THE EFFECTIVENESS OF THE EXTRACT OF 'HYPTIS SAUVEOLENS' LEAVE (A SPECIE OF EFFINRIN) IN REPELLING MOSQUITO

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Abstract:

Are there valid, healthier options when it comes to repelling our fine buzzing and biting friends? Some ideas for natural insect repellents fall into the category of folklore, myth and urban legends, but other natural remedies can be an effective means of protecting yourself and your loved ones from biting bugs and harsh chemicals.

The use of active ingredient in plants as successful pest control in recent years can never be over emphasized . Apart from the hazards caused by the established pesticides and insecticides to man and live stock, they are very expensive to purchase, therefore they are no more within the reach of many Nigerians. Moreover, chemical control technology is subjected to the predicament of unstable foreign exchange. In the light of these shortcomings it becomes inevitable to research into local sources of insecticides that would be cheap and readily available to individuals.

This paper focuses on the extraction of the active ingredient in Hyptis sauveolens and incorporating it into a locally produced cream using different quantities. According to the results, the three samples with the active ingredient in different ratios were discovered to be active and effective. The sample with the highest concentration of the active ingredient was found to be most effective in repelling mosquito (0.5ml).

Keywords: Hyptis Sauveolens, Essential oil, soxlet Extraction, Efficacy, Repellants.

1. Introduction:

Biologically active compounds derived from selected plants species such as *Ocimum gratissiumum, hyptis sauveolen, Acarcia Arabica, Azadirachta indica* and *Eleusive indica* have been commonly used in the past to control insects in many tropical counties (Abebayo et al., 1996).

Hyptis is a genus of flowering plant in the Lamiaceae family. These plants, known commonly as bushmints, are widespread in the tropics and warmer temperate regions of the Americas. There are 300 to 400 species, which may be annual or perennial, and small herb to large shrub (Adesokan et al.,2001).

The mosquitoes are a family of small, midge-like flies: the Culicidae. Although a few species are harmless or even useful to humanity, most are a nuisance because they consume blood from living vertebrates, including humans. In feeding on blood, various species of mosquitoes transmit some of the most harmful human and livestock diseases. Some authorities argue accordingly that mosquitoes are the most dangerous animals on Earth.

Mosquitoes don't just whine in your ear and drive you mad with itching, but they also spread disease to more than 700millon people every year. However, mosquito transmit diseases to many people annually and cause death of 1 of every 17 people currently alive. Mosquito infect protozoan which cause malaria and cause more than 30,000 death annually, (Annals, 1 January, 1998).

It has long been observed that plants' flowers, roots, leaves and seeds contain some active ingredients which are known as Essential oil. Some are odoriferous, some are volatile and Ethereal (being extractable with ether an organic solvent). Parts of the naturally occurring organic substance present in the plant are the essential oils which are the secondary substances in plants and have been found to be of great importance to the human life. Odour of the active ingredients in plants may serve as attractant of insects in some species, thereby promoting pollination. While in others, they may serve as repellant to insects thereby reducing the possibility of being attacked by the pest (NIIRBT,1998).More people died each year from mosquito-borne disease than from any other single cause diseases e.g. Malaria, Filariasis (Caused by Brugia malayi, spread by anopheles mosquito), Encephalitis (a viral

diseases transmitted by adult female mosquito of the spp Aedanine and culcine) and Yellow fever (Gillet et al,. 1973).

Mosquitoes are insects that have been around for more than 30 million years. Mosquitoes have a battery of sensors designed to track their prey, including:

*__Chemical sensors__ - mosquitoes can sense carbon dioxide and lactic acid up to 100 feet (36 meters) away. Mammals and birds gives off these gases as part of their normal breathing. Certain chemicals in sweat also seem to attract mosquitoes (people who don't sweat much don't get nearly as many mosquito bites).

__Visual sensors__ - if you are wearing clothing that contrasts with the background, and especially if you move while wearing that clothing, mosquitoes can see you and zero in on you.

__Heat sensors__ - Mosquitoes can detect heat, so they can find warm-blooded mammals and birds very easily once they get close enough.

Something with this many sensors sounds more like a military aircraft than an insect. That's why mosquitoes are so good at finding and biting you.

Not everyone can tolerate the types of toxic chemicals that are used to ward off mosquitoes. So what is a person to do to ward off these obnoxious, infectious winged creatures?

World health organization 1980, reported that 47 species of Anopheles mosquito have developed resistance to the organolalorin based insecticide ‘Dieldrin’. 34 species to organo-phosphates and 2 species to synthetic pyrethroid. Besides resistant to synthetic pesticides, they are found to posses residual effect which in most cases are toxic to man and livestock. It is this realization that influences many researchers to make considerable efforts to develop less toxic insecticides of plant origin.

2. Materials and Methods

2.1 Materials and Apparatus used

Fresh leaves of *Hyptis Sauveolens*, Round bottom flask, Beakers, Stirrer, Weighing balance, burner, Measuring cylinder, Sand-bath, Thermometer, Mineral oil, Bee wax, Petroleum jelly, Lanolin, Borax(cool), Paraffin, Distilled water, Perfume and active ingredient.

2.2 Sources of Materials

Fresh leaves of *Hyptis Sauveolens* were collected early in the morning and carried down to the Pharmacognosy Laboratory Obafemi Awolowo University Ile Ife. This plant was Identified by a Botanist – Dr Ogunniyi and an Agronomist Mr. Adebayo both are Lecturer in LAUTECH, Ogbomosho.Other chemicals were gotten from a chemical shop in Ogbomosho.

2.3 Hydro-Distillation Column

Here plant material is in direct contact with the boiling water as heat is applied to the still by convectional means such as an enclosure steams coils, steam jackets or direct firing.

However, the plant material is crushed to the small pieces before is charged into the still to reduce the chick-ness of the plant material and expose the plant oil glands, thereby

increase the speed of vaporization of the essential oil. The boiling water dissolves the essentials oil in the plant material and isolation is carried through the cell membrane of the plant by osmosis which will then vaporized together with the steam and the content is collected through the tube passed to the condenser where it is condensed and later collected in the separating funnel and the water is runoff from the bottom of the separator continuously.

2.4 Collections and preparation of sample

The active ingredient from *Hyptis* for this study was extracted by Hydro distillation method in the student Laboratory in the Department of Pharmacology, Faculty of Pharmacy OAU Ile - Ife.

150g of leave sample was measured into a round bottom flask containing 600ml of water and placed on an Electro thermal heating mantle. The flask was then coupled to the extractor and the condenser attached at the rear end, fractionating column and receiving glass tube were also attached.Cooling water was supplied continuously from the pipe to the condenser for cooling. Heat was applied to the round bottom flask part for 2 hours. The procedure was repeated three times and 450g of leave was used. The apparatus was allowed to cool down after each extraction process before proceeding to the next extraction process. Each lasted for 2 hours. The volume of oil from each extraction was small. Mixture of water distilled and essential oil, which floated over the water was collected in the receiving glass tube. The oil was run-out carefully into a bottle with an air tight cover.

The Active ingredient obtained was stored in a bottle at room temperature.

The oil density was found to be 0.89g/m using Density meter (mettler Toledo).

2.5 Measuring principle:

A hollow glass tube vibrates at a certain frequency. This frequency changes when the tube is filled with the sample: the higher the mass of the sample, the lower the frequency. This frequency is measured and converted into density. Benchtop instruments are equipped with a built-in Peltier thermostat to control the temperature (no water bath required).

3. Production of Cream

There are two phases in the production of cream;

[1] Oil phase

[2] Water phase

To produce 60g of Emollient Cream:

In the Oil Phase, Mineral oil (15g), Bee wax (5g), Petroleum jelly (8g), Lanolin (8g) and Borax were added together in a beaker which was put into a preheated sand bath, these was heated for about 5minutes with continuous stirring to ensure proper mixing.

The water phase contains: Borax (cool) (0.4g) and Distilled water (26.6g) were put in a beaker and heated for about 5minutes with continuous stirring to ensure proper mixing.

The water phase was slowly added to the oil phase and stir continuously to ensure proper mixing and then heated to 65^0C. When complete cooling occurred, the cream was divided into three and the active ingredient was incorporated at different concentrations after the perfume have been added; 0.50, 0.30 and 0.25ml respectively.

The formulation of the cream is shown below:

TABLE 1

MATERIALS	AMOUNT (g)
OIL PHASE	
Lanolin	8
Mineral Oil	15
Petroleum Jelly	8
Bee wax	5
WATER PHASE	
Distilled water	26.6
Borax (cool)	0.4

TABLE 2.

3.2 Cream with different concentration of active ingredient

OIL PHASE	SAMLPE 1	SAMPLE 2	SAMPLE3
	AMOUNT (g)	AMOUNT (g)	AMOUNT (g)
Mineral oil	15	15	15
Lanolin	8	8	8
Petroleum Jelly	8	8	8
Beewax	5	5	5
WATER PHASE			
Borax (cool)	0.4	0.4	0.4
Distilled water	26.6	26.6	26.6
Active Ingredient	0.25	0.30	0.50

TABLE 3

OIL YIELD

Extraction process	mass of sample(g)	Oil yield (ml)
Process A	150	0.81
Process B	150	0.90
Process C	150	0.91

Total mass of sample (g) = 450

Total Oil yield (ml) = 2.62

Yield = 2.62 / 450

$= 5.82222 * 10^{-03}$

= 0.006ml/g

$= 6.0 \mu kg^{-1}$ of air sample.

4. Analysis of the Active Ingredient in *Hyptis Sauveolen*

The Laboratory analysis of the Active Ingredient was done in the pharmagonocy department, faculty of Pharmacy in Ile-Ife. The Extract of the leaves was found to contain fatty acid, Terpernoid (60%) which is the main active ingredient, Citral-a(geranial) (40%),

α-oxobisabolene (12%), Thymol and carvaerol (usually found as major phenol present as a strong fungicidal and irritant properties) and stigmasterol.

5. Efficacy Test

Three experiments were carried out for the Efficacy of the active ingredient (Essential oil) in

Hyptis sauveolens.

5.1 Experiment I

The experiments were carried out with the three different concentration of the Active ingredient at the Lecture Hall at Ladoke Akintola University of Technology, Ogbomosho, with three students.

Sample 1{Cream with 0.25ml active ingredient} was first used by a student at night in the Lecture hall in LAUTECH, Ogbomosho. Mosquitoes were observed to be repelled until about 3 hours later which they began to move nearer to the legs where the cream was applied.

Sample 2 {Cream with 0.30ml active ingredient},mosquitoes were repelled and were not seen until close

to 6 hours later.

Sample 3 {Cream with 0.50ml active ingredient},mosquitoes were repelled and were not seen.

5.2 Experiment II

This is a control experiment. Ordinary cream was used at the same time the incorporated samples were used and mosquito bites was noticed.

The experiment was carried out at night to ensure the availability of mosquitoes.

6. Results and Discussion

TABLE 4

Cream	Active Ingredient (ml)	Activities (Repellency)
20g	0.25ml	Repel Mosquito between 2-3 hours
20g	0.30ml	Repel Mosquito between 5-6 hours
20g	0.50ml	Repel mosquitoes between 9-10 hours
20g	Control	Mosquito bites

The results obtained from this study confirms the facts that had been established by previous works in terms of efficacy of the active ingredient in Hyptis Sauveolens.

From the result of the Experiment, it was clearly confirmed that the Essential oil in Hyptis Sauveolens extract repels mosquitoes at different concentrations. 0.25 was the least repellant, while 0.30 followed and 0.50 was found to be most effective.

It is clear from the result that the active ingredient in the Hyptis Sauveolens showed a significant measure of repellency as well as toxicity to the mosquitoes.

The study demonstrated that 0.25ml is not so much effective in controlling mosquitoes as 0.5ml .

Since Experiment I contains *Hyptis Sauveolens* active ingredient and II does not , the repellency in I was found to be traceable to the action of the oil. However no mosquito was found dead.

7. Conclusion

In this study, it was shown that the *Hyptis Sauveolens* active ingredient has insecticidal Properties. Furthermore the mosquito repellant cream produced possesses repellency characteristics against mosquito. Thus the necessity to produce non-toxic , safe and biodegradable attractive and synthetic insecticide has made the *Hyptis Sauveolens* to be apparent. Natural insect repellents tend to provide coverage for a shorter time, but their coverage is safer so you may find it worth the extra effort applying a bit more often. Because

of their shorter protection time, natural repellents are ideal for short evening outdoor activities like walking the dog, barbecuing, or watering the garden.

This study reaffirms the possibility of using indigenous Nigerian plants with insecticidal property for the control of Mosquitoes.

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