

## Formulation and Development of Herbal Mosquito Repellent Cream from *Anisomeles Heyneana*

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Submitted: 26-05-2022

Revised: 03-06-2022

Accepted: 07-06-2022

### ABSTRACT

The purpose of this study was to determine the herbal mosquito repellent activity of plant components like *Anisomeles heyneana* was used to create safe and effective herbal mosquito repellent cream formulation, belonging to the family Lamiaceae. Extraction of *Anisomeles heyneana* using the Soxhlet apparatus to extract the ethanol extract. The arm-in-cage method was used to test the activity of mosquito repellents. In this procedure, exposed to a cage containing 20 mosquitoes and then the volunteer's forearms were rubbed with 1gm cream as applied to the volunteers, after check the number of mosquito insects aligning as biting the arm being recorded every minute in This repellent activity was carried out in the indoor activity carried out 5 min determining the mosquito repellent activity of each cream for indoor and outdoor as a comparison to standard odorous cream, Mosquito repellent cream with active components of *Anisomeles heyneana*, the active constituents present in phytoconstituents are tannins, steroids, terpene, flavonoids, active ingredients for *Anisomeles heyneana* ranging from F1 - 0.25% w/v, F2 - 0.50 % w/v, and 0.75 % w/v was created for each cream formulation. After checking the evaluation of the cream following are viscosity, spreadability, pH, Washability, and thermal stability are measured.

**Keywords** - *Anisomeles heyneana*, Mosquito Repellent activity, cream evaluation.

**Place cite of this article:** SMBT Institute of Diploma Pharmacy, Nandi-hills, Dhamangaon, Nashik, and Maharashtra, India.

### I. INTRODUCTION

Mosquitoes are among the most vexing blood-sucking insects that humans must contend with several mosquito species belonging to the genera *Anopheles*, *Culex*, and *Aedes* serve as a vector for diseases such as Dengue fever, Malaria, Yellow Fever, Japanese Encephalitis, and a variety of other infections, Mosquitoes also transmit diseases to approximately 700 million people worldwide, resulting in over one million fatalities each year. As a result, Mosquito management is a major public health concern all over the world, the goal of this study is to produce effective plant-based mosquito repellent products because the majority of mosquito repellent creams and devices on the market are considered to have detrimental harmful effects on humans<sup>1</sup>.

Insect repellents have been used since the beginning of time. Oil of citronella, dimethyl phthalate, in alone, and Rutgers 612 were the only four main repellents available before World War II. During the war, other military repellent formulas for use on garments were created, but none of them were successful in providing the needed protection to military soldiers stationed around the world. As a result, the US government had screened over 20,000 mosquito repellent chemicals by 1956. N, N-diethyl-m-toluamide (DEET) was discovered to have insect repellent characteristics in 1953, and the first DEET product was released in 1956. The most extensively used mosquito repellent is still DEET. Although it is generally considered safe, side effects have been reported, including encephalopathy in children, urticarial syndrome, allergy, hypotension, and slowed heart rate. There have been several other chemicals tested for repellent properties, but none have achieved the commercial success of DEET<sup>6</sup>.

### Control mosquito disease

Mosquito management and personal protection from mosquito bites are now the most essential measures for controlling mosquito-borne diseases. Mosquito control strategies include habitat modification and biological control. Physical control of disease transmission involves killing or stopping mosquitos from biting humans, which can be accomplished by the use of mosquito repellent<sup>7</sup>.

### Anisomeles heyneana

Anisomeles Linn .R.Br is one of the most important genera in the Lamiaceae family, with plants ranging from Africa to India, Southeast Asia to Northeast Australia, and east to Taiwan, Japan, and the Philippines. India has the Anisomeles genus is represented by three species viz. Anisomeles Indica, Anisomeles malabarica, and Anisomeles heyneana. Anisomeles heyneana commonly this species is known as western hill catmint chandhara in Hindi, Gopali in Marathi, and Oshthaphala Anisomeles heyneana in Sanskrit. It is a tall, erect herb with slender stems and branches that are quadrangular oppositely arranged ovate lance like-a leaves that are 5-12 cm long. Flowers appear in cymes ranging in length from 10 to 30

cm. White flowers with a pink tinge and two lips grow to 1 to 1.5 meter in height. The upper lip measures 5 millimeters. The bottom lip has three-lobed edges. The flowers resemble cow earlobes, hence its Marathi name. It blooms from October to November<sup>2,13</sup>.

### II. MATERIALS AND METHODS-

**Collected and processing** –On the 30<sup>th</sup> of October, the Anisomeles heyneana plant was collected from the western ghats of India in the 'where valley,' latitude 20°6'53"N; Longitude 73°27, 7"E of tribakeshwar Tehsil District Nashik, Maharashtra (India). 2022, October proof D.M Kokate, dept. of botany, m.v.p's prepares and authenticates a herbarium. Nashik K.S.S.W college at the institute level, the plant voucher specimens have been kept SMBTIODP/HERM/22-2022(SMBTIODP/HERB/16-20220 to remove adhering dust and unwanted substance, the entire herb was washed with water. plant matter was taken out its was then dried chopped and pulverized in the shade. The dried powdered material was used for the extraction.



Figure 1 -Anisomeles heyneana

### Morphological classification -

**Hindi**- Chandra

**Marathi** -Gopali

**Other** – Chandhara, Western Hill Catmint

**Sanskrit**- Oshthaphala

**Kingdom** -Plantae

**Phylum** -Tracheophyta

**Class**–Magnoliopsida

**Order**-Lamiales

**Family** -Lamiaceae

**Genus** -Anisomeles

**Species** -Anisomeles heyneana.

### Extraction

Soxhlet Extraction - 40 g of dried powder of Anisomeles heyneana plant were weighed and extracted in a Soxhlet apparatus with 250ml of solvent at room temperature for 18 hours.

### Phytochemical analysis

The identification of different phytoconstituents was carried out using proximate chemical analysis of Anisomeles heyneana extract.

Alkaloids, phenols, flavonoids, saponins, tannins, cardiac glycosides, phytosterols, mucilage, triterpenoids, amino acids, proteins, and other phytochemicals were investigated. This examination was carried out using an experimental procedure<sup>5</sup>.

**The following steps are used to make the herbal mosquito cream**

By emulsifying the essential oils in water with an emulsifying wax, an aqueous cream oil in water type was created. The mosquito repellent cream's formula is as follows.

**Table 1:** Formulation chart of mosquito repellent cream-

INGREDIENTS	F1	F2	F3
Extract	0.25%	0.50%	0.75 %
Propylene Glycol	2.5%	5%	7.5%
Cetyl alcohol	2%	2%	2%
Lanolin	1%	1%	1%
Stearic acid	20%	20%	20%
Glycerin	10%	10%	10%
Potassium hydroxide	1%	1%	1%
Methyl paraben	0.2%	0.2%	0.2%
Propylparabens	0.02%	0.02%	0.02%
Mentha oil	5%	5%	5%
Distilled water	Q.S.to100%	Q.S.to 100%	Q.S. to 100%

**Preparation of Anisomeles heyneana Cream –**

The oil in water type cream was made by combining lanolin, stearic acid, cetyl alcohol, and propylparabens these ingredients are oil phase and glycerin, potassium hydroxide, methylparaben, this ingredient in the water phase. Both the oil and aqueous phases were heated at 70°C. The oil phase was added to the aqueous phase with continuous stirring until a homogeneous cream was formed. After complete emulsification, the active components of the Anisomeles heyneana extract added propylene glycol were mixed properly, and then the addition of mentha oil was at a temperature of 30°C<sup>8</sup>.

**Mosquito repellent activity** -. (Oyedelep et al.2002; odalo et al, 2004).

**Mosquito repellent indoor activity** – (check this activity performed under the guidance of a physician)

The indoor activity was tested in the arm cage method, in this activity performed in SMBT institute of Diploma pharmacy at the research level, the same no of mosquito samples was collected at the district Malaria hospital department in Nashik for Mosquito repellent activity. The herbal insect repellent cream against Anopheles Gambia mosquitoes was tested. Female Anopheles Gambia was obtained from the surrounding neighborhood and starved for 18 hours to test mosquito repellent action (MRA). Humans were chosen for MRA who had a minimal or no allergic reaction to mosquito bites or the test herbal cream. On the day of the trial, before checking the mosquito repellent activity volunteer's health is good. The volunteers had no interaction with lotions, fragrances, oils, or perfumed soaps. 20 hungry female Anopheles Gambia were placed in a cage measuring 50x50x50 cm. The test 2 gram

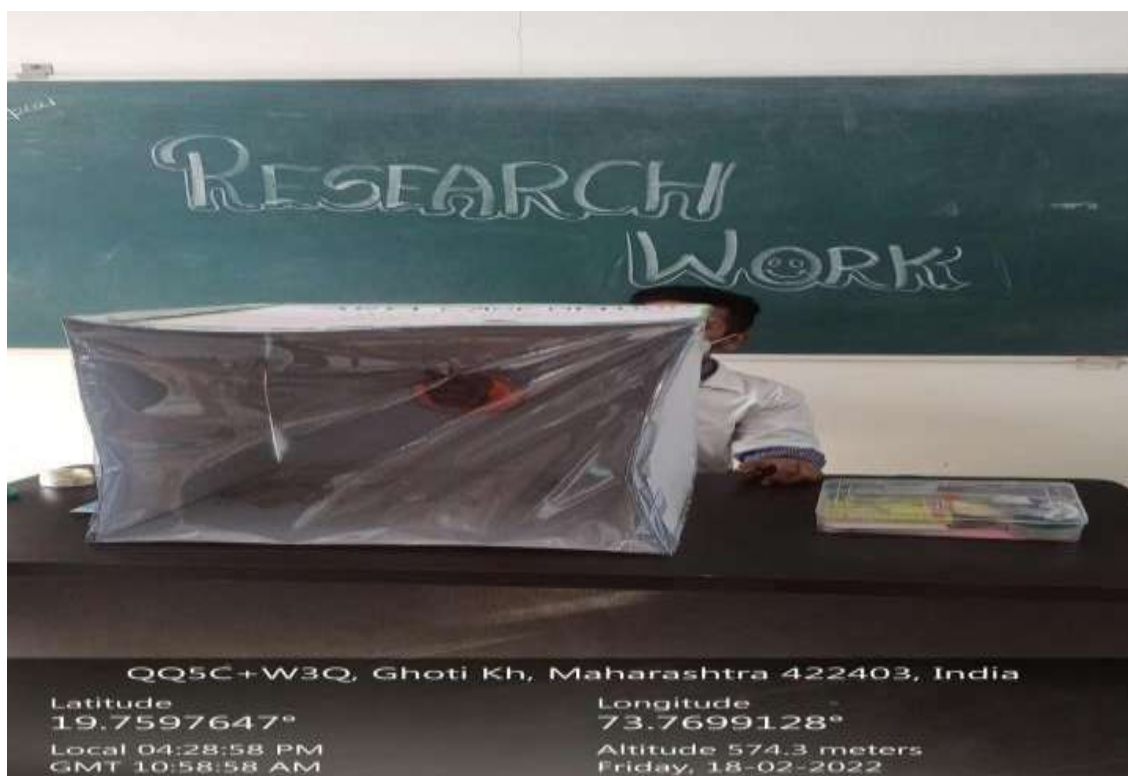
cream was applied to a volunteer's forearm from wrist to elbow. A glove was worn over the remaining hand. After releasing the 20 experimental insects, the control arm was placed in the cage and remained there for 5 minutes. During the test, the number of insects that landed and bit that arm was recorded. The treated was placed in the cage for the same amount of time as the control,

and the number of landing and biting insects was counted. Each test sample was examined at the same concentration<sup>12</sup>. Table.4 shows the results.

Sample Number – Control Number

Repellency (%) = -----  
----- X 100

The Total Number of Controls



**Figure 2: Test of mosquito repellent activity (Indoor)** – The indoor activity for mosquito repellent test result is in table 4.

**Evaluation of cream –**

The cream's appearance, spreadability, irritancy test, viscosity, pH, and thermal stability were all investigated.

**Appearance –**

Color, texture, roughness, and scent were used to evaluate the cream's appearance.

**Spreadability -**

The spreadability was measured in seconds for two slides to separate from the cream; the shorter time it took for two slides to separate from the cream, the better. Two sets of standard-sized glass slides were taken. One of the slides was covered with the herbal cream formulation. The cream was sandwiched between the two sides after the other slide was placed on top of the

formulation. The upper slides were weighted, causing the cream between the two slides to be pushed uniformly to form a thin layer. The burden was lifted.

**Viscosity –**

At room temperature, the viscosity of the sample was determined by using a Brookfield viscometer and is found to be 839 ± 31 P.

**Irritancy test –**

On the left hand dorsal surface, mark an area (1 sq.cm) surface .the cream was applied to specific area and the duration of irritation examined and reported at regular intervals up to 24 hours and reported.-

**pH –**

A standard buffer solution was used to calibrate the pH meter. In a 100 ml beaker, 1g cream was weighed and dissolved in 45.0 ml of distilled water, then dispersed in it. Using a pH meter

The pH of the cream was determined to be 6.8.

**Washability –**

The washability of formulation was tested by first applying the skin, then assessing the ease and extent of washing it with distilled water and manually examining the effect<sup>15</sup>.

**Thermal stability –**

For 48 hours, the formed cream was stored in Petri plates within the incubator at 45°C. If the sample displays no oil separation or other phase separation after being removed from the incubator, it passed the test.

**III. RESULT -**

The herbal mosquito repellent was to determine the herbal mosquito repellent effects of Anisomeles heyneanacream so that safe and effective herbal insect repellent, Herbal based has a considerable repellent effect, the visual appearance, spreadability, irritancy test, pH, and thermal stability of the prepared cream were all measured. The cream was a nice appearance, with a smooth texture and the ability to spread effortlessly. The cream passed the irritancy test with no signs of redness or itching, indicating that it is safe to use topically. The pH of the cream was discovered to be 6.5. Which is closer to the skin's necessary pH. and viscosity of herbal mosquito repellent cream is found to be  $839 \pm 31$  P. The cream remained thermally stable at  $45^\circ\text{C} \pm 1^\circ\text{C}$  for 48 hours with no phase separation.

**Table 2- Phytochemical analysis of extract –**

Phytoconstituents	Pet.ether (40°-60°)	Benzene	Chloroform	Propanone	Ethanol	Water
Alkaloids	-	-	-	-	-	-
Amino acids	-	-	-	-	-	-
Carbohydrates	-	-	-	-	-	+
Flavonoids	-	-	+	-	+	-
Mucilage	-	-	-	-	+	+
Phenolic	-	-	-	+	+	+
Testosterone	+	+	+	-	-	-
Proteins	-	-	-	-	-	+
Saponins	-	-	-	-	+	+
Tannins	-	-	-	+	+	-
Triterpenoids	+	+	+	+	+	-

'+' presence, '-' absence

Following are observations of the Phytoconstituents in herbal mosquito repellent cream like Tannins steroids, terpenoids flavonoids are present shown in following table 2

**Observations -**

**Table 3-Values of evaluation parameter of cream –**

Formulation	Thermal stability	pH	Spreadability	Viscosity	Irritation	Appearance And Washability
F1	$45^\circ\text{C} \pm 1^\circ\text{C}$	6.3	6.2g cm/sec	$1000 \pm 35$ P	NIL	Good
F2	$45^\circ\text{C} \pm 1^\circ\text{C}$	6.2	6.3 g cm/sec	$940 \pm 33$ P	NIL	Good
F3	$45^\circ\text{C} \pm 1^\circ\text{C}$	6.5	6.2 g cm/sec	$839 \pm 31$ P	NIL	Good



**Table 4 - Herbal mosquito repellent activity for cream indoor and outdoor repellency result -**

Treatment Stability	Repellency (%)	
	Indoor	
Positive control	98.25±1.25	
F1	82.38±1.11	
F2	87.49±1.32	
F3	90.15±1.55	

**IV. CONCLUSION -**

Thus, in the current investigation, creams containing 0.75 % Anisomeles heyneana have a great mosquito repellent effect on F3 formulation. Based on these findings, both Phytoconstituents have the potential to be employed in pharmaceuticals.

**V. ACKNOWLEDGMENT –**

We are very thankful to the Principal of SMBT Institute of Diploma Pharmacy and SMBT Sevabhavi trust, Dhamangaon Nashik. Maharashtra India for providing us with facilities in our research work

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