The Efficacy of Repellant activity of synthetic creams and Essential oils against the mosquito

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Abstract:

Mosquito repellant have an important role in protection of individual against vector borne diseases such as Malaria, Denguefever, Filariasis , Yellow fever etc., Several synthetic products are available in the market as repellant against mosquitoes most of them are having side effects and causing illness to human, so find an alternative is to use natural products that possess good efficacy and are environmentally friendly . Among those chemicals, essential oils from plants belonging to several species have been extensively tested to assess their repellent properties as a valuable natural resource.The Intervals between time of repellant application and the landing of the first mosquito biting is considered as the protection time. The result were obtained from investigation of herbal cream an goodknight was found to be more effective than odomos cream. However neem oil was exhibited high protection time than castor and coconut oils. In the present investigation , we have identified that essential oils were better than the synthetic cream to control the mosquitoes . Plants can provide safer alternatives than synthetic chemicals , as a result it is the hour to launch extensive search to explore ecofriendly biological materials for control of insect pests.

Keywords: Mosquito repellant activity, plant extract, essential oil, Synthetic creams, repellancy

INTRODUCTION;

Repellants in humans are unattractive to a mosquito so that it will avoid areas of the body that have been treated with the produce. Repellant do not kill mosquitoes. The repellant will be provides protection from biting for a long period of time just one application. The university of Florida mosquito researches test and evaluate the effectiveness of mosquito repellant based on the amount of time the product will continue for the repel mosquitoes after on application to the skin, this is known as complete protection time . Repellants that are available are either synthetic chemicals such as citronella, various formulation of these repellants are available that differ in the amount of active ingredient , which is the substances that actually repels the mosquito. Plant essential oils are potential natural repellants that are expected to replace synthetic compounds. It contains 26monoterpenes such as apinene, cineole, limonene, eugenol, terpinolene, citronellal, camphor and thymol have mosquito repellant activity.

The present work was designed to screen the repellant property of the synthetic creams like odomos, good knight, herbal cream and the essential oils like coconut oil, castoroil and neem oil against the mosquitoes.

MATERIALS AND METHOD;

SYSTEMATIC OF THE MOSQUITO:

The mosquito comes under the order : Diptera because of the possession of a air of wings and under the family , Culicidea, which includes the slender flies with elongate proboscis. Males have plumose antennae and female have pilex antennae. The larvae reach its pupal stage within 5 days of preparation. The female mosquito feed on human being and also vector. The outtake of blood meal is essential for the development of eggs. Population density increases during the winter months due to continued breeding and this has facilitated by the availability of adequate amount of water for breeding.

STUDY AREA AND REPELLENT FOR ASSESSMENT:
Sites in front of Sivanthi patti village Tirunelveli, Tamilnadu, India has been selected for the study. The important of synthetic materials such as Diethyltoluamide, N-N- diethyl benzamide , Herbal cream and Plant based oils like Neem, Coconut , Castor tested for their efficacy against the mosquito bites.

REPELLANT USED FOR SCREENING:

ODOMOS:
Odomos, a cream contains N-N – diehylbenzamide as an acticve ingredient and a cream base. It is manufactured by Dabur India Limited.

GOOD NIGHT :
N-N- Diehyl Benzamide 12.0 w/w Ethyl alcohol (Dentured) 36 w/w s manufactured by VARDHAMAB REMEDIES PVT LTD - Tarapur Industrial area, Bolser. Marketed by Godrej Sera Lee Ltd., Puolsngar, Easters Express Highway Vikhorli, Mumbai.

Herbal cream:
The herbal cream constituents are derived from Citronella leaf, neemseed, deodarwood and it is cream based marketed by Apollo pharmacy, a unit of Apollo hospitals Enterprise Ltd, Chennai.

Neem oil:
Neem oil is generally light to dark brown , bitter and has a rather strong odour that is said to combine the odours of peanut and garlic . It comprises mainly triglycerides and large amount of triterpenoid compounds. Azadirachtin is the most active component for repelling and killing pests and can be extracted from neem oil. Neem oil can also be obtained by solvent extraction of the neem , seed, fruit , oil, cakes, or kernel.

Castor oil:
A vegetable oil obtained by pressing the seeds of the castor oil plant (*Ricinus communis)*. Castor oil is a colourless to very pale yellow liquid with a distinct taste and odour . It is a triglyceride in which approximately 90 percent of fatty acid chains are ricinoleates. Oleate and linoleates are the other significant components. Castor oil and its derivatives are used in the manufacturing of soaps , lubricants, hydraulic and brake fluids , paints, dyes, coatings, inks, cold resistant plastics , waxes and polishes, nylon pharmaceuticals and perfumes.

Coconut oil:
It is a edible oil extracted from the kernel or mature coconuts harvested from the coconut palm . It has various applications. Because of its high saturated fat content, , it is slow to oxidize and thus resistant to lasting upto six months at 24 c without spoiling.coconut oil contains a large proportion of lauric acid, a saturated fat that rises total blood cholesterol levels by increasing both the amount of high density lipoprotein cholesterol.

PROTECTION TIME:

The method adopted by Pandian and Chandrasekaran (1980) was used to record the biting activity cycle mosquito.
The time intervals between the time of repellent application and landing of the first mosquito for biting is considered as the protection time, to find the efficiency of the Odomas, Goodnight, Vicco Turmeric, Aloevera were applied topically on the legs of the investigator and exposed to be bitten by mosquitoes. Among these find out Indoor and Outdoor protection time and compare any variation among them.
The repellency, exposed as percentage of protection at each concentration was calculated from four replicates using the following formula:

% of protection =

Number of bites received by control – Number of bites received by treatment area x 100
Number of bites received by control area

RESULTS:

Repellants vary among themselves in their chemical composition and formulations. Some of the repellants become in effective against mosquitoes by exhibiting shorter protection time . Various formulaltions of these repellants are available that differ in their amount of active ingredient, which is substances that actually repels the mosquito. Though the manufacturers claim that teir products only 6 hours of protection throughout the night many of the products do not repel the mosquito effectively. The present work was carried out essential oils like neemoil, castor oil, coconut oil and the synthetic creams like odomos, good knight, herbal cream were tested against mosquito and exhibited repellant activity, However there was a variation in the protection time offered by these repellants.

Mean protection time recorded for essential oil and synthetic creams(Table 1&2) it shows that there is a variation among them against this mosquito .Good knight and herbal cream offered high mean protection time than odomas similar for essential oils like neem oil , and castor oil exhibited higher mean protection time than coconut oil.

Among indoor mosquito protection time recorded (Table3&Fig-1),) that there is a variation among odomos goodknight, herbal cream .Good knight and odomos are more efficient in indoor and outdoor areas it showed moderate protection time than herbal cream . Herbal cream is less effective in outdoor compared to indoor . Neem oil and castor oil(Table-4&Fig-2) have same effect in indoor and outdoor , but coconut oil is less effective in indoor and outdoor. The results shows that all the test products exhibited moderate protection time .

. The protection time for synthetic creams were compared with control and experimental are good knight (75%,Odomos(74%), Herbal creams (75%) (Table-5) (Fig-3).

The protection time for essential oils were compared with control and experimental are Neem oil(87%), Castor oil(76.4%) Coconut oil(72.7%)(Table -6, Fig-4).

Table-1

Mean Protection exhibited by various repellants tested against mosquitoes

S. N	REPELLENT	PROTECTION TIME		MEAN	STANDARD DEVIATION	STANDARD ERROR
		EXPERIMENT I FEBRUARY	EXPERIMENT II MARCH			
1	ODOMOS	103	94	98.5	6.36	4.5
2	GOOD NIGHT	77	163	120	60.81	43.4
3	HERBAL CREAM	153	78	115.5	53.03	37.9

Table-2

Mean Protection exhibited by various essential oils tested against mosquitoes

S.N	Essential oil	PROTECTION TIME		MEAN	STANDARD DEVIATION	STANDARD ERROR
		EXPERIMENT I FEBRUARY	EXPERIMENT II MARCH			
1	COCONUT OIL	74	146	98.5	50.91	36.36
2	NEEM OIL	158	163	120	3.53	2.52
3	CASTOR OIL	153	78	115.5	53.03	37.87

Table-3

INDOOR AND OUTDOOR APPLICATION OF SYNTHETIC CREAMS DURING FEBRUARY AND MARCH -2017

Repellant	February			March		
	Inside	Outside	Total	Inside	Outside	Total
ODOMOS	36.2	42.2	78.4	42	37.5	79.5
GOODKNIGHT	41.5	41	82.5	40.7	31.2	71.9
HERBAL CREAM	37.8	24.5	62.3	45.2	45.8	89

Fig-1- INDOOR AND OUTDOOR APPLICATION OF SYNTHETIC CREAMS DURING FEBRUARY AND MARCH -2017

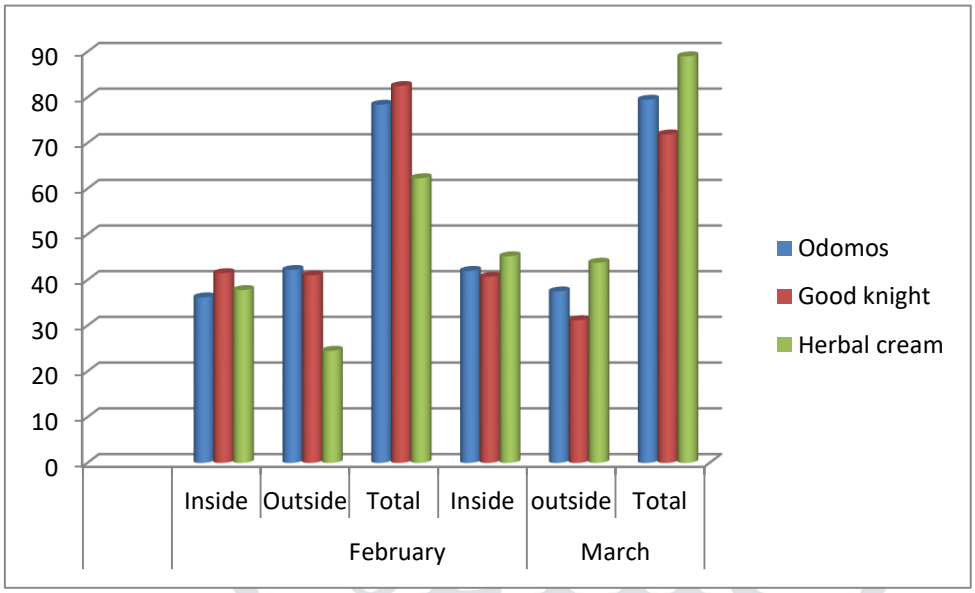


Table-4

INDOOR AND OUTDOOR APPLICATION OF ESSENTIAL OILS DURING FEBRUARY AND MARCH -2017

Repellant	February			March		
	Inside	Outside	Total	Inside	Outside	Total
COCONUT OIL	50.8	39.7	90.5	38	41.5	79.5
NEEM OIL	52.3	48	100.3	49.5	48.3	97.8
CASTOR OIL	52.8	45.5	98.3	39	29.2	68.2

Figure-2 : INDOOR AND OUTDOOR APPLICATION OF ESSENTIAL OILS DURING FEBRUARY AND MARCH -2017

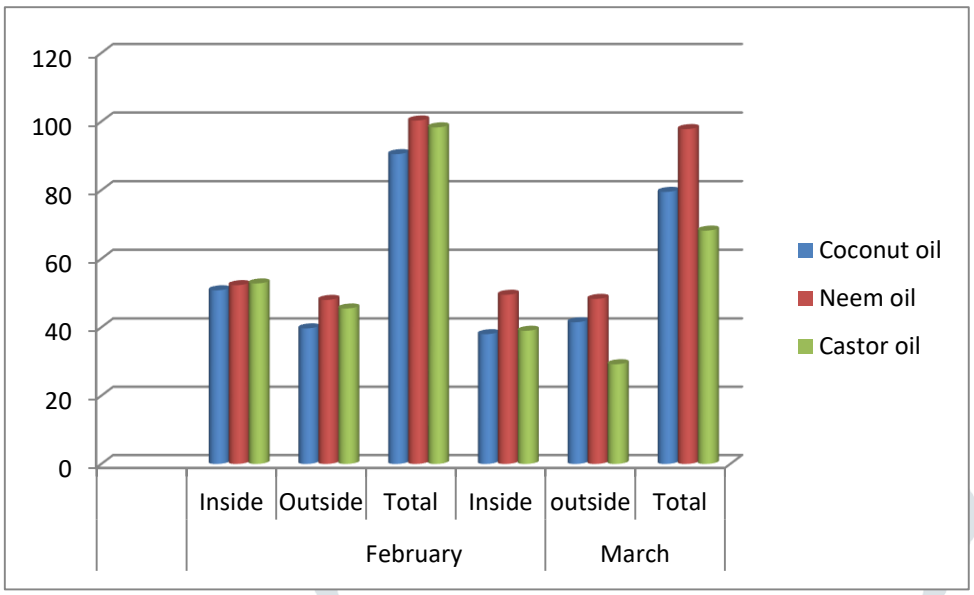


Table-5

PERCENTAGE OF PROTECTION TIME BY VARIOUS SYNTHETIC CREAMS TESTED AGAINST CONTROL AND EXPERIMENTAL MOSQUITOES

S. No	Sample	Protection
1	ODOMOS	74%
2	GOOD NIGHT	75%
3	HERBAL CREAM	75%

Figure-3 :PERCENTAGE OF PROTECTION TIME BY VARIOUS SYNTHETIC CREAM TESTED AGAINST CONTROL AND EXPERIMENTAL MOSQUITOES

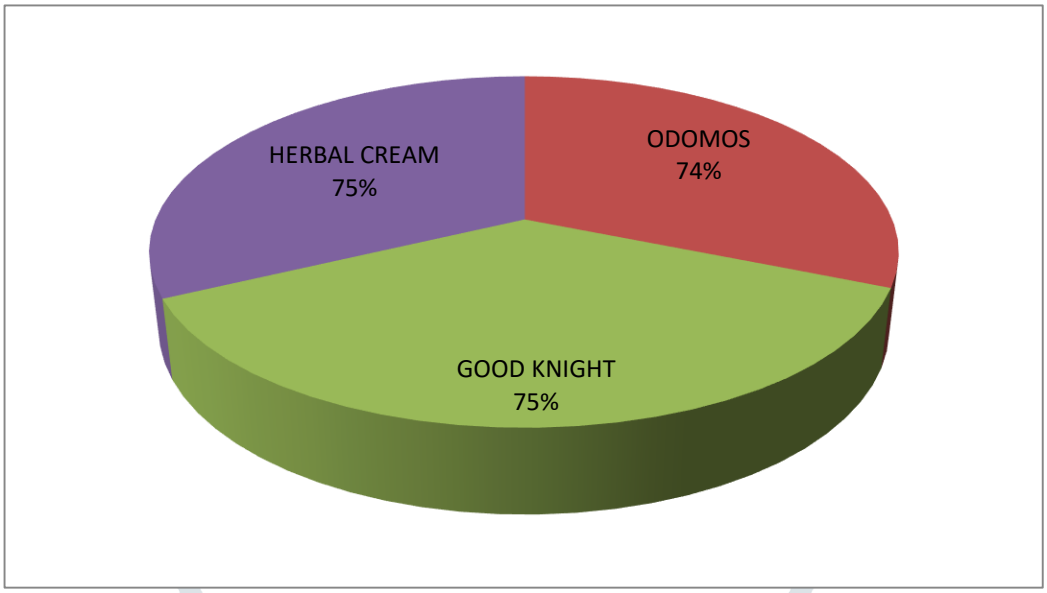
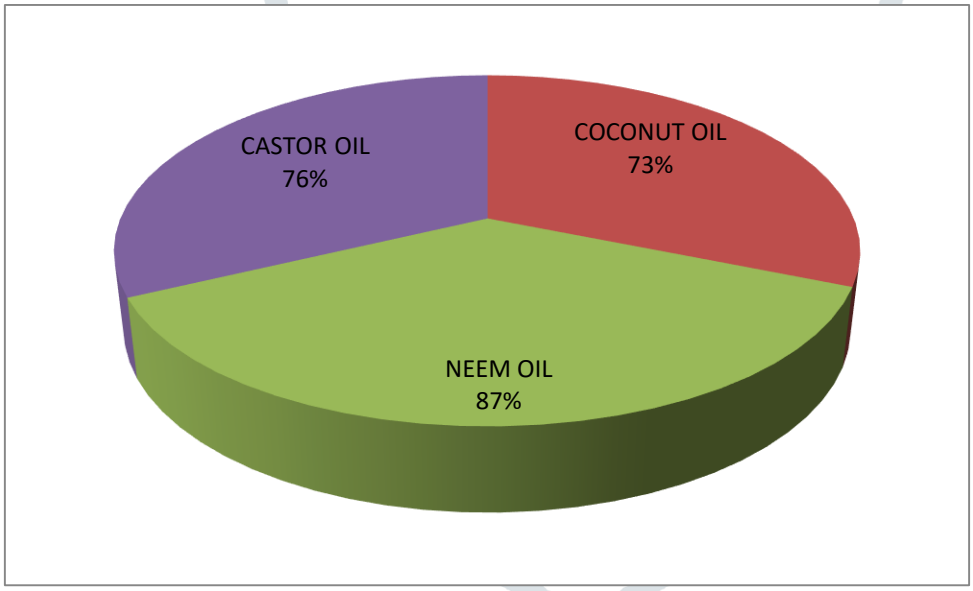


Table-6

PERCENTAGE OF PROTECTION TIME BY VARIOUS ESSENTIAL OILS TESTED AGAINST CONTROL AND EXPERIMENTAL MOSQUITOES

S. No	Sample	Protection
1	COCONUT OIL	73%
2	NEEM OIL	87%
3	CASTOR OIL	76.4%

Figure-4 PERCENTAGE OF PROTECTION TIME BY VARIOUS ESSENTIAL OILS TESTED AGAINST CONTROL AND EXPERIMENTAL MOSQUITOES



Discussion :

Vector control is facing a threat due to the emergence of resistance in vector mosquitoes to conventional synthetic insecticides , warranting either counte measure or development of newer insecticides(Chandre et al, 1998). Mosquit Exhibited rhythmic biting pattern , the repellant property of selected synthet Repellants were tested during dusk hours to obtain an accurate results. The Synthetic repellants like herbal cream exhibited a reasonable protection time By showing on effective repellant activity and also the suppression activity.

P.K.Mittal and U.S Sreehari (2011) found that repellants are commonly usec Personal protection measures to avoid mosquito bites. In the present study Odomos cream offered moderate protection time than goodknight and herbal cream.

Frances , S.P *et.al* (2001) says that the best feature of goodknight naturals Mosquito repellant cream was the fact this cream could also be safe for kids. Applying this mosquito repellant cream on the exposed areas of my body (especially on my hands and legs) the mosquito never seemed to come near Me and this made me quite comfortable and happy too. In the present study Goodknight offered high protection time than odomos .

An insect repellant of plant origin is well defined and harmless to human and The non target. Thousand of plants have been tested as potential sources of Insect repellants.

Ranasinghes and samarsinghe(2016) developed safe and efficient herbal mos Formulation by mixing hexane extract of *Azadirachtra* seeds , hexane extrac Of *Vitex negundo* leaves, Osmium sactiu leaves, long rhizomes, Citresiesis leaves, Eucalyptus leaves oil solutions prepared by using each plant extract essential oil was tested for mosquito repellant activity using arm in cage method .By application an volunteers 100%mosquito repellant up to six hour was observed in spray for outdoor and indoor field trials.In the present work mosquito repellant cream neem offerd high protection time in indoor when compared to the outdoor.

Mukesh et.al (2014) investigated the relative repellant of *Pongamia pinnata* and *Azadirachta indica* seed oils on vector mosquito *Aedes aegypti* under laboratory conditions . this study confirmed that *Azadirachta indica* and *Pongamia pinnata* have mosquito repellant potential. In the present work Coconut oil showed low protection time compared to neem and castor oil.

Chemical mosquito repellants have a remarkable safety profile , but they are toxicity Against the skin and nervous system like rashes, swelling, eye irritation.
It can be recommended that that smearing of Plant essential oil like Neem oil and Synthetic creams like goodknight, Herbal cream over the exposed body parts offers protection against mosquito bites to certain extent.Hence it was concluded that natural mosquito repellants were preferred over chemical mosquito repellants.

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