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## FORMULATION AND EVALUATION OF POLYHERBAL MOSQUITO-REPELLENT DHOOP

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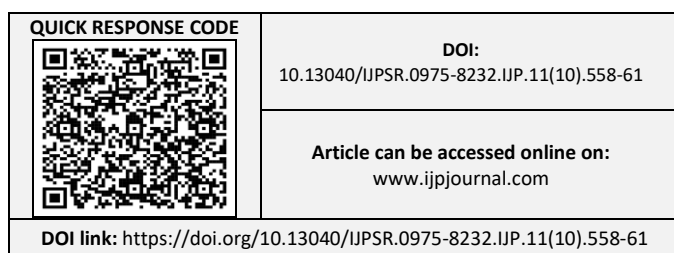
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**ABSTRACT:** Mosquitoes are the major deadliest insects in the world which cause the number of vectors borne diseases (e.g., Dengue, malaria, Zika virus fever, yellow fever, west Nile fever, Japanese encephalitis) in human being. In present years, interest in plant-based products has been revived because of the development of resistance, cross-resistance and possible toxicity hazards associated with synthetic insecticides and their rising costs. Presently available mosquito repellent in the market is based on the chemical and they are toxic against the skin and nervous system, thereby they cause skin rashes, swelling, eye irritation, and other health problems. So, to overcome these herbal products are more preferred than chemical-based mosquito repellents. Herbal materials belonging to different plant species and their mixtures have been seen to act as effective repellent against various mosquitoes and pests. The easy availability and less adverse environmental impact have led to the increased interest in plant origin repellants which are safe and biodegradable alternatives to synthetic chemical repellants for use against mosquitoes and pests. The easy availability and less adverse environmental impact have led to the increased interest in plant origin repellants which are safe and biodegradable alternatives to synthetic chemical repellants for use against mosquitoes. By performing dhoop, various airborne diseases may be prevented, and the product been easily available in remote area leading to its sterilization. The current work focuses on preparation and evaluation of natural and herbal dhoop formulation for cleansing the environment. Further research is warranted to explore the full spectrum of biological activities of the formulation, optimize its composition, and assess its long-term safety and efficacy in diverse environments.

**INTRODUCTION:** Mosquito borne diseases such as malaria, dengue, yellow fever, filariasis and chikungunya are major health problems all around the world<sup>1</sup>. There are more than a hundred species of mosquitoes throughout the world that can act as vectors to transmit the different types of diseases in humans and other vertebrates<sup>2</sup>.

Over the past three decades, the encounter of humans with mosquito borne viruses (MBV) such as zika virus, Flavivirus, yellow fever virus, dengue virus and chikungunya virus to become frequent, and these viruses greatly expanded their distribution range, causing large epidemics, responsible for millions of human cases with significant morbidity and mortality<sup>3</sup>.

A/C to the recent data provided by the WHO, 241 million cases of malaria were estimated in 2020, which resulted in more than 400,000 deaths due to this disease<sup>4</sup>. As mosquitoes and diseases from them are spreading globally and affecting different



regions, mosquito control and personal protection from mosquito bites is the major meaningful measure for controlling several life-threatening diseases transmitted by bites of blood-seeking mosquitoes. Proper selection and application of mosquito repellents are essential to reduce mosquito borne diseases. They are volatile chemicals which repel the mosquito in the opposite direction from its source<sup>5</sup>. An ideal mosquito repellent should be effective, safe, non-toxic, and not produce any adverse effects when used in houses or applied to children, adults, and women during pregnancy<sup>6</sup>.

Chemical repellents such as allethrin, dimethyl phthalate (DMP), IR3535 [ethyl butyl acetyl amino propionate (EBAAP)], N, N-diethyl-met-toluamide (DEET) and picaridin and are utilized in most the commercially produced mosquito

repellents. However, these repellents contain poisonous and harmful compounds and are non-biodegradable, which can hamper the ecosystem and cause various other health related issues<sup>7,8</sup>.

So due to the above reason, the best alternative is to select plant-based mosquito repellents to control mosquitoes and treat mosquito-borne illness. The plant-based compounds are eco-friendly, species-specific, biodegradable and have lesser or no harmful effects on human beings<sup>9</sup>. This formulation not only provides protection but also fills the environment with a pleasant aroma, making it a preferred choice for those looking to avoid chemical-based repellents. The introduction of such a natural mosquito repellent is a step forward in promoting health and wellness, ensuring safety from mosquito-borne disease while preserving the integrity of our ecosystem.

## MATERIALS AND METHODS:

### Materials:

**TABLE 1: THE DETAILS OF THE INGREDIENTS OF HERBAL DHOOP**

Sl. no.	Ingredients	Scientific name	Category	Qty. taken
1	Turmeric	<i>Curcuma longa</i>	Antimicrobial, antibacterial	1tbl spoon
2	Neem	<i>Azadirachta indica</i>	Antimicrobial	5gm
3	Tulsi	<i>Osmium sanctum</i>	Antiflu	5gm
4	Mint	<i>Mentha piperita L.</i>	Mosquito repellent and antiviral	5gm
5	Sambrani	-	Biofuel	3tbl spoon
6	Camphor	<i>Cinnamomum camphora</i>	Air purifier/biofuel	10gm
7	Cowdung	-	Biofuel	1 part
8	Ghee	-	Binder	15g
9	Cowmilk	-	Binder	10ml
10	Rose water	-	Perfuming	Q.S.
11	Marigold leaves	<i>Tagetes erecta</i>	Perfuming	Q.S.
12	Clove	<i>S. aromaticum</i>	Antimicrobial	2gm
13	Cinnamon	<i>Cinnamomum verum</i>	Mosquito repellent	10gm

**Preparation of Herbal DhooP:** The plant powders and cowmilk and ghee were taken in a clean mortar and pestle and macerated finely. The cow dung was added to this mixture and again macerated finely to obtain a fine paste **Table 1**. A polythene sheet will

cut into cone shape and fill the above mixture and compress it then remove the polythene cover and keep aside for drying up to four days in an oven at 50°C temperature and stored in an airtight container<sup>10</sup>.



**FIG. 1: FORMULATED DHOOP**

**RESULT AND DISCUSSION <sup>11</sup>:**

1. Physical evaluation
2. Sensory analysis
3. Anti-microbial analysis
4. Mosquitos’ repellent activity
5. Flammability and burning time

**Physical Evaluation:**

**TABLE 2: PHYSICAL PARAMETER AND THEIR OBSERVATION**

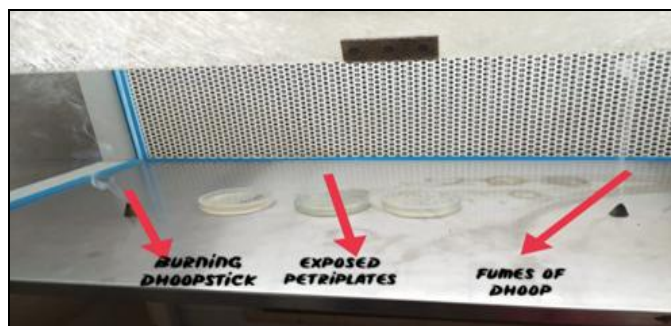
Sl. no.	Parameters	Observation
1.	Colour	Brownish
2.	Odour	Resinous

**Sensory Analysis:** A survey also carried out in order to evaluate the acceptability of herbal dhoop among 15 peoples. Various parameters such as smell, appearance, smoke *etc.*, was evaluated.

**TABLE 3: SENSORY ANALYSIS MADE BY THE PEOPLE**

Sl. no.	Question	Yes	No
1.	Is the smell appreciable?	13	02
2.	Smoke is irritating?	09	06
3.	Use of product at home?	15	00
4.	Will you recommend the product?	13	02
5.	Resinous product?	09	06

**Anti-microbial Analysis:** The evaluation of antimicrobial activity was carried out by preparing nutrient agar plates in duplicates (2 sets of plates exposed in same area) each. One set from each area was exposed to dhoop for one hour. Later this plates along with those set of plates not exposed to dhoop were exposed to different areas and incubate at 37°C for 24 hrs in an incubator.



**FIG. 2: EXPERIMENTAL SETUP FOR EVALUATING THE ANTI-MICROBIAL ACTIVITY**

**Mosquitos’ Repellent Activity:** To evaluate the dhoop stick against mosquitos’ repellent activity. The repellency activity by the stick or dhoop to the

mosquitos shown successful result when burning in a bawn having mosquitos and it explain that natural insecticidal preparation is always effective than synthetic repellent. During the burning of dhoop it was shown that 80% of the mosquitos are killed.



**FIG. 3: MOSQUITOS’ REPELLENT ACTIVITY**

**Flammability and Burning Time:** The flammability and burning time of the dhoop was checked by burning dhoop. It was observed that the dhoop was burnt completely creating smoke and the burning time was 24 min <sup>12</sup>.

**CONCLUSION:** There poly herbal dhoop was prepared and evaluated. The main aim of present study is to cleansing the air and kill the mosquitos. The above evidence that this dhoop can cleanse the air or environment and having the mosquito’s repellent activity. It can also create a positive environment and can also act as room purifier. This dhoop may serve as an alternative to the chemical-based dhoop sticks.

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**CONFLICT OF INTEREST:** Nil

**REFERENCES:**

1. Shraddha G, Desai S, Mistry J, Patel S and Ingahlalli R: Efficacy of leaves of *Lantana camara* as mosquito repellent. Int J Trend Sci Res Dev 2018; 2(5): 1397–1404.
2. Rueda LM: Global diversity of mosquitos (Insecta: Diptera: Culicidae) in freshwater. Hydrobiol 2008; 595: 477–487.
3. Bellone R and Failloux AB: The role of temperature in shaping mosquito-borne viruses transmission. Front Microbiol 2020; 11: 584846.
4. Bernhard L, Bernhard P and Magnussen P: Management of patient with lymphoedema caused by filariasis in Northeastern Tanzania. Physiother 2003; 89: 743–749.
5. Focke ABWW, Tewo RK, Androsch R and Kruger T: Mosquito-repellent controlled-release formulations for fighting infectious diseases. Malar J 2021; 20: 165.

6. Diaz JH: Chemical and plant-based insect repellents: efficacy, safety, and toxicity. *Wilderness Environ Med* 2016; 27(1): 153–63.
7. George I, Edim H and Edet E: Studies on mosquito repellent activity of *Cymbopogon citartus* (lemon grass) using human volunteers. *Int J Res-Granthaalayah* 2016; 4(12): 41–47.
8. Hazarika H, Krishnatreyya H, Tyagi V, Islam J and Gogoi N: The fabrication and assessment of mosquito repellent cream for outdoor protection. *Sci Rep* 2022; 12(1): 2180.
9. Hazarika H, Boruah S, Islam J, Paul A and Zaman M K, Antimicrobial, mosquito larvicidal and repellent activity of essential oils isolated from three local species of ginger grown in upper Assam region, India. *Curr Trends Pharm Res* 2020; 7(1): 126–142.
10. Kumar A, Bhatia VK and Chauhan N: *In-vitro* antimicrobial evaluation of herbal dhoop prepared from cow products and herbs. *IJPPR Human* 2020; 19(3): 629-637.
11. Akanksha A. Dethe, Pallavi J. Gaikawad, Manasvi A. Dhokale and Dipali S. Shelke: A review; “preparation and evaluation of herbal doop. *IJARST* 2022; 2(2): 216-219.
12. Sonawane AP, Tamboli Abhijeet S and Gokhale Omkar D: Asian J. Pharmacog, Formulation and Evaluation of polyherbal Dhoop (Fumigation) for Sterilization 3(1): 18-22.

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