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Overview on Method of Preparation for Herbal Mosquito Repellent

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Abstract: ***Herbal dhoop, a kind of incense that is Ayurvedic, enhances medicine as well as spirituality. This is an exposition comparing six different methods for preparing herbal dhoop from orange peels, cow dung, cow urine, marigold, neem, and lemongrass oil. This article describes the methods for making herbal dhoop using any of the six ingredients from the collection and processing of raw materials to mixing with other herbal materials, then shaping into sticks or cones, and finally drying and burning to make fragran and valuable herbs. Results indicate that the raw materials used, the manufacturing procedure followed, and the quality control taken before using it or during use would significantly play a role in case efficacy and safety of the herbal dhoop. Further, potential benefits and limitations of each of the six ingredients in herbal dhoop preparation have been discussed in this paper. The antimicrobial and anti-inflammatory activities include herbs like orange peel, marigold, and neem. Cow dung and cow urine both have possible spiritual and medicinal benefits, while leamon grass oil has refreshing and uplifiting aroma with possible effect of having antimicrobial and anti-inflammatory activities.The findings also establish that all the six methods of preparing herbal dhoop have their advantages and limitations, making the choice method for formulating the particular herbal dhoop dependent on what properties and uses it is intended to have. Further, studies on safety and efficacy of herbal dhoop have so far been barely scratched, especially in exploring possible uses.***

Keywords: ***Herbal dhoop, Ayurvedic incense, orange peel, cow dung, cow urine, marigold, neem, lemongrass oil, antimicrobial properties, anti-inflammatory properties, spiritual and medicinal uses etc.***

I. INTRODUCTION

Almost a third of the world's population is affected by vector-borne diseases such as malaria, dengue fever, Zika virus, etc. World Health Organization (WHO) reveals that more than 200 million cases of mosquito-borne diseases occurred in 2019 alone with a figure of more than 700,000 deaths [1].Most of these diseases are transmitted through mosquitoes, so control of these insects is the primary and obvious step to take in preventing transmission [2]. One of the options for preventing these diseases has been the use of repellents against such mosquitoes [3]. The repellent works by preventing mosquitoes from detecting carbon dioxide, heat, and moisture of the human body, confusing them during locating and feeding on their hosts [4]. Types of repellents include synthetic chemicals such as DEET and picaridin, as well as natural and herbal alternatives [5]. One interesting alternative that gained popularity in recent years is the use of herbal mosquito repellents as they are supposed to be safe and effective [6].

Inhaled as extracts, infusion or essential oils derived from plants, herbal mosquito repellents can be used in various forms [2]. Citronella, lemongrass, and neem are some of the most important plant-based mosquito repellents [3].. Effectiveness has been established for these repellents against Aedes, Anopheles, and Culex mosquito species [4].

II. HISTORY

Herbal mosquito repellent has been in use as early as about thousands of years ago, for different cultures and civilizations all over the world used plants and herbs to repel mosquitoes and other insects. Some historical milestones of herbal mosquito repellents are as follows:

A. Ancient Civilizations

1) Ancient Egypt: It is clear that Egyptians have many phases and forms of herbal material like citronella or lemongrass for use against mosquitoes and other household insect pests as shown in [2].
2) Ancient China: Mosquitos were repelled with herbal medicines like neem and geranium [6].
3) Ancient India: Mosquito repellent and other insects were also the requirement of Indians using Ayurvedic medicine, which consisted of administering herbs and plants like neem and citronella [5].

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B. Medieval Period

1) The Middle Ages: These herbal remedies included the use of plants and herbs during the Middle Ages for repelling mosques and other insects [3].
2) Traditional medicine: The traditional health systems like Unani and Siddha use various herbal medicines as mosquito repellents [2].

C. Modern era

1) Essential Oils: The modern herbal mosquito repellents are derived from the essential oils such as citronella and lemongrass [6].
2) Herbal Extracts: Such herbal extracts as neem and geranium further broadened these horizons [5].
3) Commercialization: They have also made these herbal mosquito repellents available through their commercialization in forms of sprays, creams, and lotions to the public [3].

D. Latest Developments

1) Nanotechnology: Innovations in nanotechnology in the development of herbal mosquito repellants have enhanced their effectiveness as well as longevity in their action [2].
2) Microencapsulation: Microencapsulation has improved the stability and shelf-life of such herbal mosquito repellants [7].
3) Eco-Friendly Sustainability: Development of eco-friendly herbal mosquito repellents has become a focused area for research and development [5].

III. BACKGROUND

Herbal mosquito repellents have been used to repel mosquitoes and prevent them from getting bitten for many years, thus reducing the risks of certain diseases caused by mosquitoes [2]. Most of these repellents are plant-derived, and have different forms of applications including essential oils, extracts, and infusions [3]. In recent years, herbal mosquito repellents have been gaining much attention because of their perceived safety and efficacy and hence the possible environmental benefits [5].

Some of the most popular herbal mosquito-repelling agents include citronella, lemongrass, and neem [2]. Besides being proven to have mosquito-repelling properties, the essential oils of these plants further repel mosquitoes [4]. These repellents can be used in different ways like application on the skin, application on clothes or surfaces, and also can be vaporized or used in coils [6].

IV. BENEFITS OF HERBAL MOSQUITO REPELLENTS

1) Reduction of risk of contracting diseases spread by mosquitoes: Herbal mosquito repellents can help reduce the chances of contracting diseases like malaria, dengue fever, and Zika virus through bites from carrier mosquitos [2].
2) Environmental benefits: These herbal mosquito repellents are biodegradable and non-toxic, thus representing a greener alternative to synthetic repellents [6].
3) Cost-effective: Herbal mosquito repellents may be very cost-effective for individuals or communities that cannot afford synthetic mosquito repellents [3].
4) Improved safety: Safety is often thought to be higher for herbal mosquito repellents than for synthetic ones, since the former are derived from natural bases. As a result, they are less likely to cause skin irritations or any adverse effect [4].

Of all, the effective and safe nature of herbal repellents may vary from one plant to another, the mode of preparation, and the active principles's concentration in the preparation [6]. Furthermore, some herbal mosquito repellents do not have a good efficacy record when compared with the synthetic ones, which imply more frequent reapplication [2].

V. PURPOSE AND SCOPE

Herbal repellents are therefore taken as one of the safest, effective, and eco-friendly alternatives against synthetic repellents and can be integrated with all the other protective measures to minimize risks of contracting diseases by mosquitoes.

1) Review of the literature on herbal mosquito repellents: This review paper will comprehensively analyze the literature found about herbal mosquito repellents with respect to efficacy, safety, and potential benefits [5].
2) Evaluation of herbal mosquito repelling efficacy: This review paper will determine effectiveness in terms of prevention of mosquito bites and reducing risks associated with mosquito-borne diseases [3].
3) Assessment of the safety of herbal mosquito repellents: This review paper will assess the safety of herbal mosquito repellents, such as whether they cause skin irritation or cause allergic reactions and any other adverse effects [4].

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4) Discussion of the possible benefits of herbal mosquito repellents: This review paper will detail talking points concerning potential benefits of herbal mosquito repellents relative to their reduced environmental impact, cost-effectiveness, and increased safety [6].
5) Identification of gaps in the literature: This review paper will identify gaps in the literature on herbal mosquito repellents and research where further study might be required [2].

The scope of this review paper is restricted to herbal mosquito repellents; it does not include synthetic mosquito repellents nor types of insect repellents [5]. The review paper will mainly discuss the herbal mosquito repellents that are applied to prevent mosquito bites and to reduce the risk of diseases transferred by mosquitoes while not exclusively talking about their use in other fields such as agriculture or industry [3].

In all, this review paper has the purpose as well as a scope to provide quite an extensive picture of the current state of knowledge on herbal mosquito repellents and their future research requirement [2].

VI. TYPES OF HERBAL MOSQUITO REPELLENTS

1) Essential Oils Repellents: These particular repellents are composed of the essential oils extracted from certain plants as well as herbs. Citronella, lemongrass and neem are some of the essential oils that are often used in the mosquito repellent formulas. Use of essential oils repellent is largely in sprays, lotions and candles [2].
2) Herbal Extract Repellents: These are made with herbal extracts obtained from plants and herbs. Examples of herbal extracts used in mosquito repellents are neem, citronella, and lemongrass extracts. Commonly found in sprays, lotions, and creams are herbal extract-based repellents [7].
3) Powder Poison: These types of repellents were ground plant and herb-based. Common examples of these powdered plants and herbs include citronella powder, lemongrass powder, and neem powder. Powder-based repellents are used in sprays and lotions [6].
4) Cream-based repellents: These are creams infused with herbs or essential oils. Their examples include neem cream, citronella cream, and lemongrass cream, which are usually used as mosquito repellent cream. Cream-based repellents tend to repel ant as well as some other insects [3].
5) Spray-Based Repellents: These repellents are formulated as a spray and infused with herbal extracts or essential oils. Citronella spray, lemongrass spray, and neem spray are examples of sprays found in mosquito repellents. Spray-based repellents are mostly used for the purpose of repelling mosquitoes and other insects [2].
6) Lotion-Based Repellents-from lotion infused with herbal extracts or essential oils. Repellent lotions comprise neem lotion, citronella lotion, and lemongrass lotion. Lotions are majorly used to repel mosquitoes and other insects [7].
7) Candle-Based Repellents: These are candles infused with herbal extracts or essential oils. An example of candle use in mosquito repellents is the use of citronella candles, lemongrass candles, and neem candles [5]. candle-based repellents are mostly used to repel mosquitoes and other insects.
8) Diffuser based repellents: These are repeller diffusers infused with herbal extracts or essential oils. Neem diffusers, citronella diffusers, and lemongrass diffusers are examples of diffusers within mosquito repellents. Diffuser based repellents are very commonly used to repel mosquitoes and other insects [3].

VII. ADVANTAGES AND DISADVANTAGES OF DIFFERENT TYPES OF HERBAL MOSQUITO REPELLENTS WITH EXTRACTS

A. *Citronella and Lemongrass Extract*

Advantages

1) Works well against mosquitoes and other flying insects [5].
2) Totally natural and non-toxic [3].
3) Can be used in the form of essential oils, sprays, and candles [5].
4) Has a delightful citrus fragrance [3].

Disadvantages

1) Not as effective as those DEET-based repellents [5].
2) May cause skin irritation in some people [3].
3) Not as long-lasting as other repellents [5].

B. Neem and Tulsi Extract

Advantages

1) Good against the mosquitoes and other insects [5].
2) It has an antimicrobial and antifungal activity [3].
3) Can be available in the form of essential oils, sprays, and creams [5].
4) Has a natural and non-toxic fragrance [3].

Disadvantages

1) It may not be on par with DEET-based repellents [5].
2) Causes skin irritation in some individuals [3].
3) It probably has a very strong and awful smell [5].

C. Eucalyptus and Peppermint Extract

Advantages

1) Effectiveness against mosquitoes and other insects [5].
2) Cooling and refreshing scent [3].
3) Various forms of application, such as essential oils, sprays, and creams [5].
4) Naturally found and non-toxic [3].

Disadvantages

1) Less effectiveness than DEET-based repellents [5].
2) Skin irritation in some individuals [3].
3) May not last as long as other repellents [5].

D. Geranium and Catnip Extract

Adavantages

1) Good against mosquitoes and other insects [5].
2) Naturally and non-toxic scent [3].
3) It is very flexible in its methods of application-that is essential oils, sprays, and creams [5].
4) Has a calming and relaxing effect [3].

Disadvantages

1) Not effective as DEET-based repellents (The repellents are less effective than DEET based repellent) [5].
2) Causes skin irritation in some individuals [3].
3) But, also maybe less lasting than others repellent [5].

E. Effect of Basil and Lavender Extract

Advantages

1) It repels mosquitoes and other insects [5].
2) It has a natural non-toxic scent [3].
3) Different use applications: i.e. essential oils, sprays, and creams [5].
4) It calms and assures the user [3].

Disadvantages

1) It may not be so effective as DEET-based repellents [5].
2) It might cause skin irritation in some individuals [3].
3) It may not be as long-lasting as other repellents [5].

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F. Tea Tree and Lemongrass Extraction

Advantages

1) It is effective against mosquitoes and other insects [5].
2) It has antifungal and antimicrobial activity [3].
3) Available in various forms: essential oils, sprays, creams [5].
4) Provides calming and soothing effects [3].

VIII. ADVANTAGES AND DISADVANTAGES OF DIFFERENT TYPES OF HERBAL MOSQUITO REPELLENT ALKALOIDS AND TERPENOIDS

A. Citral and Limonene Alkaloids

Advantages

1) Effective against mosquitoes and other insects [2].
2) Natural and “non-poisonous” [5].
3) Applicable in different forms such as essential oils, sprays, and creams [3].
4) Leaves a pleasant citrus smell [6].

Disadvantages

1) Less effective than DEET-based repellents [4].
2) Causes skin irritations for some individuals [2].
3) Have a shorter staying power than most of the other repellents [5].

B. Azadirachtin and Eugenol Terpenoids

Advantages

1) Effectiveness on mosquitoes and other insects [5].
2) Has antimicrobial and antifungal property [2].
3) Forms of application include essential oils, sprays, and creams [3].
4) Has a non-toxic and natural scent [6].

Disadvantages

1) Less effective than DEET-based repellents [4].
2) Toxicity to a number of personal type [2].
3) May have strong and foul odor [5].

C. Eucalyptol and Menthol Terpenoids

Advantages

1) Efficacious against mosquitoes and other insects [4].
2) Cooling smell, refreshing fragrance [6].
3) Can be used in several forms, such as essential oils, sprays, and creams [3].
4) Has all-natural, non-toxic characteristics [5].

Disadvantages

1) Not as effective as DEET-based repellents [2].
2) Skin irritation may occur in some individuals [4].
3) May not last as long as the other repellents [5].

D. Geraniol and Nepetalactone Alkaloids

Advantages

1) Mosquitoes and other insects are efficient deterrents ([3].
2) It has a naturally non-toxic smelling [6].
3) Can be taken in different forms, essential oil, spray or cream [2].

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4) It produces a relaxing, calming effect [5].

Disadvantages

1) Less efficacious than DEET-based-like repellents [4].
2) Skin irritation might occur in some individuals [2].
3) Less long-lasting than some other repellents [5].

E. Linalool and Camphor Terpenoids-Merits

1) Mosquitoes and other insects are efficiently deterred by it [6].
2) It is a natural-scented and non-toxic one [5].
3) It offers itself in various forms such as essential oils, sprays, creams, etc.[3].
4) The soothing and calming effect [2].

Disadvantages

1) Not that effective compared to DEET-based repellents [4].
2) Skin irritation might occur in some individuals [2].
3) May not last as long as other repellents [5].

IX. METHOD OF PREPARATION OF HERBAL DHOOP BY USING ORANGE PEEL

A. Ingredients

1) Orange peel: 20 gm
2) Bamboo powder: 15 gm
3) Wood powder: 10 gm
4) Citronella oil: 2gm
5) Lemongrass oil: 1 gm
6) Neem oil: 1 gm
7) Limonene oil: 1 gm

B. Method of Preparation

1) Drying and Powdering Orange Peel: Sun dry the orange peels or dry them in a dehydrator. Grind these dried peels to a fine powder in the grinder or mortar and pestle [9].
2) Mixing Ingredients: Mix the orange peel powder with guggul resin, turmeric powder, neem powder, camphor powder, and sandalwood powder in a ratio such as (e.g., 2:1:1:1:1:1) [10].
3) Addition of Binding Agent: Mix well with small amounts of coconut oil or ghee added to the mixture. It will bind all the ingredients [8].
4) Shaping Dhoop Sticks: Shape small sticks or cones of the mixture. You may use bamboo sticks or shape dhoop as small cones at home[11].
5) Drying Dhoop Sticks: Sun-dry or dhoop dry these dhoop sticks. This basically helps in getting rid of any extraneous moisture [9].
6) Burning Dhoop: Burn these dhoop sticks or cones over charcoal or using a dhoop burner. This discharges fragrance and the medicinal qualities of the herbs [9].

X. METHOD OF PREPARATION OF HERBAL DHOOP BY USING COW DUNG

A. Ingredients

1) Cow dung: 20 gm
2) Bamboo powder: 15 gm
3) Wood powder: 10 gm
4) Citronella oil: 2 gm
5) Lemongrass oil: 1 gm
6) Neem oil: 1 gm
7) Limonene oil: 1 gm

B. Methods of Preparation

1) Collection and Drying of Cow Dung: Fresh cow dung should be collected and dried under sun or dehydrator [8].
2) Mixing Ingredients: Mix dried cow dung along with guggul resin, turmeric powder, neem powder, camphor powder, and sandalwood powder with an appropriate ratio (2:1:1:1:1:1) [10].
3) Adding Binding Agent: Add a little bit of coconut oil or ghee and mix well. Thus, the ingredients bind together [10].
4) Shaping Dhoop Sticks: Shape this mixture into either small sticks or cones. Bamboo sticks can be used, or the mixture can be shaped into small cones [12].
5) Drying Dhoop Sticks: This is followed by drying the dhoop sticks in the sun or dehydrator, which assists in removing excess moisture [8].
6) Burning Dhoop: Take dhoop sticks or cones and burn with charcoal or using dhoop burner. Scents and medicinal properties of herbs are released [10].

XI. METHOD OF PREPARATION OF HERBAL DHOOP BY USING COW URINE

A. Ingredients

1) Cow urine: 20 ml
2) Bamboo powder: 15 gm
3) Wood powder: 10 gm
4) Citronella oil: 2 gm
5) Lemongrass oil: 1 gm
6) Neem oil: 1 gm
7) Limonene oil: 1 gm

B. Method of Preparation

1) Collection and Processing of Cow Urine: Fresh cow urine was collected and processed by filtration, sedimentation, and boiling to separate impurities and pathogens shortly [9].
2) Mix Ingredients: Then mix the processed cow urine with guggul resin, turmeric powder, neem powder, camphor powder, and sandalwood powder at a particular ratio (for example, 2:1:1:1:1:1) [11].
3) Add Binding Agent: Mix in a little amount of coconut oil or ghee, then knead well, which helps agglutinate the whole mass [9].
4) Shaping Dhoop Sticks: Shape it into small sticks (you can even use bamboo sticks) or cones with the mixture [12].
5) Install Dhoop Sticks: Dry the dhoop sticks in sunlight or use a dehydrator to remove excess moisture [8].
6) Burning Dhoop: Burn the dhoop sticks or cones over charcoal or using a dhoop burner; this releases the fragrance and medicinal properties of the herbs [11].

XII. METHOD OF PREPARATION OF HERBAL DHOOP BY USING EUCALYPTUS OIL

A. Ingredients

1) Eucalyptus oil: 10 ml
2) Bamboo powder: 15 gm
3) Wood powder: 10 gm
4) Citronella oil: 2 gm
5) Lemongrass oil: 1 gm
6) Neem oil: 1 gm
7) Limonene oil: 1 gm

B. Method of Preparation

1) Ingredient Mixing: Mix the eucalyptus oil with the guggul resin-turmeric-neem powder-camphor powder-sandalwood powder ratios in a very specific way. For example, (2:1:1:1:1:1) [14].
2) Add Binding Agent- A little coconut oil or ghee is added to the mixture and mixed well: This binds the material into the mixture [11].
3) On Making Dhoop Sticks: A small stick or cone can be shaped using this mixture. You can also use bamboo sticks, or shape the mixture into small cones [8].

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4) Drying Dhoop Sticks: Dry the dhoop sticks in the sun or using the dehydrator [12].
5) Burning Dhoop: Light the above dhoop sticks or cones of dhoop over a charcoal or dhoop burner. Fragrance and medicinal property of herbs come out [14].
6) Quality Control: Dhoop quality also checks for whether they are dry or free from any contaminations and have a pleasant aroma [11].

XIII. METHOD OF PREPARATION OF HERBAL DHOOP BY USING MARIGOLD

A. *Ingredients*

1) Marigold flowers: 20 gm
2) Bamboo powder: 15 gm
3) Wood powder: 10 gm
4) Citronella oil: 2 gm
5) Lemongrass oil: 1 gm
6) Neem oil: 1 gm
7) Limonene oil: 1 gm

8) *Method of Preparation*

1) Collection, Drying and Collection of Marigold Flowers: Collection of fresh marigold flowers and Drying of marigold flowers under Sunlight or Dehydrator as applicable [15].
2) Powdering Marigold Flowers: Powdering dried marigold flowers using a grinder or mortar and pestle [11].
3) Incorporation of Ingredients: Mixing marigold flower powder with guggul resin, turmeric powder, neem powder, camphor powder, and sandalwood powder in a specific ratio (e.g., 2:1:1:1:1: 1) [8].
4) Add Binding Agent: Add small amount of coconut oil or ghee into the compound and mix well [12].
5) Shaping Dhoop Sticks: Shape mixture into small sticks or cones using bamboo stick or shape them into small cones [15].
6) Dried Dhoop Sticks-Sun Dry or use Dehydrator for drying dhoopticks. This helps to remove any excess moisture [11].
7) Dhoop Burn: Burn the dhoop sticks or cones in burning coal or dhoop burner. This releases fragrance and medicinal properties of herbs [8].
8) Quality Control: The dry dhoop sticks are okay, free of contaminants, and with a good aroma [12].

XIV. METHOD OF PREPARATION OF HERBAL DHOOP BY USING NEEM

A. *Ingredients*

1) Neem leaves: 20 gm
2) Neem oil: 5 gm
3) Bamboo powder: 15 gm
4) Wood powder: 10 gm
5) Citronella oil: 2 gm
6) Lemongrass oil: 1 gm
7) Limonene oil: 1 gm

B. *Method of Preparation*

1) Collection, Drying and Collection of Marigold Flowers: Collection of fresh marigold flowers and Drying of marigold flowers under Sunlight or Dehydrator as applicable [16].
2) Powdering Marigold Flowers: Powdering dried marigold flowers using a grinder or mortar and pestle [11].
3) Incorporation of Ingredients: Mixing marigold flower powder with guggul resin, turmeric powder, neem powder, camphor powder, and sandalwood powder in a specific ratio (e.g., 2:1:1:1:1: 1) [8].
4) Add Binding Agent: Add small amount of coconut oil or ghee into the compound and mix well [12].
5) Shaping Dhoop Sticks: Shape mixture into small sticks or cones using bamboo stick or shape them into small cones [16].
6) Dried Dhoop Sticks-Sun Dry or use Dehydrator for drying dhoopticks. This helps to remove any excess moisture [11].
7) Dhoop Burn: Burn the dhoop sticks or cones in burning coal or dhoop burner. This releases fragrance and medicinal properties of herbs [8].
8) Quality Control: The dry dhoop sticks are okay, free of contaminants, and with a good aroma [12].

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XV. METHOD OF PREPARATION OF HERBAL DHOOP BY USING LEMONGRASS OIL

A. *Ingredients*

1) Lemongrass oil: 10 ml
2) Bamboo powder: 15 gm
3) Wood powder: 10 gm
4) Citronella oil: 2 gm
5) Neem oil: 1 gm
6) Limonene oil: 1 gm
7) Eucalyptus oil: 1 gm

B. *Methods of Preparation*

1) Mixing Ingredients: Mix lemongrass oil and guggul resin, turmeric powder, neem powder, camphor powder, and sandalwood powder in a specific ratio (e.g., 2:1:1:1:1:1) [17].
2) Adding Binding Agent: Add a small amount of coconut oil or ghee to the mixture and mix well. This helps bind the ingredients together [11].
3) Shaping the dhoop sticks: Shape the mixture into small sticks or cones. You can use bamboo sticks or shape the mixture into small cones [8].
4) Drying the dhoop sticks: Dry the dhoop sticks in the sun or using a dehydrator. This helps remove any excess moisture [12].
5) Burning Dhoop: Burn the dhoop sticks or cones over charcoal or using a dhoop burner. This releases the fragrance and medicinal properties of the herbs [17].
6) Quality Control: Check the quality of the dhoop sticks by ensuring that they are dry, free from contaminants, and have a pleasant aroma [11].

XVI. METHOD OF PREPARATION OF HERBAL DHOOP BY USING TULSI

A. *Ingredients*

1) Tulsi leaves: 20 gm
2) Tulsi oil: 5 gm
3) Bamboo powder: 15 gm
4) Wood powder: 10 gm
5) Citronella oil: 2 gm
6) Neem oil: 1 gm
7) Limonene oil: 1 gm

B. *Method of Preparation*

1) Collection and Drying of Tulsi Leaves: Collect fresh Tulsi leaves and dry them in the sun or using a dehydrator [18].
2) Powdering Tulsi Leaves: Grind dried Tulsi leaves using a grinder or mortar and pestle [11].
3) Mixing Ingredients: Mix Tulsi leaf powder with Guggul resin, Turmeric powder, Neem powder, Camphor powder, and Sandalwood powder in specified ratio such as: 2:1:1:1:1:1[8].
4) Add Binding Agent: Add a small amount of coconut oil or ghee to the mixture and mix well. This helps bind the ingredients together [12].
5) Shaping Dhoop Sticks: Shape the mixture into small sticks or cones. You can use bamboo sticks or shape the mixture into small cones [18].
6) Drying Dhoop Sticks: Sun-dry or dehydrate the dhoop sticks. Moisture shall be drawn away from them by this step [11].
7) Buring Dhoop: The dhoop sticks or cones should be burned on charcoal or with the aid of a dhoop burner. This releases the fragrance and medicinal properties of the herbs [8].
8) Quality Control: Quality check of the dhoop sticks whether they are dry, free from contaminants and has a sweet aroma [12].

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XVII. METHOD OF PREPARATION OF HERBAL DHOOP BY USING LEVENDOR OIL

A. *Ingredients*

1) Levendor oil: 10 ml
2) Bamboo powder: 15 gm
3) Wood powder: 10 gm
4) Citronella oil: 2 gm
5) Neem oil: 1 gm
6) Limonene oil: 1 gm
7) Eucalyptus oil: 1 gm

B. *Method of Preparation*

1) Mixing Ingredients: Lavender oil, Guggol, turmeric powder, neem powder, camphor powder, and sandalwood powder procured in a ratio, e.g., 2:1:1:1:1:1[19].
2) Adding Binding Agent: Add a very small quantity of Coconut oil or ghee to the kneaded dough so that it can easily bind the mix [11].
3) Shaping Dhoop Sticks: Shape into small sticks or cones as per your requirement using bamboo sticks or mold the mix into small cones [8].
4) Dry the dhoop sticks either in the sun or by using a dehydrator. These dhoop sticks have excess moisture from them [12].
5) Burning the Dhoop: The sticks are burned over charcoal or in a dhoop burner for the release of fragrance and medicinal properties of the herbs [19].
6) Quality Checking: The dhoop sticks will be better if dry, free from contaminants, and with a pleasant aroma [11].

XVIII. METHOD OF PREPARATION OF HERBAL DHOOP USING CHARCOAL

A. *Ingredients*

1) Charcoal powder: 20 gm
2) Neem oil: 5 gm
3) Citronella oil: 2 gm
4) Lemongrass oil: 1 gm
5) Eucalyptus oil: 1 gm
6) Bamboo powder: 10 gm
7) Wood powder: 10 gm
8) Herbal blend (Tulsi, Lavender, and Rosemary): 1 gm

B. *Method of Preparation*

1) Mixing of Ingredients: Activated charcoal powder is mixed with guggul resin, turmeric powder, neem powder, camphor powder, and sandalwood powder in the ratio of 2:1:1:1:1:1 [20].
2) Binding Agent Addition: Small amount of coconut oil or ghee may be added to the mixture and mixed well; this binds the ingredients together [11].
3) Forming Dhoops: Create small sticks or cones. You can also use bamboo sticks or shape the mixture into small cones [8].
4) Drying of Dhoop Sticks: Then the dhoop sticks should be dried under sunlight or in a dehydrator so that all moisture is removed [12].
5) Burning Dhoop: Burn the dhoop sticks or cones over charcoal or with the help of a dhoop burner; this gives a fragrance and medicinal properties of herbs [20].
6) Quality Control: The dhoop sticks are tested for quality by ensuring they are dry and free of adulterants and have a pleasant scent [11].

XIX. CONCLUSION

Herbal dhoop has remained a quite long established Ayurvedic incense for medicinal and spiritual purposes. In the preparation of herbal dhoop, a type of incense, a combination of herbs, spices, and other natural materials has been blended in definite proportions to formulate a unique mixture.

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This study explored six different methods of making herbal dhoop. The ingredients include, orange peel, cow dung, cow urine, marigold flowers, neem, lavender oil, tulsi, and activated charcoal. Each method has its unique feature and merits over one another. These spices and components like orange peel, marigold, and neem, help develop anti-microbial and anti-inflammatory activities. The use of cow dung and cow urine is considered to be effective for spiritual and medicinal benefits. Of course, addition of lavender oil and tulsi gives a very calm effect, but activated charcoal offers purification and detoxification in air. The methods of preparation of herbal dhoop differ from one another with respect to the ingredients used, ratios of ingredient combinations, methods of drying and burning the dhoop sticks. Proper manufacturing procedures and quality control measures are necessary to ensure both its efficaciousness and safety. The fact remains, to prepare herbal dhoop using different methods and from various ingredients may therefore conclude that it is a product that possesses multifaceted versatility and complexity. Each method has diverse features and benefits, thus choosing a particular method that suits the preferred properties or intended use of herbal dhoop. The medicinal and spiritual faculties embedded in herbal dhoop should be scrutinized in further research, as well as modalities of standardization in preparation.

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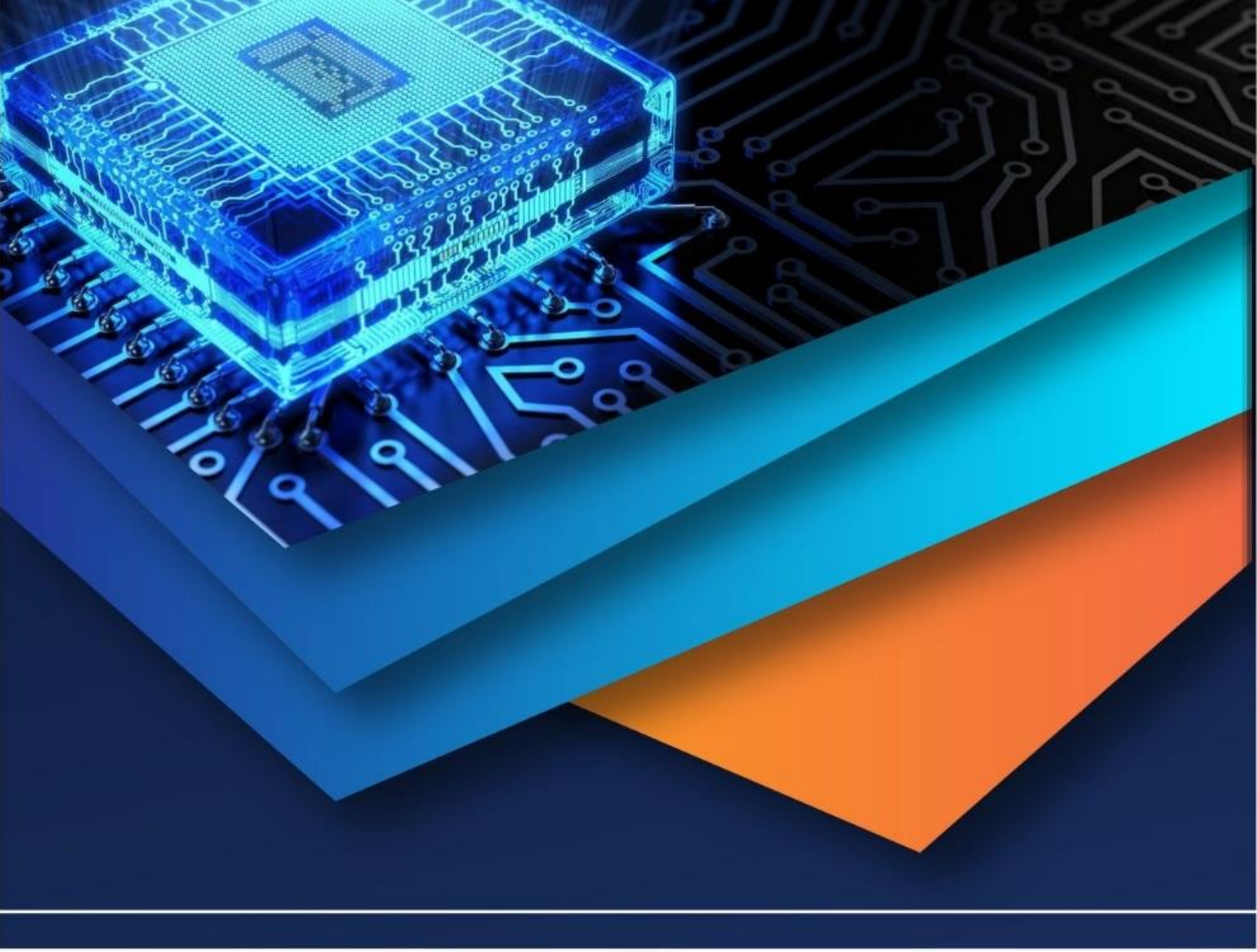

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