

## **The Role of Impregnated Curtains in Adult Mosquito Control in Wad Medani Town**

**Faisal El Tayeb Hassan<sup>1</sup> and Isam Eldin Mohammed Taha<sup>2</sup>**

1. Ass. Professor Faculty of Health and Environmental Sciences, University of Gezira

2. Ass. Professor Faculty of Health and Environmental Sciences, University of Gezira

### **Abstract**

The purpose of this small study trail is to identify the role of impregnated curtains in controlling adult mosquitoes. The success of this study will solve all problems facing the insecticide house residual spraying mainly mosquito resistant to insecticides, high cost of insecticides and spraying operations and spraying refusals. The study was made in north-east of Wad Medani town in three houses facing permanent mosquito breeding ponds. Three rooms in three adjacent houses 50 meters from the breeding ponds were selected for the study. One room was treated with residual insecticide, the second room with impregnated curtains and the third room was left without intervention as control. The study period covered all the rainy season (15/7 – 15/10/2009) and the results showed that high larvae count in the ponds, zero adult mosquito in room 1 and room 2 and high density of adult mosquitoes in room 3. The study recommended further study if this trial is recommended to be implemented in a large scale.

### **ملخص الدراسة**

أجريت هذه التجربة الصغيرة لمعرفة مدى إمكانية الستائر المعالجة بالمبيدات من مكافحة البعوض البالغ. إن نجاح هذه التجربة ربما جعل هذا البرنامج بديلاً عن رش المنازل بالمبيدات ذات الأثر المتبقي وتفادي المشاكل الناجمة والتي تتمثل في مقاومة البعوض للمبيدات مع ارتفاع أسعارها وأيضاً ارتفاع تكلفة تسيير حملات الرش بالمبيدات ثم رفض المواطنين المتزايد لرش منازلهم بالأخص في المدن والقرى الكبيرة التي يقلل من فعالية عمليات الرش. تمت هذه التجربة في الطرف الشمالي الشرقي من مدينة ود مدني لعدد ثلاثة غرف في ثلاثة منازل متجاورة قبالة أراضي منخفضة تقع بين المنازل السكنية والنيل الأزرق. هذه الأراضي المنخفضة عرضي لمياه الأمطار ومياه النيل الأزرق أثناء موسم الفيضان وهي دائماً مصدراً لتوالد البعوض وإقلاق راحة مواطني المنازل حول هذه البرك. تم اختيار ثلاث غرف في ثلاثة منازل متجاورة وتبعد عن هذه البرك حوالي 50 متراً. تم معالجة الغرفة الأولى في المنزل الأول بمبيد ذو أثر متبقي ثم الغرفة الثانية في المنزل الثاني بالستائر المشبعة بالمبيد أما الغرفة الثالثة تركت دون تدخل للمقارنة. أظهرت النتائج وجود توالد مستديم بالبرك قرب المنازل في الفترة من 15/7 – 15/10/2009 أما في غرف الدراسة فلم تظهر الغرفة 1 و 2 أي كثافة للبعوض الطائر بينما أظهرت الغرفة

**EDITORIAL**

الثالثة كثافة عالية. هذه النتائج تدل علي أن الستائر المعالجة يمكنها أداء مهمة رش المنازل بالمبيدات مع تفادي كل المشاكل المصاحبة لرش المنازل. توصي هذه الدراسة بضرورة التوسع في هذه التجربة في محاولة اكبر حجماً حتى تظهر بعض الحقائق اللازمة لإنجاح هذا العمل.

**Introduction:**

Malaria is a major public health problems in Sudan. It leads to an estimated 7.5 to 10 million cases every years.<sup>[1]</sup> Many efforts were carried out to control this disease. <sup>[1,5]</sup> Mosquito control programs in Sudan since the early 50<sup>th</sup> of the last century, depended on the following a) elimination of mosquito breeding sites. b) mosquito larvae control c) adult mosquito control by using residual insecticide. Still this method of mosquito control is adopted because it proved to be effective if properly done(un published data). The part of adult mosquito control by residual insecticide is now facing serious problems which render the control program not effective. These problems are a) technical - mosquito acquiring resistant against insecticides b) high cost of insecticide and application cost c) administrative – people in towns and big villages are refusing their houses to be sprayed. These problems are rendering the whole malaria control program not properly functioning, so it is high time to look for radical solutions(un published data). Using mosquito netting curtains or permanent screening for doors and windows is one of the recommended ways to protect yourself and your family from mosquito biting or other insect biting, especially if you are living in the insect-borne diseases environment. Field trials were carried out in villages near Ouagadougou, Burkina Faso. Houses were provided with curtains made from 100% cotton netting, impregnated with permethrin at the dose of 1g a.i./m<sup>2</sup>, to cover the doorway, the window(s) and the space under the eaves. Entomological data collected during the period 1985-86 showed residual permethrin activity for about a year, also a reduction in the prevalence of splenomegally and parasitaemia in the study villages as compared to control.<sup>[2,3]</sup> Similar studies conducted in in Uriri, Kenya in 1988. The results revealed that, the curtain group had fewer infections per person week at risk than the bed-net group.<sup>[4,7]</sup> The introduction of parathyroid curtains in Venezuela areas gave 100% mortality rate of vectors encountered in bed rooms of houses with impregnated curtains.<sup>[8]</sup> More trials examined morbidity, and showed an impact of ITNs nets and curtains on illness, and on both *P. falciparum* and *P. vivax* infections group. <sup>[9]</sup> In Sudan, the role of mosquito impregnated bed net was assessed, the results indicated that, reduction in mosquito populations and malaria morbidity was obtained in South Gezira villages.<sup>[6]</sup> The success of impregnated mosquito bed nets in controlling malaria in Africa especially Sudan gave a bright sign to impregnate curtains with insecticides to do the same job of residual spraying and avoid all problems mentioned above. This small trial of impregnating curtains we hope will lead to a bigger project trial on the same way of avoiding the use of residual insecticide.

**EDITORIAL**

**Objectives of the study:**

**Main objective:** To evaluate the role of impregnated curtains in the control of adult mosquitoes.

**Specific objectives:**

1. To assess the role of the residual spraying in controlling adult mosquitoes.
2. To assess the role of impregnated curtains in controlling adult mosquitoes.
3. To know the load of adult mosquitoes in a room without intervention.
4. To evaluate mosquito breeding in the study ponds in the absence of larviciding program.

**Study methodology:**

**Study area:-**

The study area lies at south – east of Wad Medani town. It is near the Blue Nile facing a big piece of land depression holding rain water and river water when there is high river flood. The houses facing this land depression are the resting places for the mosquito breeding in these ponds and the people living are suffering very much from mosquito biting and malaria disease. Some years Wad Medani town is not sprayed with residual insecticide because of insecticide shortage and larvae control program will be the program of choice; and the coverage for larvae breeding is not ideal method in such breeding sites. Total numbers of houses around the ponds are 86 with about 260 inhabitants. 3 rooms in three adjacent houses facing the ponds were selected for the study.

**Study methods:**

Three rooms in three adjacent houses 50 meters from the ponds were selected.

- Room 1 to be treated with residual insecticide – K. othrine 2.5% at a dose of 30 mg a.i/ m<sup>2</sup>.
- Room 2 to cover the four inner walls with impregnated curtains made of toul treated with Delta methrine 2.5% at a dose of 30 mg a.i/ m<sup>2</sup>.
- Room 3 to be left without any treatment as control.

**Study procedure:**

1/ A pre – test for:-

- a/ Density of mosquito larvae in the ponds.
  - b/ Adult mosquito density in the rooms.
- This data to be collected before intervention.

2/ A routine survey for:-

- a/ Fortnightly adult collection for the three rooms.
- b/ Fortnightly larvae collection from the ponds.

The duration of this program is three month (the rainy season 15/9 to 15/ 10/ 2009).

**EDITORIAL**

Data collected to be subjected to comparison to find out the positive results gained from the impregnated curtains in the control of adult mosquitoes.

**Results and discussion**

**Table ( 1 ) Pre survey and routine survey of mosquito larvae density during 15/9 to 15/ 10/ 2009**

Date	Breeding sites inspected	No. of dips	Total larvae collected	Larvae density per dip
15/7/2009	All breeding ponds	60	12	0.2
30/7/2009	"" "" ""	60	84	1.23
15/8/2009	"" "" ""	60	351	5.85
30/8/2009	"" "" ""	60	467	7.8
15/9/2009	"" "" ""	60	783	13.0
30/9/2009	"" "" ""	60	562	9.36
15/10/2009	"" "" ""	60	261	4.38

The table above shows that mosquito breeding in the ponds took place earlier than 15/7/2009 and continued to increase till it reached the peak during September. House residual spraying was not done in wad Medani town during this time and larval control program was very week. The level of mosquito breeding in the ponds during the period of the study is very adequate to maintain malaria transmission.

**Table ( 2 ) Pre survey and routine survey of adult mosquito density during 15/9 to 15/ 10/ 2009**

Date	Type of survey	Room 1	Room 2	Room 3
		Residual spraying	Impregnated curtains	Control
14/7/2009	Pre survey	1.0	2.0	2.0
15/7/2009	Routine survey	2.0	0.0	1.0
30/7/2009	"" ""	1.0	3.0	7.0
15/8/2009	"" ""	0.0	0.0	9.0
30/8/2009	"" ""	0.0	3.0	6.0
15/9/2009	"" ""	0.0	0.0	21
30/9/2009	"" ""	0.0	0.0	17
15/10/2009	"" ""	0.0	0.0	9.0

The pre survey showed very low mosquito density and all of it non malaria mosquitoes. Since early August mosquito breeding became significant and continued to increase till it reached over 20 mosquitoes per room

## **EDITORIAL**

in mid September. The most common practice is indoor residual house spraying. It is clear from the above table that room 1 which was sprayed with residual insecticide could efficiently eliminate the adult mosquitoes. And also the same happened in room 2 with impregnated curtains, except for 3 mosquitoes found in the roof in mid August survey. The mosquitoes were unfed which means that they could not find the chance for taking blood meal because of the repellency effect of the curtains; and even if they could take the blood meal they will not fly as high as the ceiling and they will be subjected to the insecticide in the curtains. Similarly impregnated curtains showed residual permethrin activity for about year 2. Studies also suggested that, permethrin impregnated curtains reduce the splenomegally and parasitaemia in the studied group. Room 3 in table 2 is a good resting place for mosquitoes and density of resting mosquitoes became as high as 20/room in September in the absence of any mosquito control method. This means that malaria transmission has the full chance.

## **Conclusion:**

The house residual spraying in the malaria control programs is now facing a big problem:

1. Mosquitoes ready to gain resistant against any insecticide after several applications, which means that the malaria program has to change the insecticide at the first sign of resistant.
2. Insecticides prices are becoming very high and some local governments can not buy it.
3. Running cost of spraying operations is becoming very high and also in affordable.
4. People in towns and big villages are refusing their houses to be sprayed.

So it is high time to review the strategy of malaria vector control which depends mainly on residual insecticide as the main line of control. So this small study gave clear sign that insecticide treated curtains can do the same job of the residual spraying and also can avoid all problems associated.

## **Recommendations:**

If the result of this small scale study is approved to be implemented, small pilot project in a limited area should be done to clear the following:

- a/ Acceptability of the people to the project.
- b/ The role of the community to make the program successful.
- c/ Types and designs of curtains accepted by the people.
- d/ Any difficulties which may appear.
- e/ If possible the effect of the treated curtains on the level of malaria parasite in the project area.

## **References:**

**EDITORIAL**

1. Malik, E.M. and Khalafalla, O.M. (2004). Malaria in Sudan: past, present and the future. *Gezira Journal of health Sciences*, 1(suppl): 47-51.
2. Majori G., Sabatinelli. G. Colluzi, M (1987). Efficacy of permethrin-impregnated curtains for malaria vector control. Article first published online: 7 MAR 2008.
3. Pietra, Y ; Procacci G, Sabatinelli G;Kumlien S; Lamizana L, G RotiglianoG (1991) Impact of utilization of permethrin impregnated curtains on malaria in a rural zone of high transmission in Burkina Faso Bulletin. *de la Societe de pathologie exotique*. Vol: 84, Issue: 4, Pages: 375-385.
4. J D Sexton, T K Ruebush, A D Brandling-Bennett, J G Breman, J M Roberts, J S Odera, J B Were  
Medicine › Miscellaneous Papers Permethrin-impregnated curtains and bed-nets prevent malaria in western Kenya. *The American Journal of Tropical Medicine and Hygiene* (1990) Volume: 43, Issue: 1, Pages: 11-18.
5. El Gaddal, A.A. (1985). The Blue Nile Health Project: a comprehensive approach to the prevention and control of water- associated diseases in irrigated scheme of Sudan. *Journal of tropical medicine and hygiene*, **88**: 47-56.
6. Taha Isam Mohammed (2000) The role of insecticide treated bed nets in protection from mosquito bites and mosquito borne disease in Gezira Scheme.MSc thesis, University of Gezira, Sudan (unpublished data).
7. Mutinga, A. kiokoti, R and Ngindu, A. M. (1993). Malaria prevalence and morbidity in relation to the use of permethrin treated wall cloth in Kenya. *Medical Jor.*, 75, 756 762.
8. Herber Oliver and Kroeger A(2003). Pyrethroid impregnated curtains for chagas, disease control in Venezuela. *Acta. Tropca* **88**:33-38.
9. Wiley John & Sons, Ltd (2006).Insecticide-treated bed nets and curtains for preventing malaria (Review) Copyright © 2006 The Cochrane Collaboration. Published .