

# POLYHERBAL PLANTS USED IN NAIL LACQUER FOR TREATMENT OF FUNGAL INFECTION OF NAIL

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## ABSTRACT

*Nail lacquers are viscous preparation to decorate nails for fingers and toes and protect the nail plates. Onychomycosis is a fungal infection of nail. Onychomycosis also known as tinea unguium. Symptoms may include in white or yellow nail, discoloration, thickening of the nail and separation of the nail from nail bed. Oral antifungal drugs may be prepared are used for treating fungal nail infection. But, the disadvantages of oral antifungal agents are toxicity and treatment period. So, the prepared of antifungal nail lacquer using herbs extract for the treatment of fungal infection.*

**Keywords :** Antifungal herbs, Nail lacquer, Onychomycosis.

**1. INTRODUCTION :** Onychomycosis also known as tinea unguium, it is a fungal infection of nail [1]. Onychomycosis is a contagious contamination of fingernails and toenails which influences around 19% world population [2]. This infection occurs mainly in diabetic and older patients [3]. The most common cause is dermatophytes, non dermatophytes, molds, and yeast mainly candida albicans [3]. About 80% cases of onychomycosis mostly toenails are affected [4]. Symptoms may include in onychomycosis - white or yellow nail, discoloration, thickening of the nail and separation of nail from the nail bed [4].

### **1.1 Causes of Fungal Infection :**

Toenails are 10 times more commonly infected as compared to fingernails. About 60 to 80% of cases are caused by dermatophytes, dermatophyte infection of the nails is called tinea unguium. Many of the remaining cases are caused by non dermatophyte molds (e.g. Aspergillus, Fusarium). Immuno comprised patients and those with chronic mucocutaneous candidiasis may have candida onychomycosis (which is more common on the fingers). Both are seen most often in the elderly, those with impaired immune systems, and in people with diabetes and poor peripheral circulation [1].

**1.2 Treatment :** Various oral and topical therapies have been used in the treatment of onychomycosis.

1) Oral : Antifungal tablets will often clear a fungal nail infection.

2) Topical : Creams, lotions and gels are used for treating fungal infection of nails.

Oral antifungal drugs are longer treatment period and some toxicity are arises. The drugs which are available in the market are too expensive and some people cannot afford to buy them. Hence, it is necessary to find an alternative method for the treatment of fungal infection [2].

## **2. PLANT PROFILE :**

Following are main herbal plants are show the Antifungal activity.

1. *Psidium guajava*
2. *Mentha piperita*
3. *Carica papaya*
4. *Lawsonia inermis*

### 2.1 *Psidium guajava* :

*Psidium guajava*, is an important food crop and medicinal plant in tropical and subtropical countries is widely used like food and in folk medicine around of the world. Guava leaves are oblong to oval in shape and average 7-15 centimeters to long and 3-5 centimeters wide. There are various chemical constituents, pharmacological, and clinical uses are present. A number of metabolites in good yield and some have been shown to possess useful biological activities belonging mainly to phenolic, flavonoid, carotenoid, terpenoid and triterpene. Extracts and metabolites of this plant, particularly those from leaves and fruits possess useful pharmacological activities. It for long has been known for its antifungal, anti-inflammatory, antimicrobial, antioxidant antidiarrheal, antimutagenic properties [7].



**Fig. *Psidium guajava***

**Table -1 : Taxonomic classification of *Psidium guajava* :**

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Myrtales
Genus	<i>Psidium</i>
Species	<i>P.guajava</i>

### Vernacular names :

French : goyave or goyavier  
 German : guave, guavenbaum, guayave  
 Japanese : banjiro  
 Portugal : goiaba, goiabeiro  
 Brazil : araçá-goiaba, araçá-guaçú, guaiaba

Espanol : guayaba, guayabo

English : guava

## 2.2 *Mentha piperita* :

*Mentha piperita* L. (Family: Lamiaceae; Synonym: *M. balsamea* Wild; commonly known as peppermint) is an important medicinal herb (“medicinal plant of the year 2004”<sup>1</sup>; oldest known medicinal plant species in Eastern and Western traditions although first described in 1753 by Carolus Linnaeus) worldwide<sup>2</sup>, apart from its potential uses as flavoring agent (from chewing gum to after dinner mints), in cosmetics, pharmaceutical products amongst others [10].



**Fig. *Mentha piperita***

**Table -2 : Taxonomical classification of *Mentha piperita* :**

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Lamiales
Superorder	Asteranae
Genus	<i>Mentha</i> L.
Species	<i>Mentha piperita</i>

### **Vernacular names :**

English : Brandy mint, Peppermint

Marathi : Pudina

Portuguese : Hortelana pimentosa

Spanish : Mentainglesa

Kashmiri : Pudyanu

Malayalam : Puthina

### 2.3 *Carica papaya* :

*Carica papaya* is an evergreen, tree like herb, 2-10 m tall, usually unbranched, although sometimes branched due to injury, containing white latex in all parts. Stem cylindrical, 10-30 cm in diameter, hollow with prominent leaf scars and spongy fibrous tissue. It is native to the tropics of the Americas but now is widely cultivated in other tropical regions of the world for its edible melon - like fruit, which is available throughout the year [11].



**Fig. *Carica papaya***

**Table -3 : Taxonomic classification of *Carica papaya* :**

Kingdom	Plantae
Phylum	Tracheophyta
Division	Magnoliophyta
Class	Magnoliopsida
Order	Brassicales
Genus	<i>Carica</i>
Species	<i>Carica papaya</i>

### **Vernacular names :**

Sanskrit : Erandakarkati

Bengali : Papeya, Pappaiya

English : Papaya

Gujarati : Papayi, Popaiyum

Hindi : Papeeta

Kannad : Parangimara

Malayam : Kappalam, Kappanga

Marathi : Papaya

Tamil : Pappali, Pappayi

Telugu : Boppayi  
 Urdu : Erandkharbujah  
**2.4 Lawsonia inermis :**



**Fig. Lawsonia inermis**

*Lawsonia inermis* is a much branched glabrous shrub or small tree 2-6 in height, which may be spiny. Bark greyish brown, unarmed when young, older plants with spine tipped branchlets. Young branches quadrangular, green but turn red with age. *Lawsonia inermis*, commonly called henna, is a large, evergreen shrub or small tree with a densely branched habit. It is native to dry, coastal scrublands of North Africa, the Middle East, and portions of Southern Asia and has naturalized in parts of Africa and northern Australia [2].

**Table -4 : Taxonomic classification of *Lawsonia inermis* :**

Kingdom	Plantae
Subkingdom	Virodaplantae
Division	Tracheophyta
Subdivision	Spermatophytina
Class	Magnoliopsida
Order	Myrtales
Family	Lythraceae
Genus.	<i>Lawsonia</i>
Species	<i>Inermis</i>

**Synonyms :**

*Lawsonia alba* Lam  
 Henna  
 Samphire  
 Cypress shrub  
 Mendhi

**3. METHOD OF PREPARATION :**

**Formulation of nail lacquer :** Polyvinyl pyrrolidone are mixed with water and were dissolved in sufficient quantity of formaldehyde to get clear solution. Salicylic acid was dissolved in above mixture and castor oil was added. Then extract Psidium guajava, Mentha piperita, and Carica papaya were added with continuous stirring.

#### **4. EVALUATION PARAMETER :**

**4.1 Non - volatile content :** Non volatile content of nail lacquer was determined to get the weight of formulation that retained on nail plate after application. Nail lacquer (1g) was taken in a glass petridish of about 8 cm in diameter. Sample was spread equally using brush. The dish was put in an oven at 105°C for 1 hour, cooled and weighed. The difference in weight of sample before and after drying was the non volatile content present in the nail lacquer [1].

**4.2 Lacquer film thickness :** One ml of formulation was spread equally with an applicator brush in 8 cm diameter petri dish and was allowed to dry at room temperature. After drying nail lacquer film was isolated from the petri dish. The film thickness was measured at three different places using a micrometer screw gauge and average was calculated [2].

**4.3 Drying time and Gloss :** An area of 4 × 4.5 cm<sup>2</sup> was marked on glass petri dish to which a film of nail lacquer formulation was applied with the help of brush. The time taken for the film to dry was noted using a stopwatch. The readings were obtained in triplicate. Glossiness was determined by visual inspection and measured as follows: good (++), very good (+++) and excellent (++++) [1].

**4.4 Smoothness of flow formulation :** Nail lacquer were poured on a glass slide on an area of 1.5 inches. It was spread on a glass plate by making glass slide slit. Smoothness of flow determined [3].

**4.5 Water resistance test :** This test was performed to measure the resistance of nail lacquer towards water permeability of film. A continuous film was applied on the petri dish, dried and then water was poured on it to immerse the film. The weight of petri dish was taken before and after immersion and increase in weight was calculated [1].

**4.6 Antifungal activity :** Antifungal activity of nail lacquer was evaluated by cup plate method against *Candida albicans*. The sterilized sabouraud dextrose media was poured to the sterilized petri plates and allowed to set. Bacterial culture was inoculated on the media in aseptic condition. Wells were prepared aseptically with sterilized cork borer. Wells were filled with each 0.8ml (50mg/ml) following solution in DMSO: Nail lacquer loaded formulation (0.8ml). Plates were kept for pre-diffusion in refrigerator for 15 min. After normalized room temperature, all plated were incubated at 30°C for 48 hr. Zone of inhibition (diameter in mm) was measured [4].

#### **5. Conclusion :**

Nail lacquers give life and beauty to the nails. Using them can be tempting, especially if one is currently frustrated over an attractive nail problem like nail fungal infections. It is the easiest way to fix the fungal infection problems of nails. There are special nail lacquers that are used for treatments for onychomycosis. But the marketed products contain drugs which possess side effects on prolonged use. Also, the nail lacquer available are expensive. The aim of the study is to suggest the importance of antifungal herbs that can be used in the treatment of fungal nail infections without any side effects.

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