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Design and Evaluation of Mosquito Repellent Incense Sticks Using Herbals

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ABSTRACT

Objective

The aim of the present study was to prepare poly herbal mosquito repellent incense sticks. Two formulations are made F1 and F2.The F1 formulation contains a single herbcalled Holy basil and F2 formulations contains poly herb like holy basil and garlic.The mosquito repellent action of the prepared formulation was evaluated for its efficacy.

Methods

The mosquito repellent sticks using herbals are prepared by hand rolling method in the research laboratory. The chemicals used are the benzoin, charcoal, starch and the lemon grass oil. The starch is used as a binder to roll the sticks and the lemon grass oil was used as flavoring agent.

Result

The formulation F1 and F2 was prepared and evaluated for its efficacy.The F2 formulation containing poly herbs shows better repellent action than F1 formulation containing single herb.

Conclusion

The synthetic mosquito repellent causes several disadvantages like neurological effects, olfactory effects, anxiety, fremor, lung carcinogen etc. In the market several mosquito repellent formulations are available in the form of coil, mat, sprays, and fast cord. So the use of herbs in the preparation of mosquito repellent sticks are free from carcinogenic chemicals, cheaper, and easy to formulate.

KEY WORDS: Mosquito repellents, Essential oil, Incense sticks.

I. INTRODUCTION

Mosquitoes are over 3600 species, which belongs to the family of culicidae. Mosquitoes causes several diseases like malaria, dengue, and yellow fever [1, 2]. Mosquito repellents will repel the mosquitoes from biting humans. Many synthetic mosquito repellents available in the market are causing more side effects like respiratory problems,coughing and irritation.[3,4]The herbals are used in the preparation of mosquito repellent formulations in order to reduce the marketed product harmful effects. Herbals with mosquito repellent activity are camphor,benzoin,lemon balm,garlic powder,lavender,holybasil and cinnamon oil.Neem was the herbal have multiple uses like antifungal,antidiabetic,antibacterial and antiviral agent.Neem also gives protection against biting of the mosquitoes. [5, 6]. Neem oil was the herbal used asa bio pesticide and have more mosquito repelling action. It's also preferably used in the cosmetic formulations. Lemon balm was the herbal used in the mosquito repellent stick preparation for the flavoring action. It also aid in the metabolism and removes the nervous tension [7,8].Garlic releases allicin, this allicin causes mosquito repellent action.Garlic also used to reduce the blood pressure.Vitexnegundois a medicinal herb with mosquito repellent action.Benzoin [9]its gum resin. Its odour will repel the mosquito.

II. METHODS

All the ingredients were of analytical grade. Neem, holy basil, benzoin are purchased from the Ayurveda shop in Chennai. Starch is procured from Qualigens fine chemicals,Mumbai.[10]

METHOD OF PREPARATION OF INCENSE STICKS [11,12]

All the dried herbs were finely powdered in a mixer and then passed through a sieve (no.80). The powder should be very fine or else there will be problems in the binding and burning.Total 100g of powder premix taken to prepare 20 incense sticks. The quantity of plant material taken is listed in table 1 and table 2.Water was gradually added to the fine powder until it attained dough-like consistency. It should be well mixed and not too watery, otherwise it creates problems in making

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sticks.The dough was divided into portions and was rolled by hand in small quantities on plain bamboo sticks. This can be done by a machine in large scale production.The sticks were dried for 24hours under shade. Tray dryer can be used to dry the sticks faster.The dried incense sticks were scented with lemongrass oil.Finally sticks were packed in a suitable packing material preferably plastics and stored.

Table 1: FORMULATION TABLE (F1)

S.No	Ingredients	F1 FORMULATION SINGLE HERB
1	Holy basil	15gms
2	Neem	10gms
3	Benzoin	5 gms
4	Charcoal	50gms
5	Starch	10%
Lemon grass oil		QS

Table 2:FORMULATION TABLE (F2)

S.No	Ingredients	F2 FORMULATION POLY HERB
1	Holy basil	12.5gms
2	Garlic	12.5gms
3	Neem	10 gms
4	Benzoin	5 gms
5	Charcoal	50gms
6	Starch	10%
Lemon grass oil		QS

Table3 : EXCIPIENTS TABLE

S.No	Ingredients	Uses
1	Charcoal	Binding agent
2	Starch	Binder
3	Benzoin	Fragrance and mosquito repellent
4	Lemon grass oil	Fragrance

III. EVALUATION

BURNING ON USERS: [13, 14]

Test was done by simply selecting mosquitoes from areas in the evening and night period. The public remarks were noted down after allowing them toinvestigate mosquito repellent activity. The prepared incense sticks F1 and F2 were checked for causal effects such as irritation, coughing, and tears were observed and recorded.

SMOKE TOXICITY TEST:[15]

Smoke toxicity test was conducted in a chamber measuring 34.5x24x0.95 cm. Then adult mosquitoes were released into the chamber and they were exposed to the smoke of burning incense sticks for 45 minutes. The mortality data were recorded after every 15minutes.Total number of mosquitoes used was 25

FEED BACK FROM 20 VOLUNTEERS [16]

The feedback of mosquito repellent incense stick were taken from 20 people and requested to evaluatethe formulation(F2) containing poly herbs.

IV. RESULT AND DISCUSSION

EVALUATION OF BURNING ON USERS:

Smoke from the herbal mosquito repellent sticks produce no toxic effect to humansand also

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act as germicidal. Incense sticks prepared are cost effective and easily portable. The Prepared incense sticks were given to the 10 houses, hostel and canteen for getting feedback about the product depending on the duration of time, illness, and allergic reactions. The peoples from houses, hostel and canteen have replied that less irritation, no allergic reactions and coughing. The mosquitoes also repelled after burning of the incense sticks

Table 4:Behavior of mosquitos on ignition

S.No	Areas	Observation	Remarks
1	Houses	Mosquitoes escaped	Less irritation and mosquitoes repelled
2	Hostel	Mosquitoes escaped	No irritation and allergic reaction. Mosquitoes repelled
3	Canteen	Mosquitoes escaped	No irritation and coughing. Mosquitoes repelled

SMOKE TOXICITY TEST

Observation is done regarding time taken to burn the stick, fragrance ofsticks, and duration of repellent activity. It is very safe to use and is nontoxic in nature. This mosquito repellent sticks can be used regular in houses and laboratories. The formulation F2 containing poly herb was found to have more mosquitoes repelled in short period than F1 formulation.

Table 5:Smoke toxicity test for the prepared formulations

TIME(Mins)	F1 Formulation	F2 Formulation
15	9	11
30	8	7
45	8	7
Total	25	25

Feedback from 20 people

From the smoke toxicity test it was concluded F2 will be the best formulation than F1 formulation as it produces the smoke for a long period and kill the mosquitoes. The feedback of mosquito repellent incense stick were taken from 20 people and requested to evaluate the formulation(F2) containing poly herbs.

Table 6: Feedback from 20 people

Parameters	Excellent	Good	Average	Poor
Product elegance	15	5	_ _ _	_ _ _
Mosquito repellency	17	3	_ _ _	_ _ _
Odor of the incense stick	14	6	_ _ _	_ _ _
Allergy	_ _ _	_ _ _	_ _ _	_ _ _
Product satisfaction rating of 1 to 5 score (Average)	4	_ _ _	_ _ _	_ _ _

V. CONCLUSION

The mosquito repellent incense sticks were prepared using herbals show excellent mosquito repellent action and also have no side effects. The incense sticks were ecofriendly, cost effective and safe to use. It is easily portable and can be easily used by all the age groups. The herbal incense sticks give a pleasant smell and repel

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mosquitoes, so the herbals are highly recommended for the formulation of mosquito repellent incensesticks. The lemon grass oil used in the formulation gives pleasant odour during ignition of the sticks. The F2 formulation containing poly herbs shows more mosquito repellent action than F1 formulation which contains only single herb.

CONFLICT OF INTEREST

The authors state that there is no conflict of interest.

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