

# Formulation of Economically Affordable Herbal Mosquito Repellent Sticks

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**Abstract**—whenever there is a climate change this leads to expand the occurrence of various vector borne diseases like malaria and dengue. Worldwide, Malaria is the one of the most major health related issues. The mostly affected group consists of young children and pregnant women. In 87 nations and territories, nearly half of the world's population dwells in places where malaria transmission is at risk. One of the important methods for limiting the spread of transmissible diseases is mosquito control and personal protection from mosquito bites. The market is currently saturated with chemical-based mosquito repellent products, which are not only more expensive but also more dangerous to the human body. In this paper an effort has been made to develop economically affordable herbal mosquito repellent sticks comprised entirely of herbal ingredients. Since ingredients used were almost herbal hence it has low side effect on inhalation.

**Keywords**— Plant extract, Essential oil, Mosquito repellent activity, Mortality rate, low smoke, public survey.

## I. INTRODUCTION

Malaria is a parasitic life-threatening disease caused by bite of female Anopheles mosquitoes. There are 5 parasite species that cause malaria infection out of these 2 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. Some of them are natural ingredient based while others are synthetic or chemical based products. 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. Therefore, researchers are actively working with natural ingredients to be used as mosquito larvae insecticides or repellents.

Natural herbal mosquito repellents are non-toxic, effective, eco-friendly, biodegradable cheap and prepared. The natural ingredients were used to make an herbal mosquito repellent sticks; essential oil obtained for eucalyptus leaves, camphor, neem bark/ leaves and acacia gum and gelatin powder used as binding agent. This formulation was evaluated for appearance, efficiency and safety.

## II. MATERIAL & METHODS

### Material

The raw material has been selected based on the traditional knowledge and experience.

Herbal products

Cinnamon bark: *Cinnamomum zeylanicum*

Neem bark: *Azadirachta indica*

Neem leaves: *Azadirachta indica*

Eucalyptus oil: *Eucalyptus globulus*

Kapoor: *Cinnamomum camphora*

Acacia gum: *Acacia arabica*

Cinnamon bark, gum acacia, gelatin powder & camphor was purchased from local market.

The saw dust will be used to enhance the combustion process. Neem Bark powder have strong repellent activity of mosquitoes having good binding property. Fumigation of Camphor for making soothing atmosphere. Eucalyptus oil and neem leaves are the most generally used medicinal plants in making of mosquito repellents and has excellent insecticidal property.

### Processing Materials used

1. Sieve
2. Mortar & pestle
3. Paint brush
4. Weighing machines
5. Measuring cylinder

### Methods

#### Essential oils

Eucalyptus essential oil were purchased from the market.

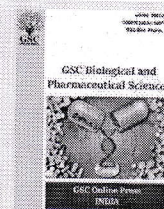
#### Preparation of Neem leaves, Neem Powder & Cinnamon Powder

The fresh Neem Leaves were dried in the shed until it gets completely dry about 3 days. Then dried leaves are transferred to the mortar & pestle and crushed it into fine powder. Then this powder is sieved through the sieve no. 44. The final obtained product is stored for further use.

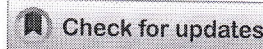
The dried neem bark are braked down into fine pieces by pestle. Then this fine pieces of bark are converted to fine powder by grinding it into blender. In the same way cinnamon powder also prepared.

#### Preparation of Mosquito repellent sticks

All the required ingredients were taken in a mortar except oil and water and mixed thoroughly. Into this mixture specified amount of essential oil added and blended evenly. At last, water was added as per requirement for binding of sticks. Then, this prepared mixture was filled in the stick mould and kept for drying. The sticks were removed from the mould and placed in the Hot air oven for 30 minutes to get dry. Once the



(RESEARCH ARTICLE)



## Role of pharmacist in healthcare system

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### Abstract

Pharmacists play a crucial role in the healthcare system by ensuring that patients receive safe and effective medications. They are responsible for dispensing medication, advising patients on drug interactions and side effects, monitoring medication therapies, and collaborating with other healthcare professionals to optimize patient outcomes additionally, pharmacists provide patient education on disease management, medication compliance, and lifestyle modifications. They also serve as drug information experts, conducting drug utilization reviews and providing guidance on appropriate medication selection and dosing. The role of pharmacists is becoming increasingly important as healthcare systems strive to improve patient safety, reduce medication errors, and control healthcare costs. As medication experts, pharmacists are well-positioned to help address these challenges and improve the overall quality of care provided to patients. As a summary we can say that "Physician gives medicine to the patients but life to medicine given by pharmacist"

**Keywords:** Healthcare system; Effective medications; Medication compliance; Pharmacists; Patient safety

### 1. Introduction

The emphasis of the pharmacy profession has evolved from technical, product-focused duties to patient-focused, health outcomes counselling information and specialized services. The nation is embarrassed by this "Pharmaceutical Care" change, in which pharmacists accept responsibility for patient outcomes related to their medication therapy in partnership with other health care providers. Today's pharmacists are primarily responsible for identifying, fixing, and preventing drug-related issues. In order to realize the objective of "Health for by 2000," several crucial components of healthcare are outlined in the report of the worldwide conference on primary health care held in September 1978 at Alma Ata.

- Education concerning prevailing health Problems and methods of identifying, Preventing and controlling them.
- Promotion of food supply and proper nutrition.
- Prevention and controlled of locally Epidemic Nutrition.
- Provision of essential diseases.
- Immunization against the major infection Diseases.
- Availability of health professional.
- Availability of health professionals.
- National health policies.<sup>1,2</sup>

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Principal





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## Formulation and Evaluation of Ornidazole Proniosomal Gel



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### ABSTRACT

Proniosomes are converted into niosomes on hydration, the reason for adopting Proniosomal technology that they exists as a liquid crystalline state, this state of existence is much stable than normal niosomes. This research mainly emphasizes on formulating Proniosomal gels with span surfactants, cholesterol, soya lecithin and alcohol as aqueous phase. Ornidazole drug is chosen as an active ingredient in preparation of Proniosomal gels, these are prepared by coacervation phase separation method and the prepared formulations characterized for FTIR studies, Encapsulation efficiency, size distribution and In vitro release studies were carried. FTIR studies were carried and showed that there was no interaction between API and used excipient. The encapsulation efficiency of Proniosomal formulations are in the range of 38% to 78%. Morphological size and shape of the vesicles are characterized by using optical microscopy and scanning electron microscopy, particles are found to be spherical, size of the particles are in the range of 3.29 $\mu$ m to 30 $\mu$ m and permeation studies showed good control release for prolonged period of time. Span20 Nonlecithin formulation showed highest amount of drug release of 88% in 24 hours. *In vitro* rat skin permeation studies proved that good amount of drug is permeated than the marketed formulation. The results suggest that Ornidazole proniosome formulations can be used for a Topical drug delivery system for the treatment of skin infections.

  
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## Development and Evaluation of Herbal Mosquito Incense Repellent Stick

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### ABSTRACT:

In this work, garlic leaves and holy basil were used to prepare and develop polyherbal mosquito repellent incense sticks. It is created two formulas, F1 and F2. Holy basil is the only herb used in the F1 formulation, while holy basil, garlic, and other herbs are used in the F2 formulation. The developed formulation's ability to repel mosquitoes was compared and its effectiveness assessed.

**Key word:** Mosquito repellent sticks, holybasil leaves, Garlic

### Introduction:

Mosquitoes are among the most disturbing blood sucking insects afflicting human beings. Several mosquito species belonging to genera Anopheles, Culex and Aedes are vectors for the pathogens of various diseases like Dengue fever, Malaria, Yellow fever, Japanese Encephalitis and several other infections. Mosquitoes alone transmit diseases to more than 700 million people and over one million deaths are reported annually across the globe<sup>[1]</sup>. Therefore, the control of mosquitoes is an important public health concern around the world. As most of the mosquito repellent products and devices available in the market are reported to have harmful effects on human beings, the objective of the present study is to develop effective plant-based mosquito repellent products<sup>[2]</sup>. A mosquito repellent is a substance applied to skin, clothing or other surfaces which discourages mosquitoes from landing or climbing on that surface.<sup>[3]</sup> Usually, mosquito repellents work by masking human scent or by using a scent which mosquitoes naturally avoid.<sup>[3,4]</sup> Carbon dioxide and lactic acid present in sweat in warm-blooded animals act as an attractive substance for mosquitoes

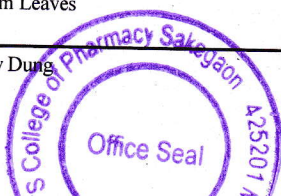
Perception of the odour is through chemo-receptors which are present in the antennae of mosquitoes.<sup>[5]</sup> The repellents block the lactic acid receptors and destroy upwind flight. According to the past researches, the essential oils of the leaves of Cymbopogonardus (Citronella),<sup>[6]</sup> Cymbopogoncitrates (Lemongrass),<sup>[7]</sup> Cymbopogonwinterianus (Citronella),<sup>[8]</sup> Ocimumbasilicum (Sweet Basil),<sup>[2]</sup> Ocimum sanctum (Tulsi),<sup>[9]</sup> Ocimumamer-icairey Basil,<sup>[14]</sup> Eucalyptus citriodora (Eucalyptus),<sup>[10]</sup> Eucalyptus globulul (Eucalyptus),<sup>[16]</sup> Rosmarinusofficinalis,<sup>[17]</sup> Melissa officinalis,<sup>[12]</sup> Curcuma longa (Turmeric) rhizomes,<sup>[18]</sup> Citrus sinensis (Sweet Orange) peels,<sup>[2]</sup> Citrus hystrix (Kaffir Lime) peels,<sup>[19]</sup> Citrus limonum (Lemon) peels,<sup>[8]</sup> Syzygiumaromaticum (Clove) buds and Pinusroxburghii resins have shown very high mosquito repellent activity. Moreover, the extracts of Azadirachtaindica (Neem) seeds,<sup>[20]</sup> leaves of Alpinia galangal (Greater Galingale),<sup>[18]</sup> Vitexnegundo (S. Nika)<sup>[21]</sup> and Tribulusterrestris (S. Gokatu) also have been studied as possible mosquito repellents. The selection of these plants was based on their availability as raw materials, scientific evidence and folkloric use as mosquito repellents.

### MATERIAL METHODS

For preparation of herbal mosquito repellent Dhoop, the dried tulsi leaves (7.05%), bay leaf (8.40%) and neem leaves (11.22%) were mixed with loban (5.32%), maida (5.63%) clove (1.98%) and saw dust (6.38%), After mixing, dried cow dung (42%) and camphor (2.14%) were added in above mixed material. Half of all essential oils used in formula were added (eucalyptus essential oil (1.57%) peppermint essential oil (1.15%) lemongrass essential oil (2.22%) ). At the end small quantity of water was added to improve binding capacity of maida and Above mixture converted into desired shape of Dhoop using mould and was allowed to dry by placing exposed overnight. Finally remaining quantity of essential oils were sprayed on Dhoop and dried in hot air oven at 120°C for 15 minutes.

#### Formula 1:

| Sr.No. | Ingredients | Parts(percent) |
|--------|-------------|----------------|
| 01     | Neem Leaves | 11.22          |
| 02     | Cow Dung    | 42             |



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