



"Herbal Shampoo Enriched with *Terminalia catappa* and *Carica papaya*: A Study on Antimicrobial Properties"

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Abstract

Herbal word is symbol of safety in contrast to synthetic one which has no adverse effects on human health. Even in areas where modern medicine is available, the interest on herbal medicines and their utilization have been increasing rapidly in recent years. Herbal medicine refers to the use of any plants seeds, berries, roots, leaves, bark or flowers for medicinal purposes. Along with other dosage forms, herbal drugs are also formulated in the form of shampoo. *Terminalia catappa* and *Carica papaya* are effective anti-microbial agent and were used to make herbal anti-microbial shampoo. This study involves the formulation of anti-microbial shampoo using *Terminalia catappa* and *Carica papaya* as a main herbal ingredient which has anti-microbial activity and the formulated shampoo is evaluated for its effectiveness, pH, solid contents, foam volume, surface tension and dirt dispersion. The aim of the study is to evaluate the anti-microbial herbal shampoo.

Keywords: antimicrobial shampoo, foam volume, plant-based antimicrobials

INTRODUCTION

Herbal Shampoo is defined as a preparation of a surfactant, surface-active material in suitable form liquid, emulsion, and pastes which when used under the conditions specified will remove surface grease, dirt on skin debris from the hair shaft and scalp without affecting adversely the hair, scalp or health of the user. It has been used for many years. Today's market is filled with a chemical Herbal Shampoo. The selection of active ingredients for hair care product is based on the ability of the ingredient to prevent skin damage as well as to improve the quality of the skin by cleansing, nourishing, and protecting the skin. The most advantage-able thing about Herbal Shampoo is that it has no side effects.

Hair growth consist of three phases:

- Anagen (growth phase): Most hair is growing at any given time. Each hair spends several years in this phase.
- Catagen (transitional phase): Over a few weeks, hair growth slows and the hair follicle shrinks.
- Telogen (resting phase): Over a month, hair growth stops and the old hair detaches from the hair follicle. A new hair begins the growth phase, pushing the old hair out¹.

PROBLEMS ASSOCIATED WITH HAIR:

Alopecia areata: Round patches of total hair loss, usually from the scalp. The cause of alopecia is unknown; the hair usually grows back.

Dandruff (seborrheic dermatitis): Ongoing mild inflammation of the scalp, resulting in scaly skin that may be itchy and flake of Seborrheic dermatitis may also affect the ears and face

Folliculitis: Inflammation of hair follicles, usually due to an *Staphylococcus aureus* is a bacteria that frequently causes folliculitis. infection.

Piedra (*trichomycosis nodularis*): Fungal infection of the hair shaft. Hard nodules made of fungus cling to hair fiber's, sometimes causing hair loss².

Benefits of herbal shampoo:

- ❖ Herbal shampoos for hair fall are devoid of harsh chemicals and toxins and are made out of natural oils, minerals, and herbal extracted compounds. The ingredients work to improve the moisture in your hair by hydrating the hair follicles and the roots of your hair. This in turn reduces the chances of hair fall due to hair breakage.
- ❖ Herbal shampoos for hair growth are formulated to strengthen the hair follicles by delivering essential oils and nourishment all through the roots and follicles. This, in turn, stimulates the formation of new and healthy hair roots and promotes healthy hair growth.
- ❖ These Shampoos keep the color of your hair intact and with regular usage, enhance the texture of your hair. While in the case of synthetic cleansers, the harsh chemicals might affect your hair and cause premature greying of hair. Along with this, they keep your hair healthy and add a great luster and bounce to your luscious locks³.

Terminalia catappa L.,

A large spreading tree belonging to the family Combretaceae, is distributed throughout the tropics in coastal environments. Different parts of this tree have been used in folklore medicine and research studies also exhibited various medicinal properties such as antibacterial, anti-inflammatory, antioxidant, anti-tumour, anti-HIV, hepato-protective and anti-diabetic of this plant. *T. catappa* L. besides its traditional medicinal uses has major chemical constituents reported on this tree. Pharmacological activities reported provide scientific evidences for the numerous traditional uses and folklore claims of this plant⁴.



Fig 1: *Terminalia catappa* L.,

***Carica papaya* L.,**

Carica papaya belongs to caricaceae family and it is commonly known as papaya. The fruit is healthy and delicious and the whole plant parts including fruit, root, bark, peel, seeds and pulp are also known to have medicinal properties. The many benefits of papaya are owed due to high content of vitamin A, B and C, proteolytic enzymes like papain and chymopapain which have antiviral, antifungal and antibacterial properties. It is used as anti-inflammatory, antioxidant, diuretic, antibacterial, abortifacient, vermifuge, hypoglycemic, antifungal activity, antihelmenthic etc. Phytochemical studies shows that plant *Carica papaya* contains mainly alkaloids, tannins, flavnoids, glycoside⁵.



Fig 2: *Carica papaya* L.

MATERIALS AND METHOD

Extraction of *Terminalia Catappa* (Almond leaf)

One gram of the milled leaves of *Terminalia catappa* was weighed and suspended in 100ml of distilled water. The extract was obtained by heating in water bath at 60o c for 1 hour. The extract was filtered using Whatman

No. 1 filter paper and then centrifuged at 4000RPM for 20minutes. The supernatants were collected and used without further purification⁶.



Fig 3: *Terminalia catappa* leaves



Fig 4: *Terminalia catappa* extract

Extraction of *Carica papaya* (Papaya leaf)

The extracts of papaya leaf was prepared by the infusion method. 100 g of papaya leaf powder were immersed in a pot that contained 500 ml of distilled water. The pot was then heated and occasionally stirred for 15 minutes. The temperature was gradually increased from 15°C to 900°C. The liquid extract obtained was sieved and dried in a vacuum dryer to obtain concentrated papaya leaf extracts⁷.



Fig 5: *Carica papaya* leaves



Fig 6: *Carica papaya* extract

METHODS

The Plant Extracts (*Terminalia catappa* and *Carica papaya*) were mixed in different proportion to obtain a shampoo. Coconut oil is added to the plant extract. Herbal extracts were added to 10% gelatin solution and were mixed by shaking for 20 min. 0.05% of methyl paraben and sodium lauryl sulphate were added with stirring. The final volume was made to 100 ml with gelatin solution.⁸

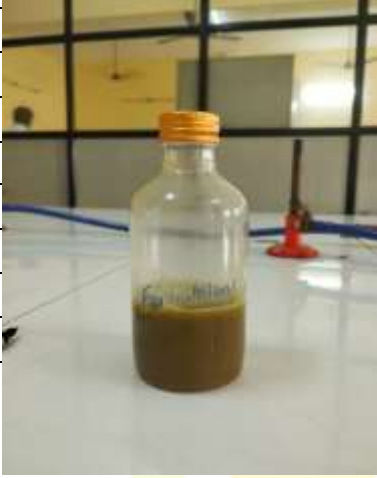
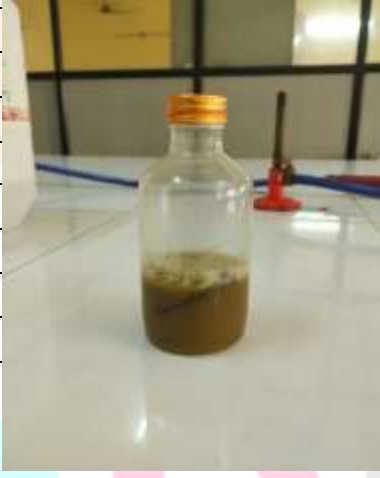
FORMULATION 1:

FORMULATION 2:

CONSTITUENTS	WEIGHT
<i>Terminalia catappa</i> extract	2.5ml
<i>Carica papaya</i> extract	2.5ml
Almond oil	3ml
Coconut oil	3ml
Coco glucoside	5ml
Sodium lauryl sulphate	1g
Methyl paraben	1ml
Gelatine (10%)	q.s

EVALUATION OF FORMULATION:**1.Physical Appearance / Visual Inspection:**

The formulations prepared were evaluated in terms of their clarity, foam producing ability and fluidity.⁹

CONSTITUENTS	WEIGHT
	
FORMULA 1	FORMULA 2

Research Through Innovation

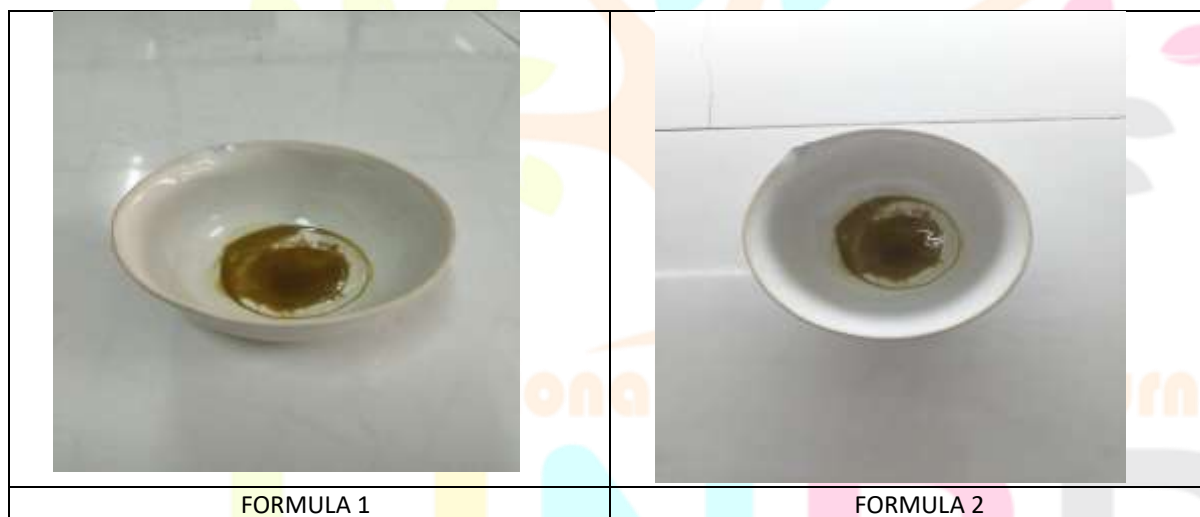
2.pH Measurement

The pH was measured using pH paper. 3 determination were taken for each shampoo sample.⁹



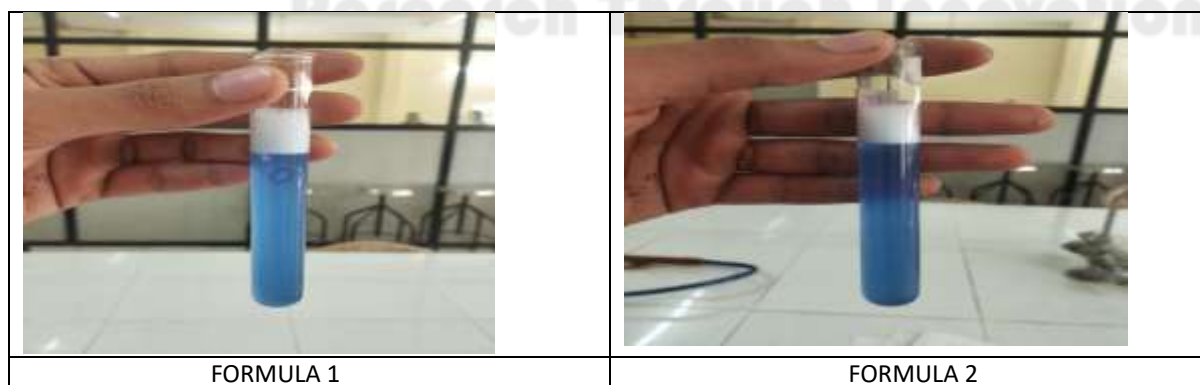
3.Determination of Solid Content:

The solid content was determined by taking a dry, weighed and clean evaporating dish, to which 4g of shampoo sample was added. Then the dish was weighed again, accurate weight of shampoo sample was calculated. Then the evaporating dish was kept a hot water bath till all liquid was evaporated. weigh the dish again and find out accurate weight of remaining solid content of sample.⁹



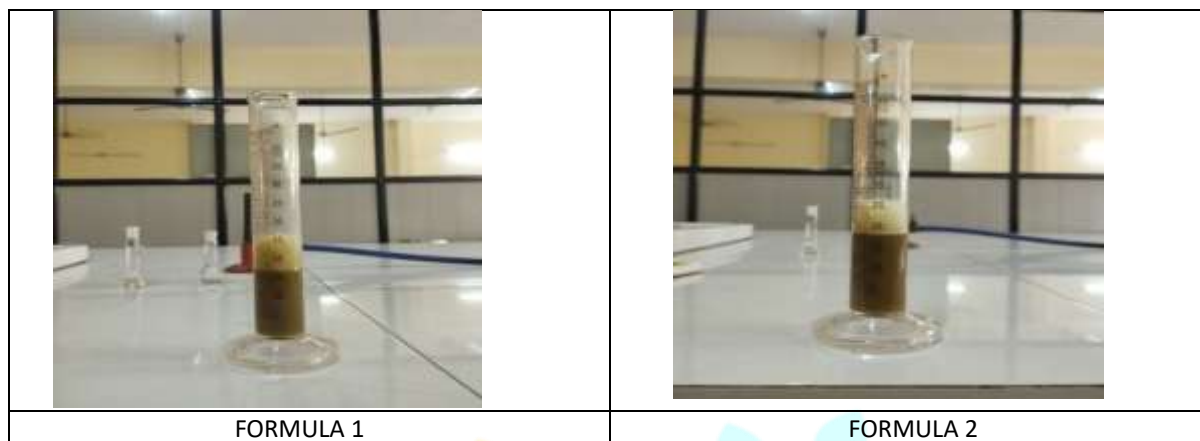
4.Dirt Dispersion:

To a large test tube add 10ml of distilled water and few drops of shampoo. and few drops of ink add a stopcock and shake for 10 times. The amount of ink in the foam was estimated as none, moderate or heavy.⁹



5.Foam Volume:

About 20 ml of shampoo sol. Was taken in a measuring cylinder fitted with stopcock and shaken for 10 sec. Foam volume was then calculated immediately, after 3 minutes and after 6 minutes.⁹

**6.Surface Tension Measurement:**

Surface tension of the undiluted shampoo was determined by the drop count method **stalagmometer**. Surface tension of marketed formulation was determined by preparing a 10% of shampoo using distilled water.⁹

Calculation:

Density of water (ρ_1): 0.997g/ml

Density of shampoo (ρ_2): 1.067 g/ml

Surface Tension of Water (γ_1): 72 dyne/cm

Surface Tension of shampoo (γ_2): x

No. of drops of water (Average) (N_1): 62.5

No. of drops of shampoo (N_2): 168.05

FORMULA:

$$\gamma_2 = \frac{\rho_2 * N_1}{\rho_1 * N_2} \times \gamma_1$$

$$= \frac{1.069 \times 62.5}{0.997 \times 168.05} \times 72$$

$$= 28.63 \text{ dynes/cm}$$

	
Determination of Surface Tension of Water	Determination of Surface Tension of Formulation

7.Antimicrobial activity:

Required quantity of agar was prepared and microorganism (*E.coli*) was inoculated into it. Then agar solution was poured into the petri plates and allowed to stand for few minutes to get solidified. After solidification, prepared ointment was spreaded into it. Now petri plates are allowed for growth of microorganism for 24 hours. After 24hr zone of inhibition was checked to determine the antimicrobial activity of prepared Shampoo.

	
FORMULA 1	FORMULA 2

Evaluation results of formulated herbal Shampoo

Parameters	Herbal Shampoo
Appearance	Shampoo Type
Colour	Greenish.
pH	
Solid Contents	0.9g
Dirt Dispersion	Moderate Foam
Foam Volume	12ml
Surface Tension	28.63 dynes/cm

Evaluation results of antimicrobial study

Micro-organisms	Zone of inhibition (Formulation 1)	Zone of inhibition (Formulation 2)
<i>Escherichia coli</i>	23mm	29mm

CONCLUSION

The current study was conducted to strengthen hair growth and create a herbal antimicrobial shampoo that is safer than chemical conditioning agents. The purpose of this study was to use plant extract to create a shampoo that is entirely herbal. Every element that goes into making shampoo is safer to use. To assess the prepared herbal shampoo, a number of experiments were conducted. According to this study, extract from papaya and almond leaves can be used to create a natural herbal shampoo.

The findings showed that specific components found in the crude extracts, such as flavonoids, tannins, and alkaloids, may help the plant treat a variety of illnesses and may even develop into a beneficial medication for human usage. The antibacterial properties of extracts from *Terminalia catappa* and *Carica papaya* were demonstrated in this investigation. The shampoo's inhibitory action supported the usage of medication. Therefore, it is clear that this shampoo has been shown to have a strong antibacterial effect on a variety of microbes. The study came to the conclusion that all of the first physiochemical and stability investigations indicated that herbal shampoo may be used economically and with user compliance.

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