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Research Article

Formulation And Evaluation of Safe Herbal Mosquito Repellent Roll-On

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ABSTRACT

Control of mosquitoes is something of almost importance in the present day with rising number of mosquitoes borne illnesses. Deforestation and industrialized farming are also two of the factors causing an alarming increase in the range of mosquitoes. Specialty products like mosquito repellent used to combat mosquitoes are required. Each of the products used for mosquito control have varying degrees of effectiveness. Carbon dioxide and lactic acid present in sweat in warm- blooded animals act as an attractive substance for mosquitoes. The perception of the odor is through chemo-receptors present in the antennae of mosquitoes. Insect repellents work by masking human scent; a number of natural and chemical mosquito repellents were studied in this review that work to repel mosquitoes. Chemical mosquito repellents has a remarkable safety profile, but they are toxicity against the skin & nervous system like rashes, swelling, eye irritation, and worse problems, though unusual --including brain swelling in children, anaphylactic shock, and low blood pressure. Hence it was concluded that natural mosquito repellents were preferred over chemical mosquito repellents.

INTRODUCTION

Mosquitoes spread disease like malaria, dengue, and chikungunya. Therefore mosquito control and personal protection from mosquito bites are the most important measure to control the disease. Prevention of this type of diseases involves protecting against mosquito bites. Use of appropriate mosquito repellent is important to avoid diseases [1]. The substances which make surface unpleasant to the mosquito are considered as mosquito repellent. The repellents block the lactic acid receptors and thus the mosquito loses its contact.[2]. It is usually applied to the skin or other surfaces which discourages mosquito from landing on those surfaces. These compounds mainly contain active ingredients as well as secondary ingredients which aids in the delivery of cosmetic appeal [3]. They are available in many forms such as creams, lotions, oils and most often are aerosols[4]. Malaria is a principal cause of illness and death in countries where the disease is

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endemic. Personal protection against mosquitoes using repellents could be a useful method that can reduce and/or prevent transmission of mosquito-borne diseases [5]. The available repellent products, such as creams, roll-ons, and sprays for personal protection against mosquitoes, lack adequate long-term efficacy. In most cases, they need to be re-applied or replaced frequently [6]. The encapsulation and release of the repellents from several matrices has risen as an alternative process for the development of invention of repellent based systems. The present work reviews various studies about the development and use of repellent controlled-release formulations such as polymer microcapsules, polymer microporous formulations, polymer micelles, nano emulsions, solid- lipid nanoparticles, liposomes and cyclodextrins as new tools for mosquito-borne malaria control in the outdoor environment [7]. Furthermore, investigation on the mathematical modelling used for the release rate of repellents is discussed in depth by exploring the Higuchi, Korsmeyer-Peppas, Weibull models, as well as the recently developed Mapusa model. Therefore, the studies searched suggest that the final repellents based-product should not only be effective against mosquito vectors of malaria parasites, but also reduce the biting frequency of other mosquitoes transmitting diseases, such as dengue fever, chikungunya, yellow fever and Zika virus. In this way, they will contribute to the improvement in overall public health and social well-being [8]. According to tradition various types of substances are used to repel mosquitoes such as smoke, plant extracts, oils, tars, and muds [9]. Carbon dioxide and lactic acid present in sweat of warm blooded animals and humans attracts female mosquitoes. In this context, we had selected oils extracted from grapefruit, cucumber, sandalwood and curry leaves obtained by steam distillation for possible mosquito repellent activity and formulated into topical dosage forms like Roll-one [10]. Topical route is most popular because of low cost, ease of application leading to high level of patient's compliance. Roll-on can help repelling mosquitoes faster and easy for handling during travelling or in garden's and fits perfectly in pockets, purses etc. [11]. Mosquitoes are Wideman thingh out the world Given that there potent and main vectors of diseases such as malaria, dengue, and yellow fever currently ac effective recognize against viruses and paras transmitted by arthropods, the development of insect repellents is crucial [12]. Many chemical-based repellents are available in the market, but they can be harmful to human and the environment, and have been with many side effects[13]. Knowledge of traditional repellent plant the incredibly beneficial for the development of natural alternatives to chemical repellents Plant oils may eventually prove to a viable alternative to synthetic repellents because they are often ask, inexpensive, and readily available in this stay we aimed prepare mosquito repellents using natural ingredients selectively viral plants that have been shown to repel mosquitoes and designed two different formulations using neem, eucalyptus oil, peppermint oil, glycerin as the main ingredients[14]. We want various easement humiliate a roll- on repellent, which evaluated for its aroma and skin irritata potential Anally we prepared a herbal mosquito repellent roll on using plant oil essential oils to create a surface layer in the water [15]. substance that prevents arthropods from landing on or biting human skin is known as a repellent. Female mosquitoes are attracted to lactic acid and carbon dioxide in perspiration, which their antennae’s chemoreceptors can detect [16]. Essential oils (EOs) are complex mixtures of plant-derived volatile organic chemicals that have been shown to have repellent effects. The monoterpenoids, sesquiterpenes, and alcohols found in EOs assist in explaining why they are repulsive [17]. Various EOs containing constituents such as citronellol, citronellal, α-

pinene, and limonene have been found to have repelling properties. Recent studies have demonstrated that linalool, a naturally occurring terpene alcohol found in many flowers and spice plants, and eucalyptol, a natural organic substance, activate the odorant receptor neuron in a mosquito's antennal sensilla[18]. The odor-sensing- based repellent screen platform is a new approach for creating repellents or chemicals with novel modes of action against arthropods. Repelling refers to the impact of a repellent on the sense of smell[19]. The chemical used in repellents restricts the ability of insect humid sensory receptors to sense moisture by inhibiting this capacity, thereby making humans undetectable to insects[20]. The DEET(N,N-diethyl-meta-toluamide) used in market preparation causes health disorder like asthma, respiratory disease and skin disease. It is useful for the infant's, old age people and child because it doe's not release harmful chemical fumes causes respiratory disease.

Essential Oils and Insect Repellents:

A substance that prevents arthropods from landing on or biting human skin is known as a repellent. Female mosquitoes are attracted to lactic acid and carbon dioxide in perspiration, which their antennae's chemoreceptors can detect. Essential oils (EOs) are complex mixtures of plant-derived volatile organic chemicals that have been shown to have repellent effects. The monoterpenoids, sesquiterpenes, and alcohols found in EOs assist in explaining why they are repulsive. Various EOs containing constituents such as citronellol, citronellal, α- pinene, and limonene have been found to have repelling properties. Recent studies have demonstrated that linalool, a naturally occurring terpene alcohol found in many flowers and spice plants, and eucalyptol, a natural organic substance, activate the odorant receptor neuron in a mosquito's antennal sensilla. The odor-sensing-based repellent screen platform is a new approach for creating repellents or chemicals with novel modes of action against arthropods. Repelling refers to the impact of a repellent on the sense of smell. The chemical used in repellents restricts the ability of insect humid sensory receptors to sense moisture by inhibiting this capacity, thereby making humans undetectable to insects[21].

Herbal Mosquito Repellent Roll-On:

Essential oils are typically extracted through distillation, often using steam. Other techniques include cold pressing, resin tapping, wax embedding, solvent extraction, absolute oil extraction, expression, and wax extraction. Essential oils (EOs) are defined as volatile oils that have strong aromatic components and give a distinctive odor, flavor, or scent to an aromatic plant. Many natural EOs with mosquito repellent properties have been discovered and utilized. They have various biological effects, such as antiseptic, antibacterial, antiviral, and fungicidal properties. Additionally, their larvicidal activity, repellent effects, and insecticidal properties have been confirmed [14]. Roller bottles, which can be used to create customized blends, are a helpful tool for utilizing essential oils. The roller ball on top makes it easy to apply the precise amount to the desired area, as it delivers a portion of the mixture upon contact. Due to their size, they don't take up much space in your handbag or backpack[22]. The ingredient used in the herbal mosquito repellent roll-on are naturally synthesized, which doe's not contain any harmful chemical. These ingredient collected from the natural sources like mint leaves, eucalyptus leaves, neem leaves. And glycerin is collected from the animal and plant sources, And egg albumin powder made up from the ovalbumin and egg white.

Sr no	Ingredient	Category
1	Neem oil	Insecticidal agent, Anti-bacterial, Antifungal, Anti-inflammatory, Skin-healing agent.
2	Eucalyptus oil	Provide fragrance and cooling sensation. Has Antimicrobial and refreshing effect.
3	Peppermint oil	Relives headache, Nausea IBS symptoms, Act As decongestant and analgesic. Provide cooling sensation.
4	Glycerin	Lubricant, Antifreeze, Plasticizer, Moisturizer.
5	Egg albumin powder	Emulsifier, Binding agent, Provide a good texture.

Procedure:

Firstly collect the essential oil's. Like eucalyptus oil, neem oil, peppermint oil, glycerin, egg albumin powder. Neem oil is excreted through the decoction method of extraction.

Decoction Method of Extraction:

1) Firstly collect the fresh and healthy leaves of naam plant (azardious indica).
2) Then weight it accurately 200 gm, And wash it with distilled water repeatedly until all the dirt remove's out.
3) Place these leaves in the mortar and pestle and crush it in a fine paste.
4) Then add 400 ml distilled water in it.
5) Mix the water and neem leaves paste in the beaker and allow it to boil for 25 minutes.
6) Then allow it for cool down in a room temperature for 15 minutes.
7) After the cooling down of mixture allow the mixture for simple filtration process.
8) Then collect the filtrate from the filtration process.
9) These oil is considered as the neem oil or neem extract.

Formulation of mosquito repellent roll on:

-Firstly collect all the ingredient required for the formulation of mosquito repellent roll on.

-Then weight it according the formula using the measuring cylinder, and weighing balance.

Neem oil	6 ml
Eucalyptus oil	7 ml
Peppermint oil	4 ml
Glycerin	3 ml
Egg albumin powder	2 gm

-After the proper measurement of ingredient one by one addition of oil take place firstly add neem oil in beaker and then add eucalyptus oil stir the mixture vigorously and add peppermint oil, glycerin and egg albumin powder in it mix it until it form uniform formulation.

-Allow the mixture for settle down for 15 minutes.

-After that make the simple filtration method setup for the filtration of oil's with the double layer of filter paper.

-And pour the mixture on the filter paper it take 2-3 hours for the filtration process after the complete procedure of filtration collect the filtrate.

Store the filtrate in the air 20 ml roll on container.

Evaluation Test:

1. Physical Test

2. Colour: Light Yellow

3. Odor: Pungent

Skin irritation test: The roll-on was applied to the skin and checked for irritation every hour. It was found to be non-irritating and was absorbed quickly. No redness or irritation was observed on the skin [27].

Fig. Skin Irritation Test:

Surface layer uniformity: After the storage of formulation for 15 to 30 days period checking for the contamination and phase separation, time to time but there is no any microbial contamination or oil phases separation. And these test shows the surface layer uniformity.

Fig. Surface Layer Uniformity

PH: The pH of the repellent roll on was measured using a pH meter after diluting the liquid with distilled water. The pH was found to be 5.5 at 25°C[29].

Fig. pH

CONCLUSION:

Conclusions and recommendations for future work Research on mosquito repellents is increasing every day due to the high demand for protection against mosquitoes-borne malaria. In the recent past, there has been extensive search for a safe, pleasant, and environmentally friendly product to mitigate or reduce transmission of diseases caused by mosquitoes. The most essential concern is to extend the time of protection of the repellents that are effective. TO development of new tools as formulation-based mosquito repellents is an important strategy for achieving systems that are more effective and have fewer undesirable impacts. Repellent based on polymeric micro and nano capsules, micro/solid lipid nano- particles, nano emulsions/microemulsions, liposomes, nanostructured micellar hydrogels and cyclodextrins provide slow release of mosquito repellent into the environment, improving the effectiveness of repellent for long period of time and reducing human exposure to the agent, for example, by permeation through the skin. Some of the studies suggested the possibility of developing long-life mosquito repellent-based products such as bracelets, socks, creams, roll-ons, and sprays that can be implemented in malaria-endemic regions outdoors. As a recommendation, more work should be done to under-stand their basic principles of formation and mechanism of release rate of repellent from the device's systems. Additionally, more studies that emphasize the physical and chemical elements and basic entomological impact are also required. Finally, more extensive and rigorous entomological and epidemiological testing should be established on products-based repellents that are more refined before they could become commercially acceptable. The product used in the formulation of repellent-roll on was totally herbal and doe's not contain any harmful effect to the environment or human health.

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