Formulation and Evaluation of Mosquito Repellent Incense Stick Using Herbs

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Abstract
Currently, using pesticides designed expressly to repel mosquitoes raises a number of health and environmental concerns.This study set out to develop a mosquito repellent that was safer, chemical-free, significantly less expensive, and simple to make. Contagious diseases can be transmitted from animals to humans or between humans via living beings known as vectors. The mosquito is the most well-known disease vector. The purpose of this study was to determine the efficacy of Azadirachta indica, a plant belonging to the Maliaceae family, as a natural insect repellent. It is utilized to manufacture a herbal mosquito repellent stick that is safe and effective. Natural mosquito repellents that are inexpensive, reliable, non-toxic, safe for the environment, and biodegradable are becoming more and more necessary in today's society.

Keywords: Mosquito Repellent, Incence Stick

1. INTRODUCTION

Vector borne infections, which account for over 17% of all infectious diseases, claim the lives of over 7 lakh people annually. Mosquitoes are the most prevalent disease carriers. Chikungunya, Dengue fever, malaria, lymphatic filariasis, Rift valley fever, yellow fever, and Zika are among the many diseases that are conveyed by these mosquitoes. India recorded 1,57,220 dengue cases and 250 mosquito-borne sickness deaths in 2017. According to the data, there were 62,268 cases of chikungunya nationwide, with Karnataka accounting for the largest number of cases (31,644).[1,2]

Climate change has led to an increase in vector-borne diseases like malaria and dengue. Malaria is a significant health concern globally, particularly affecting young children and pregnant women. With nearly half of the world's population living in areas at risk of malaria transmission, controlling mosquitoes and preventing bites is crucial. Currently, chemical-based mosquito repellents dominate the market, posing health risks due to their toxicity. This study focuses on developing affordable, herbal mosquito repellent

sticks using natural ingredients, minimizing side effects and promoting a safer alternative.In this paper an effort has make to develop economically affordable herbal mosquito repellent sticks comprised entirely of herbal ingredients. Since ingredients used were almost herbal hence it has low side effects on inhalation.[3,4,5,6]

There are parasite species that cause malaria infection out of these species have greater threat - P. falciparum and P. Vivax. With the rise in the number of mosquito-borne diseases, controlling of mosquitoes gaining vital importance in human's daily life. To combat rising number of mosquitoes, various solutions like mosquito repellent products are commercially available. Chemical based products are widely used to control the mosquitoes, but due to its synthetic components they are still toxic to human body. Due to toxicity issues there is increase in demand of development of herbal based mosquito repellent in the market. Natural herbal mosquito repellents are non-toxic, effective, eco-friendly, biodegradable cheap and prepared.[7,8,9]

Figure. Mosquito

The term "mosquito" means "little fly." The mosquito's body is segmented, with three pairs of long, hair-like legs, one set of wings, and lengthy mouth parts. For the mosquito to produce eggs, proteins and iron were also necessary. The mosquito's salvia is what causes the itchy sensation after a bite. Numerous diseases, including dengue, malaria, yellow fever, and others, are spread by mosquitoes to humans. [10,11]

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Diptera
Family: Culicidae.[12]

2. MOSQUITO REPELLENT

Types of Mosquito Repellent:

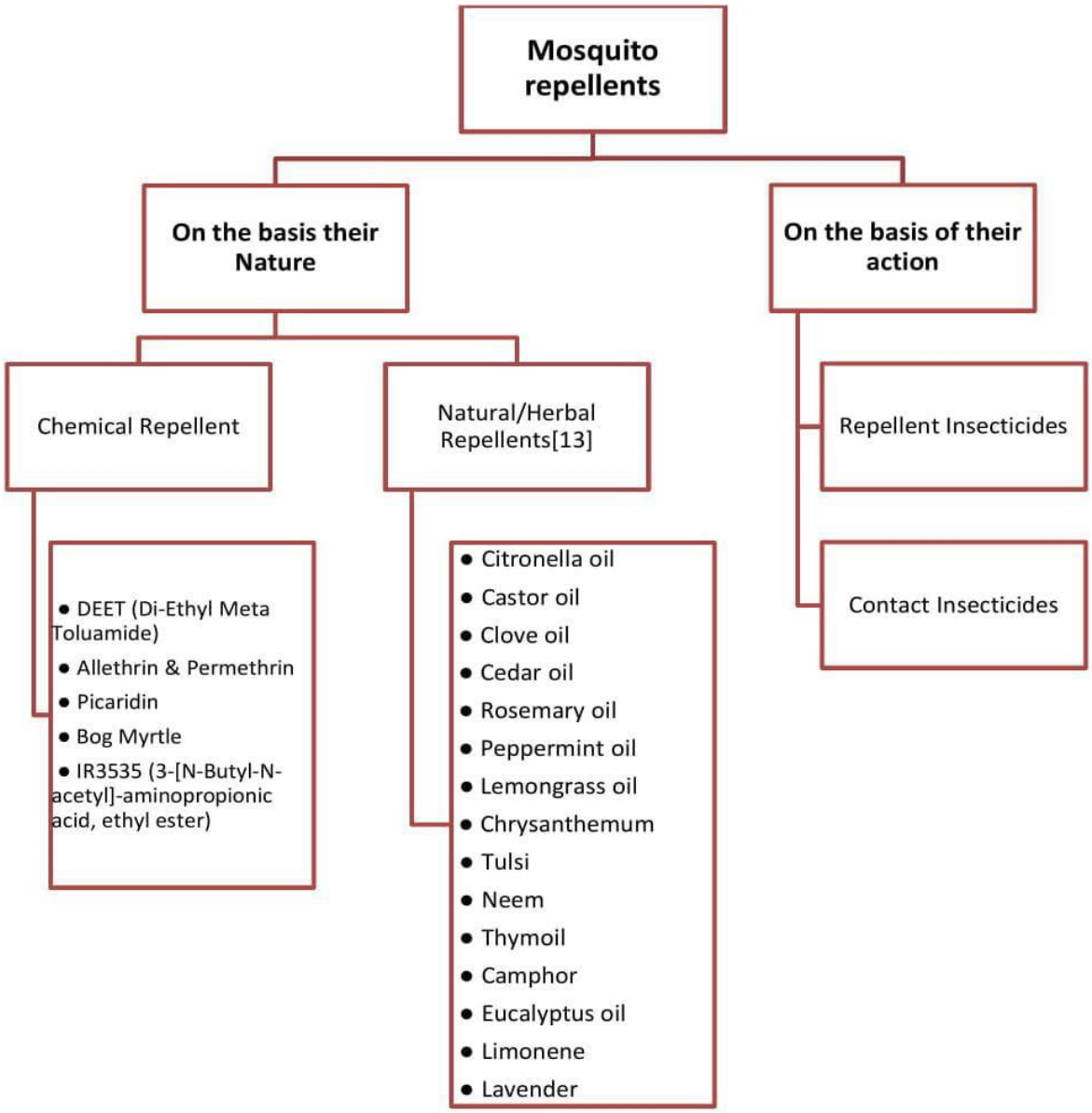

Figure: types of mosquito repellent

Types of Mosquito Repellent - Different categories are used to categorise mosquito repellents. They fall into the chemical or herbal repellent categories, depending on where they come from. They can also be divided into groups based on their behaviour. Repellent insecticides are pesticides that deter insects and other pests rather than killing or poisoning them. Insecticides are substances that include neurotoxins that

cause disruption during contact.When in contact with mosquito and insect neural systems, they become unconscious.[13]

3. INCENSE

Mosquito repellent incense sticks using herbs are a wonderful natural alternative to chemical-based products. These sticks typically combine various herbs and essential oils to repel mosquitoes.[14]

The market for incense and incense sticks has expanded globally in recent years. USA, Brazil, China, and India are the top exporters and consumers of incense and incense sticks, respectively. The smudge is typically composed of aromatic ingredients. a flammable binding in combination contents. Various materials are available. which have been in use since the dawn of time, either together or separately for incense. fragrant woods are one form of material. Essential oils, plants, and resins.[15,16,17]

Figure. Incense

Classification of incense sticks on the basis of burning:

1. Fast Burning Mosquito Repellent Incense Sticks

- Burning time: 30-45 minutes

- Smoke output: High

- Mosquito repellency: Quick and intense

- Usage: Ideal for small outdoor areas, camping, or emergency situations

2. Medium Burning Mosquito Repellent Incense Sticks

- Burning time: 45-60 minutes

- Smoke output: Moderate

- Mosquito repellency: Steady and consistent

- Usage: Suitable for medium-sized outdoor areas, patios, or backyards

3. Slow Burning Mosquito Repellent Incense Sticks

- Burning time: 60-90 minutes or more

- Smoke output: Low

- Mosquito repellency: Gradual and long-lasting

- Usage: Ideal for large outdoor areas, events, or all-day mosquito protection. [18,19,20]

4. ADVANTAGES

1. Easily available.
2. Cost effective.
3. No allergic reaction.
4. Do not cause any skin irritation.
5. Prevent causation of diseases like malaria, dengue, fever etc.
6. It is chemical free as compared to synthetic repellents.
7. Environmental-friendly.
8. Pleasant.
9. Repel other bugs.
10. Peace of mind.[21,22,23]

5. INGREDIENTS

1. Neem powder

Synonyms	Margosa
Biological	It consists of all aerial parts of plant Known as Azadirachta Indica.

Source	
Chemical Constituents	Nimbin, Nimbinene, Nimocinol, Quercetin
Family	Meliaceae
Uses	Which have insect repellent, insecticide, nematicide and antimicrobial.

2. Camphor powder

Synonyms	Laurel Camphor, Gum Camphor
Biological Source	It is obtain from the CinnamomumCamphor tree
Chemical Constituents	Bornyl Acetate, Camphene, Pinene
Family	Lauraceae
Uses	Natural insect repellent, Natural insect repellent, effective ingredient in mosquito repellent incense sticks.

3.Clove powder

Synonyms	Laung, Clavo, lavanga.
Biological Source	Caryophyllusaromaticus (former botanical name)
Chemical Constituents	Eugenol (70-80%), Eugenol acetate (5-15%), Beta-caryophyllene (5-10%), Vanillin.
Family	Botanical Familly - Myrtaceae
Uses	Insecticidal properties, Natural and eco-friendly, Coating incense sticks.

4. Rose water

Synonyms	HulthemiaDumort, Syzygium aromaticum
Biological Source	Rose water, derived from Rosa damascene.
Chemical Constituents	Volatile oils, Flavonoids, Phenolic acids.
Family	Rosaceae
Uses	Good Smell

5. Cow dung powder

Synonyms	cow dung manure, gomayachuran.
Source	derived from the excrement of bovine animals
Uses	Blending with other herbs, Cost-effective, Natural insect repellent Bess material.

Numerous helpful microbes, including Saccharomyces, Lactobacillus, Bacillus, Streptococcus, Candida, and others are abundant in cow dung. Additionally, it includes a variety of dietary ingredients like cellulose, hemicellulose, mucus, lignin, minerals, vitamins, potassium, nitrogen, oxygen, and carbon. Due to the availability of several microorganisms helpful for waste degradation, cow manure is utilised to digest waste produced by cities and hospitals[24] for the creation of papers, fibrous material derived from cow excrement is employed.[25] In recent years, natural mosquito repellents made from cow dung have proven one of the finest substitutes for synthetic repellents.[26] Cow dung toothpaste also enhances oral health and offers defence against oral infections. The use of cow dung provides more economical and environmentally beneficial human activities.[27,28] Additionally, cow dung has proven to have anti-bacterial and anti-fungal properties. Psoriasis and eczema can be effectively treated with it as a skin tonic. Neem leaf powder and cow manure are combined to prevent boils and heat rashes. Both Mycobacterium TB and the malarial parasite have been shown to be killed by cow dung. Corprophilous fungi exhibit the anti-fungal activity.[29,30]

6. EXPERIMENTAL WORK

A. Formula

Sr. No	Name of ingredients	Quantity taken (100gm)
1	Neem	35gm
2	Rose Water	15ml
3	Camphor	5gm
4	Clove	5gm
5	Cow DungPowder	30gm
6	Honey	5ml
7	Tragacanth Gum Powder	5gm
8	Water	As per q.s.

B. Method

1. In a mixer, all of the dried herbs were ground into a fine powder before being sieved (mesh no. 80).
2. 20 incense sticks required a total of 100g of powder premix.
3. Tables provide of the amount of material taken.
4. The fine powder was diluted with water gradually until it had the consistency of dough.
5. It should be well combined and not too watery to avoid difficulties while producing sticks.
6. Rolling the dough by hand in tiny batches on unadorned bamboo sticks required dividing the dough into parts.
7. Rose water was used to good fragrance the dried incense sticks.
8. Then, sticks were stored after being packed in an appropriate material, preferably plastic.

7. EVALUTION PARAMETER OF INCENSE STICK

A. Physical Appearance

Colour-Brownish Colour

fragrance-good fragrance

B. Smock Toxicity Test

A test of smoke toxicity was carried out in a chamber . next grownup In the 30minutes following their discharge into the chamber, mosquitoes were exposed to the smoke from burning incense sticks. Every 10minutes, the mortality data were recorded. There were 12 mosquitoes employed in all.

8. RESULT AND DISCUSSION

Sr. No	Colour	Odour	Mosquito Repellancy	Allergy Related Issue
1	Brownish	Rose smell	Excellent	No issue
2	Brownish	Rose smell	Good	No issue

DISCUSSION

- The mosquito repellent stick having less weight and more period of burning time is more suitable.
- The mosquito repellent sticks have less amount of moisture content leads to fast burning and results in low ash content.

9. CONCLUSION

Herbal-based mosquito-repelling incense sticks offer superior mosquito repellency, a pleasant fragrance, and zero side effects. These eco-friendly, cost-effective, and portable sticks are suitable for all ages. Unlike commercial products that can cause eye irritation, respiratory issues, and other adverse effects, herbal incense sticks provide a safe and natural solution for mosquito repellence.

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