technology. Federal Polytechnic Ilaro, Nigera.

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Malaria is a persistent health problem in Africa which requires multidimensional approaches to solve. Insecticide treated net has proved highly invaluable as one of the tools. Neem oil was extracted by solvent extraction in the present study and the oil was used to impregnate bednet. The result showed that the neem oil is a good mosquito repellent, in which its potential could be harnessed for further study.

Key words: Malaria, Neem seeds, bednet.

INTRODUCTION

Malaria is a growing health problem in Africa. Each year, 300 to 500 million people worldwide suffer from the disease, with 9 out of 10 cases occurring in sub-Saharan Africa (WHO, 1998). Malaria is a big problem in tropical region of the world and that is where neem grows best. The disease kills at least 1 million people each year and the vast majority of deaths occur among children less than five years of age. Malaria places a staggering economic burden on already strained national economies and on struggling families. The disease cost sub-Saharan African nations more than 2 billion USD in 1997 (WHO, 1998) and has slowed economic growth in Africa by up to 1.3% each year (Gallup and Sachs, 2001). In addition, malaria reduces human work capacity and productivity, and affects social development indicators such as child health and school attendance (Global Forum for Health Research, 2000). Insecticide-treated nets (ITNs) have been associated with substantial reductions in malaria transmission (Lindsay et al., 1989). Accordingly, community-randomized controlled trials conducted across a range of malaria transmission settings in sub-Saharan Africa have shown ITNs and insecticide-treated curtains to be associated with up to 30% reduction in all-cause child mortality over the first 1 to 2 years of trials (D'Alessandro et al., 1995). Recently, there has been a

major concern for the promotion of botanical as environmental friendly pesticides although there could still be a need to depend on chemical insecticides in case of epidemics outbreak (Abdelouaheb et al., 2009). *Azadirachta indica*, commonly known as neem has been used as botanical insecticides and are relatively safe towards non-target organism, less likely to induce resistance due to their multiple modes of action on insects (Umar et al., 2007). Apart from the extract, dried neem leaves and bark are commonly used in villages for protection against infestation of stored grain and other products by insects. It is widely used around the world today, either singly in integrated pest management or in conjunction with synthetic pesticide.

Although, many authors had investigated larvicidal action of the extract but little or no attention has been given to its potentiality as impregnating agent for bed net, therefore the study investigated the efficacy of neem extract as treating agent for bednet to control adult form of mosquito.

METHODOLOGY

Neem seeds

Ripe Neem fruits were collected from various neem trees that are within the premises of the Federal Polytechnic, Ilaro and some that are planted along a major street of Ilaro Township to provide shade. The fruits were dried in the sunlight for some days in order to make the removal of seeds in the endocarp easier; the seeds were later

*Corresponding author. E-mail: adewolejak@yahoo.com. Tel: +23408034232523.

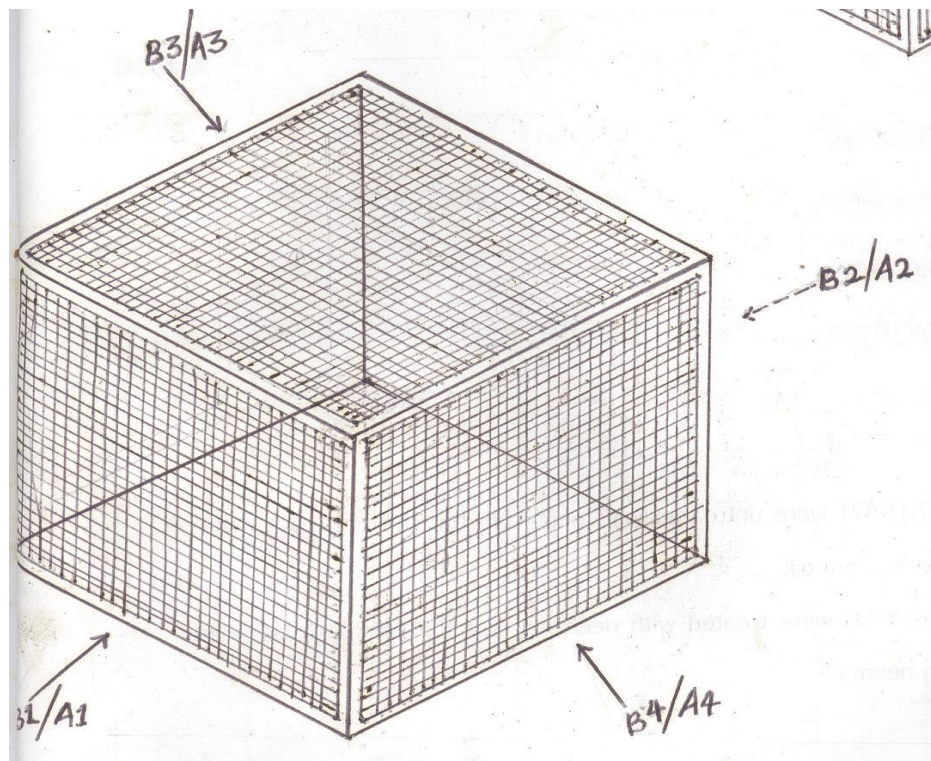


Figure 1. Box A.

dried under the sunlight again. Neem seeds oil containing majorly azadirachtin were obtained by solvent extraction (AOAC, 1990).

Mosquito larva

Mosquito larva of same species (*Anopheles*), which are identified by the positioning of the larva when at rest were collected from the garbage within the school premises and placed in two separate beakers of 500 cm³. Fifteen larvae were put in each of the beakers in the boxes and daily observations were made to see the hanging pattern of the emerged adults in the boxes.

Mosquito net

Untreated polyester net of size 100 by 180 cm were bought from retail outlet in the town, the net were then cut into two equal sizes 50 by 90 cm to serve as control and experimental pieces. The experimental piece was further divided into two equal part 25 by 45 cm each. Each of the experimental pieces was then soaked in the concentration of 5 and 10% (v/v) of azadirachtin respectively for 6 h. Two square boxes measuring (20 by 20 × 20) cm dimension each was constructed with dried wood and the nets were placed in the following order as shown in Figures 1 and 2.

RESULTS

Table 1 shows the mosquitoes distribution on both sides of the net, the treated and untreated sides. The total numbers of the mosquitoes on the sides that were treated

(A1 and A2) is two (2) while on the sides that were not treated (A3 and A4) is fourteen (14). Table 2 shows the mosquitoes distribution on both sides of the net: the treated and untreated sides. The total numbers of the mosquitoes on the sides that were treated (B1 and B2) is three (3) while on the sides that were not treated (B3 and B4) is twenty-four (24). At both concentrations in Tables 1 and 2, the results showed the preference of mosquito to hang on the side of the net that was not treated confirming the repellent action of the extract. The repellent action of the extract also increases with the concentration of the oil used.

Figures 3 and 4 shows graphical distributions of mosquitoes hanging on the four sides (A1, A2, A3, A4 and B1, B2, B3, B4) of the two boxes (Figures 1 and 2) at different concentrations of 5% (v/v) and 10% (v/v) of the neem extracts.

DISCUSSION

Neem extract holds a very good promise for the control of mosquito both at larva stage and adult stage of the insect life cycle, its potentiality have been widely researched by many authors whether as lotion cream on the body or combination with coconut oil or on the larva form alone (MRC India, 1994, 1995, 1196; Alouani et al., 2009; Umar et al., 2007); in all these cases, the average efficacy are

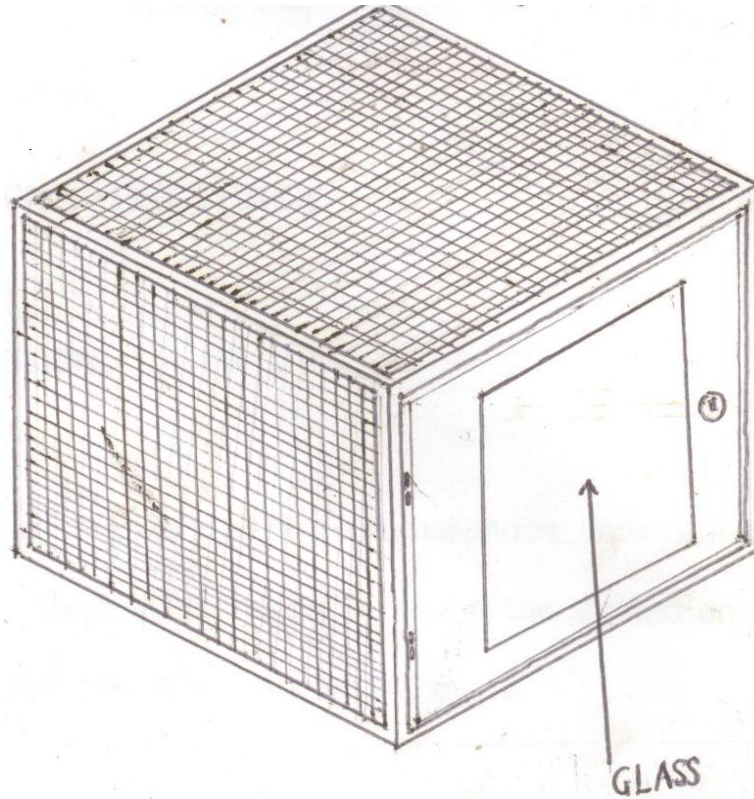


Figure 2. Box B.

Table 1. 5% (v/v) Neem oil.

Days	Cumulative number of larva hatched to adult	Number of dead adult mosquito	Numbers of mosquito on treated sides		Numbers of mosquito on untreated side	
			A1	A2	A3	A4
3	3	Nil	Nil	Nil	2	1
4	3 + 3 = 6	Nil	1	Nil	2	1
5	1 + 6 = 7	3	Nil	Nil	2	2
6	2 + 7 = 9	4	Nil	1	2	2

Table 2. 10% (v/v) Neem oil.

Days	Cumulative number of larva hatched to adults	Number of dead adult mosquito	Numbers of mosquito on treated sides		Numbers of mosquito on untreated side	
			B1	B2	B3	B4
3	5	Nil	Nil	Nil	1	4
4	5 + 2 = 7	Nil	Nil	Nil	2	5
5	1 + 7 = 8	2	2	Nil	2	2
6	4 + 8 = 12	4	1	Nil	4	4

more than fifty 50%. The present study investigated the potentiality of the extract to control mosquito through the

behavior of the insect on two different concentrations and control, the result show that the extract can as well

Distribution of mosquitoes on treated and untreated sides of the net at 5% v/v conc.

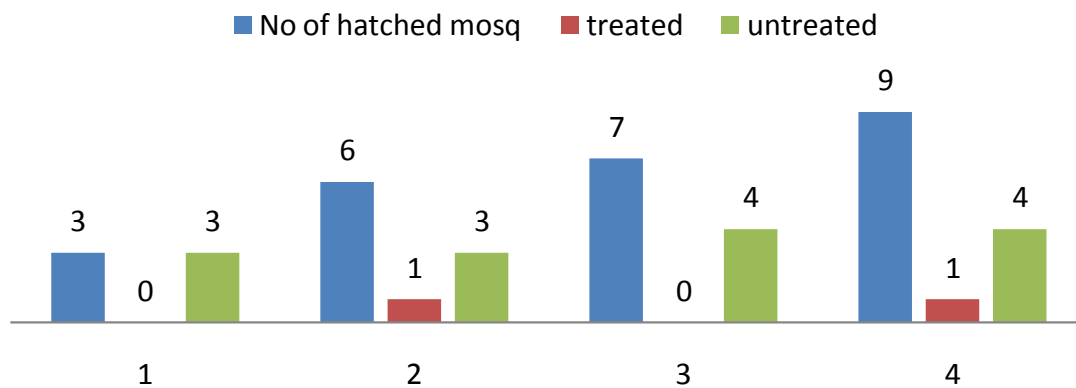


Figure 3. Graphical expression of the mosquitos' distribution at 5% v/v concentration of the *azadirachtin*.

Distribution of mosquitoes on treated and untreated sides of the net at 10%v/v conc.

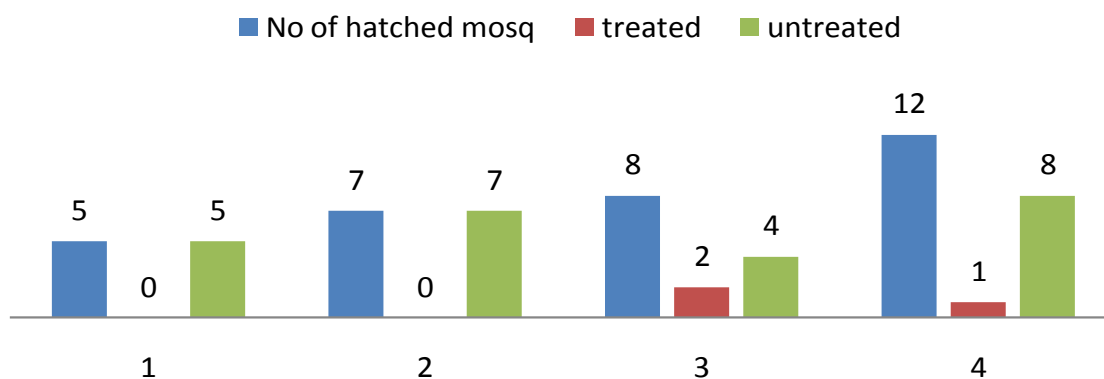


Figure 4. Graphical expression of the mosquitos' distribution at 10% v/v concentration of the *azadirachtin*.

control the adult like the larva although while it cause the larvicidal action in the larva, it can only repel the adult (Alouani et al., 2009). Oil of *A. indica* is a highly effective repellent of mosquito; the present study shows that it is dosage dependent; this result correspond to other medicinal extract trials in Tanzania by Eliningaya et al. (2008) where some knockdown effect of some of those medicinal plant were also carried out and prove to be

highly significant. The report of the study corresponds to that obtained by Sharma et al. (1993) when Neem oil soaked with mat at 5 and 10% concentration was tested as mosquito repellent and 84% efficacy was obtained for whole land landing collection.

Also, Umar et al. (2007) reported that the potentiality of the extract; *azadirachtin* is concentration specific. This is similar to the result obtained in this study.

Conclusion

A. indicia is abundant in Africa, and is a cheap raw material that should be harnessed; it is botanical therefore environmental friendly. It is recommended that more research into the potentiality of other extract of this medicinal plants and others in Africa should be explored specially as impregnating unit for bednet.

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