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Formulation And Evaluation Of Safe Herbal Mosquito Repellent Dhoop Sticks

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ABSTRACT

These days, mosquito-borne illnesses are a serious health concern. Mosquitoes are largely responsible for the transmission of several diseases, such as dengue, malaria, and yellow fever. Herbal dhoop is a natural product made from plant parts that naturally repel mosquitoes. It is safe, non-toxic, and environmentally friendly. It is manufactured from a special combination of plant extracts and aromatic oils that keep insects and mosquitoes away. The essential oils and plant extracts used in this study were evaluated at varying doses using a handcrafted mosquito stick in a room with a lot of insects. The findings showed that certain herbal plant combinations have mosquito-repelling properties. Use of camphor, neem, tulsi, marigold, and other plants that have been shown to have the strongest insect repellents and no irritation is safe and environmentally beneficial.

Keywords: Herbal Dhoop, Mosquito repellent, Sandalwood, Marigold flower.

INTRODUCTION

In the field of public health, the mosquito parasite is well-known for spreading a number of diseases. In tropical areas, a number of mosquito-borne illnesses, including filariasis, dengue fever, and malaria, pose major threats to public health. The global threat posed by common mosquito-transmitted illnesses, including encephalitis, dengue hemorrhagic fever, yellow fever, epidemic polyarthritis, and malaria, which the World Health Organization (WHO) estimates kills over 3 million people each year. [18] Humans can only contract these diseases through mosquito bites, and there is currently no effective vaccination to prevent them. Numerous tropical and subtropical diseases that have catastrophic effects on humans are mostly spread by mosquitoes. One of the primary strategies to reduce or control the incidence of these diseases is to prevent mosquito bites. Malaria and other diseases spread by mosquitoes have numerous treatments, but prevention is always preferable. Thus, the phrase "mosquito repellent" was created. Mosquito repellents are compounds that cause surfaces to be unpleasant to insects. By applying it to the skin or other surfaces, mosquitoes are deterred from settling there. Using insect repellents can be a useful and affordable way to stop infections spread by mosquitoes. Spray repellents for mosquitoes are widely available and can be applied to skin or

clothing. Another well-known effective insect repellent is a mosquito coil. Mosquitoes are deterred from biting by topical or other insect repellent applications. Frequent use of chemical-based synthetic repellents to handle mosquitoes has disrupted natural ecosystems, led to pesticide resistance, a recovery in mosquito populations, and negative effects on organisms that are not the intended target. Repellents can offer a useful and affordable way to stop infections spread by mosquitoes. [3] Using natural mosquito repellent solutions as a substitute for creating new eco-friendly repellents may be a cooperative way to reduce the negative impacts on the environment and public health. [4] One of the various pharmacological properties of many therapeutic plants and essential oils has been documented to be their ability to keep insects and mosquitoes away. The need for herbal formulations is rising globally.

Material And Method

EXTRACTION PROCESS FOR NEEM

The neem powdered sample was extracted with a alcohol and water (80:20)by using maceration method for 4 – 6 days.

After maceration the sample was filtered byusing a filter paper.

The solvent is evaporated by using a heating mental under reduced pressure below 50⁰c.

The crude extract become a solid.

EXTRACTION PROCESS FOR TULSI :-

The tulsi powdered sample was extracted with a alcohol and water (80:20)by using maceration method for 4 – 6 days.

After maceration the sample was filtered byusing a filter paper.

The solvent is evaporated by using a heating mental under reduced pressure below 50⁰c.

The crude extract become a solid.

EXTRACTION PROCESS FOR SANDALWOOD :

The Sandalwood powdered sample was extracted with a alcohol and wate (80:20)by using maceration method for 4 – 6 days.

After maceration the sample was filtered byusing a filter paper.

The solvent is evaporated by using a heating mental under reduced pressure below 50⁰c.

The crude extract become a solid.

EXTRACTION PROCESS FOR MARIGOLD:

The Marigold powdered sample was extracted with a alcohol and water (80:20) by using maceration method for 4 – 6 days.

After maceration the sample was filtered byusing a filter paper.

The solvent is evaporated byusing a heating mantle under reduced pressure below 50⁰c.

The crude extract become a solid

PHYTOCHEMICAL SCREENING:

Phytochemical Test confirmed the presence of phyto-constituents like alkaloids, flavonoids, glycosides, phenols, lignins, saponins, sterols, tannins, anthraquinone, and reducing sugar. Methanol and ethanol extracts exhibited higher phenolic content as compare to aqueous extract.

Test for Alkaloids

The technique was used to test the neem plant for alkaloids. A 0.5 g sample was dissolved in hydrochloric acid and filtered through filter paper to yield 2 ml of filtrated material. The filtrate was then treated with Dragendorff's reagent, which is a potassium bismuth iodide solution; the presence of alkaloids was confirmed by the formation of a red precipitate, which is known as the "Dragendorff's test." When Hager's reagent was added to 2 milliliters of filtrates, the presence of alkaloids was verified by the production of a yellow color.

Test for Saponins

The technique was used to test the neem plant for saponins. 50 milliliters of distilled water were used to boil 0.5 grams of sample, which was then filtered. Three milliliters of distilled water were added to five milliliters of each filtrate, and the mixture was violently agitated for approximately five minutes. The production of froth indicated the presence of saponins.

Test for Glycosides

The method of was adopted in testing for glycosides in sandalwood. A quantity of 0.5 g of sample was dissolved in ethanol for about 10 minutes for proper extraction and filtered. To 5 ml of each filtrate, 0.3 ml of Fehlings solution A and B was added until it turn to alkaline indicating the absent of glycoside.

Test for Terpenoids

The method of was adopted in testing for terpenoids in marigold plant. A quantity of 0.5 g of sample was dissolved in ethanol for about 10minutes for proper extraction and filtered. To 5 ml of chloroform was added and concentrated sulphuric acid was added . A change in colour from red and brown showed presence of terpenoid.

Test for Flavonoids

The technique was used to test the sandalwood plant for flavonoids. Three milliliters of lead ethanoate solution were added after 0.5 grams of the sample were dissolved in distilled water and filtered to 5 milliliters. The existence of flavonoids was established by their pale yellow-brown (buff-colored) appearance.

Test for Steroids

The technique was used to test the tulsi plant for steroids. After dissolving 0.5 g of the sample in distilled water and filtering it to 4 ml of the filtrate, 2 ml of acetic acid was added, and the mixture was allowed to cool completely in the refrigerator before cautiously adding concentrated H₂SO₄. The presence of a steroidal ring was revealed by a color shift from violet to bluish green.

Test for Phenol

The technique was used to test the tulsi plant for phenol. After boiling 0.5 g of the sample in 15 ml of distilled water, it was filtered. A few drops of a 10% ferric chloride solution were then added to two milliliters of the filtrate. It was established that a violet color formed, signifying the existence of a phenolic hydroxyl group.

Tests for Shinoda

A little piece of magnesium foil metal was added to the test solution after the extract (neem) had been dissolved in 95% ethanol. Three to five drops of concentrated hydrochloric acid were then added. The presence of flavonoids was suggested by the deep cherry red color.

Tests For sodium Hydroxide

Fill a titration flask with 0.5 g the sample, then dilute it to 15 ml. Fill the burette with 1 NHCl solution and add two to three drops of 1%phenolphthalein indicator. Until the color is gone, titrate the aforementioned solution against 0.1N HCl solution.

Test for Carbohydrates

Benedict's reagent was taken for the analysis of carbohydrate. the 5 mg extract was mixed with few drops of benedict's reagent, then allowed to boiled, the reddish-brown precipitate is found with the presence of the carbohydrates (absent)

Phytochemical Group	Neem Extract	Tulsi Extract	Sandalwood Extract	Marigold Extract
Saponins	+	+	+	+
Flavonoids	+	+	+	+
Tannins	+	+	-	+
Alkaloids	+	+	-	+
Reducing Sugars	+	-	-	+
Carbohydrates	-	+	-	+
Proteins	-	+	-	-
Steroid	-	+	-	+
Terpenoid	-	+	-	+
Phenol	-	-	+	+
Sodium hydroxide	+	+	-	+
Proteins and Amino Acids	-	-	+	-

Resin	-	-	-	-
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+ = Present

- = Absent

TABLE NO. 1 : PHYTOCHEMICAL SCREENING

EXPERIMENTAL WORK

A. FORMULA FOR DHOOP STICKS

Sr.no	Ingredients	Quantity taken
1	Activated charcoal	1 gm
2	Starch	2 gm
3	Neem powder	10 gm
4	Tulsi powder	10 gm
5	Sandalwood powder	5 gm
6	Marigold powder	10 gm
7	Peppermint oil	0.25 ml
8	Eucalyptus oil	0.25 ml
9	Rose oil	0.25 ml
10	Lavender oil	0.25 ml
11	Citronella oil	0.25 ml
12	Cinnamon oil	0.25 ml

13	Thyme oil	0.25 ml
14	Water	-

TABLE NO.2 : FORMULA FOR DHOOP STICK**B. PROCEDURE:**

1. All of the extracts were combined in a mortar and pestle after being weighed in accordance with the formula
2. A mortal pestle was used to combine them.
3. It is combined with the finely ground camphor powder.
4. Water was combined with charcoal and starch.
5. After heating the mixture, the extract powder is added.
6. After cooling fully, the mixture solidified into a thick paste.
7. After that, the substance was shaped into dhoop sticks.





Fig no.1:- FORMULATED DHOOP STICKS

EVALUATION TEST FOR DHOOP STICKS

PHYSICAL APPEARANCE: The color of the dhoop sticks has been visualized and the smell of the smoke has been taken into consideration for the odor test.

Result:- Colour: - Black

Odour: - Fragrant

MOISTURE CONTENT: The initial weight of the freshly prepared dhoop sticks should be noted and record the final weight of the dried dhoop sticks.

Moisture content = $\frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100$

Initial weigh

= $\frac{2.560 - 2.330}{2.560} \times 100$

2.560

Result:- The moisture content = 8.9%

• FLAMMABILITY TEST AND BURNING TIME:

To observe the flammability of the dhoop, the dhoop is burnt. Record the time taken to burn the dhoop completely.

Result:- The burning time was 24 minutes.

• ASH VALUE:

The ash value was calculated by having the initial weight of a dhoop stick. Burn the dhoop stick properly and take the weight of the ash produced by the stick.

Result :- The dhoop stick was burnt completely and the ash was collected and weighed.

The weight of ash- **0.143 %**

- REPELLENCY TEST :**

Repellency test performed in a net of cuboidal shape with an opening so that the mosquitoes can escape through. The dhoop was burn inside the net. The times taken by the mosquitoes try to escape or to get number or to be killed should be noted.

Result:-

	Marketed coil	Formulated dhoop
No. of mosquitoes	10	10
No. of mosquitoes escaped	9	8
Time (in minute)	20	25
Temperature	21 ⁰ C	21 ⁰ C
Burning time	30 minutes	24 minutes

Table NO. 3 Result of Repellency test

SMOKE TOXICITY TEST : Smoke toxicity experiment was conducted in a net. The mosquitoes were attracted by using a pair of socks and the mosquitoes were exposed to the smoke of burning incense for 45 min. and the mortality data should be recorded after every 15min.

- Result:-**

	Marketed Coil	Formulated dhoop
No. of mosquitoes	10	10
No. of mosquitoes dead	8	7
Time (in minute)	20	25
Temperature	21 ⁰ C	21 ⁰ C
Burning time	30minutes	25 minutes

Table NO. 4 Result of Smoke toxicity test

- EVALUATION OF MOSQUITO REPELLENT ACTIVITY :** Test was done by simply selecting the mosquito prone areas in the evening and night period. For investigating mosquito repellent activity the prepared incense sticks are checked for causaleffect such as irritation, coughing, and tears are observed and recorded.

• **Result:-**

Sr.no	Area	Time	Observation	Result
1	Bathroom	Morning time	Mosquitoes escaped, less irritation, no coughing tears , no headache	Mosquitoes Repelled
2	Kitchen	Night time	Mosquitoes escaped, less irritation, no coughing tears , no headache	Mosquitoes Repelled

Table No.5 Result of Evaluation of Mosquito Repellent Activity

CONCLUSION

Before mosquito repellent incense sticks were developed, a thorough literature review was conducted. Neem, Tulsi, sandalwood, rose oil, peppermint oil, thyme oil, camphor, and other plants with mosquito-repelling properties were chosen, ground into powder, and then used to create incense sticks by adding binders. Using the mosquito net cage method, the incense sticks were evaluated, and the results showed that they effectively repelled mosquitoes. Ten consumers gave the product positive feedback, and the rating score for product satisfaction was four out of five. Additionally, the product was examined for allergy symptoms, and no complaints of pain, sneezing, or wheezing were found. The product has strong mosquito-repelling properties and is generally safe to use.

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