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FORMULATION OF ANTI-DANDRUFF HERBAL PAPER SOAP

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ABSTRACT

This study focuses on the formulation and development of anti-dandruff herbal paper soap, a novel, eco-friendly, and convenient personal care product. The paper soap incorporates natural ingredients known for their anti-dandruff properties, such as neem (Azadirachta indica), Lemon grass (citronella grass) combined with a biodegradable soap base. The formulation aims to address common scalp issues like dandruff and itching while ensuring safety, portability, and ease of use. The ingredients were selected based on their antimicrobial, antifungal, and soothing properties, and the soap base was optimized to allow uniform distribution of herbal extracts on a cellulose-based paper. The product was evaluated for physical characteristics, pH, antimicrobial activity, Paper chromatography and user acceptability. Results demonstrated that the herbal paper soap effectively reduced dandruff-causing fungi, maintained scalp health, and met consumer preferences for texture, fragrance, and biodegradability. This innovative approach offers a sustainable and effective solution for dandruff management while promoting the use of natural ingredients in personal care products.

KEYWORDS: Anti-dandruff, herbal paper soap, biodegradable soap base, cellulose-based paper**.**

INTRODUCTION

What is Anti- dandruff herbal paper soap?

Anti- dandruff paper soap is a thin soap sheet. It is an anionic Surfactant that is used in conjunction with Water for Washing and cleaning, but these times every person Use Herbal because Herbal products no side effects This reason to we are using Herbal products and Making Herbal paper soap. Polyherbal soap was prepared by using neem extract and lemon grass oil evaluated by using various evaluation parameters such as organoleptic characteristics, pH, foam height and retention, skin irritation and high temperature stability.[1]

Dandruff: Dandruff is condition in which dead skin cells on your scalp flakes off, often landing on your shoulder and clothing. Although dandruff flakes look like they can be caused by several type of scalp condition.

Types of dandruff: There are several types of dandruff, each with unique cause. some types can be treated easily with changed to your hair care routine or with dandruff home remedies.[1]

1) Dry dandruff

- It is also called as pityriasis simplex characterize by excessive formation of minutes scales which accumulate on the scalp area.
- In this type of dandruff there is no excessive hair loss.
- The inflammation on the skin is not observed.
- The scales are first found in middle of the scalp and then spread to frontal, parietal and occupational areas.

2) Oily dandruff

- It is also called as pityriadis steatoides.
- It arrives on the scalp with sebum production.
- It is mostly found in young men following puberty.
- Inflammation of varied intensity developed on the scalp along with oily scales of dirtyyellow colour.
- Hair fall is most commonly found in this condition.
- The most common site affected by this type of dandruff is scalp, behind the ears, over breast bone, armpits.

Herbs used in the treatment of Dandruff

Herbal drugs or their formulations are viable alternative to synthetic drugs. During the past few decades, there has been a dramatic increase in the use of natural products in cosmetics. Natural botanicals may be used in their crude Form or they may be extracted, purified or derivatized to render them more suitable for use in cosmetic. A wide range of active principles of various plants including vitamins, hormones, Phyto- hormones, bioflavonoids, enzymes, tannic acid, fruit acids, amino acids, sugars,

glycosides and essential oils, are being considered useful in cosmetic formulations. The need for cosmetics with herbs is primarily because it is believed that these products are safe and free from side effects. Now-a-days, many herbal shampoos are available in the market which contains herbal ingredients such as plant extracts and essential oils. There are large numbers of plants which are reported to have beneficial effects on hair and are commonly used in paper soap.

- **Neem (Azadirachta indica)** The herb, Azadirachta indica, family Meliaceae has been found to have the properties of a Blood Purifier, beauty enhancer. It is used for a number of medicinal purposes. Someareas where it can be used in the treatment of common cosmetic problems are skin cleanser.
- **Lemon grass oil (Cymbopogon flexuosus)** the herb, Cymbopogon flexuosus, family Poaceae has been found have anti-dandruff property. It used for a number of medicinal purposes, it also used to kills germsand as mild astringent.

PLANT PROFILE
NEEM
Synonym – neem, margosa, nimtree
Scientific name – Azadirachta indica
Biological source: Neem consists of almost all the part of the plant which are used as drug of Azadirachta indica. It isbelong to family Meliaceae.

Geographical source

- India is native of Azadirachta.
- It is also cultivated in Napal, Pakistan, Bangladesh and Sri – Lanka.
- Neem is a fast growing tree that can reach a height of 15 – 20m, rarely to 35-40m. It isevergreen.

Macroscopic properties
Macroscopy of leaf

- **Apex:** Ovate – Lanceolate
- **Base:** Unequal
- **Colour:** Smooth and dark green
- **Odour:** Typical
- **Taste:** Bitter

Chemical constituents: Various parts of the plant is used for various therapeutic and commercial purposes due to presenceof different type of chemical in different parts of this plant. Some of them being Leaf: quercetin, nimbosterol, nimbin.

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- Leaf: quercetin, nimbosterol, nimbin
- Flower: nimbosterol, kaempferol
- Bark: nimbin, nimbidin, nimbosterol
- Seeds: Azadirachtin, Azadiradione, nimbin, vepinin
- Azadirachtin**:** Provide repellant, anti- hormonal and anti feedant properties.
- Nimbin: Provide anti -inflammatory, anti-pyretic, anti-histamine, and anti- fungalproperties.
- Nimbidin: Provide anti -bacterial, anti- ulcer and anti -fungal properties.
- Nimbidol: Provide anti-tubercular, anti- protozoa and anti- pyretic properties.
- Sodium nimbinate: provide Diuretic and Spermicidal properties.
- Gedunin: Provide vasodilator, anti -malaria and anti - fungal properties.
- Quercetin: Provide anti- protozoal, anti -oxidant and anti -inflammatory properties.

USES

- All parts of neem tree used as anthelmintic, anti - fungal, anti - diabetic, anti- bacterial, anti - viral, contraceptive and sedative.
- Oil of neem used in soap, shampoo, balms and Cream as well as toothpaste.
- Neem gum is used as a bulking agent and for the preparation of special purpose food (Fordiabetic).
- A decoction prepared from Neem roots is ingested to relieve fever in traditional Indianmedicine.

LEMONGRASS
Synonym - Cochin grass, Malabar grass
Scientific name – Cymbopogon
Biological source: Lemongrass oil is obtained from Cymbopogon flexuosus Stapf. (Syn. Andropogon nardus var. flexuosus Hack.), belonging to family Poaceae. It contains not less than 75% of aldehydes calculated as citral.

Geographical Source: Lemongrass is indigenous to India and is found in Tin-nevelli, Travancore, and Cochin. Two principal varieties of Lemongrass are recognized as the red-stemmed variety, the true *C.*

flexuosus, which is a source of East Indian Lemongrass oil and the white-stemmed variety which isdesignated as C. flexuosus var. albescens. The oil from the latter is low in aldehyde content and is slightly soluble in 70% alcohol.

Chemical Constituents: Lemongrass oil is the principal source of citral (68–85%) from which ionone is derived. The oil also contains methyl heptanone, decyl aldehyde, geraniol, linalool, limonene, dipentene, citronellal, triacontane, triacontanol, intermedeol, isointermedeol, β-caryophyllene, α-curcumene, γ- and δ- cadinene, methyl eugenol, β -caryophyllene oxide, eugenol, β-eudesmol, elemicin, farnesol, juniper-camphor, geraniol, anisaldehyde, terpinen-4-ol, α - and β-terpineol, and borneol.

USES

The oil is used in perfumery, soaps, and cosmetics and as a mosquito repellent. Lonones obtained from citral are required for synthetic violet perfumes.

MATERIALS AND METHODS

Selection and Collection of Neem and Lemongrass Leaves: The plant was collected from the area which is nearby in Gargoti region. The fresh leaves of neem and lemongrass dry were grinded and make them a fine powder which was again passed through the sieve. And then powder used in further process.

Preparation of ethanol extracts of Neem and Lemongrass Leaves: The dried powder was then subjected to the magnetic stirrer process along with the solvent. The process involves 80% ethanol as a solvent. Extraction was carried out as the 30gm powder was taken into magnetic stirrer flask and then added 300 ml of 80% ethanol in the flask containing dried powder of neem and lemongrass. Material included in vessel Clarified by filtration process and keep it for the evaporation process which gave concentrated extract of neem and lemongrass Leaves. Then the extract was then stored in a closed container to avoid the decomposition.

Fig 1 – Maceration extraction

Fig 2 - Evaporation

Phytochemical Screening of extracts of Neem and Lemongrass Leaves

Sample solution: About 100 mg (0.1 gm) of the extract is dissolved in 5 ml of distilled water and filtered. The filtrate is subjected to as a sample solution, used in following tests.

Test for alkaloids

a) **Wagner test** – Add a few drops of a solution of 2 g potassium iodide and 1.27 g iodine in 5 mL distilled water, diluted to 100 mL with distilled water, to the sample solution. A brown-coloured precipitate indicates the presence of alkaloids.
b) **Dragendroff test** - Add 1 mL of Dragendroff reagent to 2 mL of sample solution. An orange red precipitate indicates the presence of alkaloids.
c) **Mayers test** – Add a few drops of Mayer's reagent to 1 mL of sample solution. A yellowish or white precipitate indicates the presence of alkaloids. For a more specific test, add 2 mL of concentrated HCl to 2 mL of the sample solution, then add a few drops of Mayer's reagent. A white precipitate or green color indicates the presence of alkaloids.

Test for saponins

a. **Ferric chloride test:** Two milliliters (2 ml) of the aqueous solution of the extract were added to a few drops of 10% Ferric chloride solution (light yellow). The occurrence of blackish blue colour showed the presence of gallic tannins and a green-blackish colour indicated presence ofcatechol tannins.
b. **Foam test:** 1ml solution of extract was diluted with distilled water to 20 ml and shaken in a graduated cylinder for 15 minutes. Development of stable foam suggests the presence of saponins.

II. Test for Tannins

Ferric chloride test: A ferric chloride solution to a tannin solution, and a blue, black, violet, or green precipitate or colour will confirm the presence of tannins. Hydrolysable tannins produce a blue–black colour, while a combination of hydrolysable and condensed tannins produce a greenishcolour.

III. Test for Glycosides

a) **Killer – killiani test** - glacial acetic acid add ferric chloride and add extract then add small amount of

0.5 ml concentrated sulphuric acid show formation of brown or violet ring presence of glycosides.

b) **Bromine test-**Two ml of the sample solution add an equal volume or an excess of freshly prepared solution of bromine. Record the colour.

IV. Test for terpenoid – 1ml of chloroform extract and add few drops of concentrated sulphuric acid red precipitate show the presence of terpenoid.

V. Tests for Carbohydrates

a) **Benedicts test -** Concentrated sulfuric acid converts carbohydrates into furfural or its derivatives, which react with α -naphthol to form a purple product. This test is positive for carbohydrates with at least five carbons, as well as proteins and lipids with a linked carbohydrate.

b) **Molisch test -** A colorimetric test that uses Molisch's reagent to detect carbohydrates Concentrated sulfuric acid in the test converts carbohydrates into furfural or its derivatives, which react with α-naphthol to form a purple product.

Chromatography

Paper chromatography of neem and lemongrass oil: Cut the watchman filter paper in about 4 – 10 cm strip. draw horizontal line with pencil about 2 cm for the lower edge of the strip and denoted point in lower line then with the help of capillary denoted the point on paper. Then prepared the mobile phase (toluene**:** ethyl acetate**:** formic acid) and set for 15 min. then place in watchman filter paper on the mobile phase and the mobile phase travelled on the paper. Then mobile phase almost reaches to top of the paper. remove the paper from mobile phase and dry it. Then spray with detecting agents then last show the component. Find out RF value.

Thin layer chromatography of neem and lemongrass oil: Prepared the silica G plate; take the 5gm of silica G and 8 ml of water mixed it will and poured on glass plate and make it thin layer and dry at 60°c in hot air oven. t hen with the help of capillary denoted the spot. prepared mobile phase and (cyclohexane: ethyl acetate: formic acid) and set for 15 min. then plate place into mobile phase run and reaches to the top of the line on plate. Then remove plate and dry it. then spray the detecting agent and show detecting compound. Find out RF value.

Spectral analysis - UV spectroscopy

Calibration curve of neem: solution -Take 100mg volumetric neem powder lemongrass oil into 100 ml volumetric flask and makeup volume upto 100ml in dist. water (warm it necessary) shake it properly which containing neem powder. Then prepared different concentration using above prepared stock solution and absorbance of different concentrated solutions detected. Then compared tannic and gallic acid solution.

Calibration curve of lemongrass oil: Stock solution - Take 100mg volumetric lemongrass oil into 100 ml volumetric flask and makeup volume up to 100 ml in dist. water (warm it necessary) shake it properly which containing neem powder. Then prepared different concentration using above prepared stock solution and absorbance of different concentrated solutions detected. then compared tannic and gallic acid solution.

Formulation of antidandruff paper soap containing extracts of Neem and Lemongrass Leaves

Formulation

Table No. -1

Sr. no.	Ingredients	Roles	Quantity		
			F1	F2	F3
1	Neem extract	Antidandruff / preservative	3ml	4ml	5ml
2	Lemongrass oil	Antimicrobial	5ml	7ml	10ml
3	SLS	Cleaners	5gm	7gm	10gm
4	Glycerin	Humactant	7ml	10ml	15ml
5	Rosewater	Antibacterial	10ml	20ml	20ml
6	White petroleum jelly	Emollients	3ml	8ml	8ml

Formulation Procedure: To create antidandruff paper soap strips, start by measuring the required quantity of neem extract into a beaker and adding water. Then, incorporate all ingredients – neem extract, lemongrass oil, into the solution, along with sodium lauryl sulfate and perfume. Stir the mixture well until it form a semi-solid liquid. Add petroleum jelly and shake occasionally. Spread the solution onto A4 size butter paper and allow it to dry. Once dried, cut the paper into strip. Your herbal antidandruff paper soap strips are now ready for use.

Evaluation tests for antidandruff herbal paper soap

To evaluate the prepared formulation different tests were Performed.

Physical evaluation

Organoleptic characteristics

- Color: The color of the formulation was checked out against white Background.
- Odour: The odor of the soap paper was checked by mixing the soap in Water and taking the smell.
- Greasiness: The greasiness was assessed by the application on to the skin.
- Consistency: The consistency was checked by applying on skin.

pH: The pH was determined before and after the preparation of paper soap. At first the liquid soap was prepared and the pH was detected by using litmus paper the result was red litmus paper turned blue in colour and blue litmus remained unchanged. Then after the production of paper soaps the piece of paper soap was taken an added into water a then Shaked fully then the pH meter was used for testing of pH.

Foam Height: - 0.5gm of sample of soap was taken, dispersed in 25 ml distilled water. Then, transferred it into 100 ml Measuring cylinder; volume was make up to 50 ml with water. 25 strokes were given and stand till Aqueous volume measured upto50 ml and measured the foamheight, above the aqueous volume.

Sensitivity: - It is tasted by "patch test. Apply product on 1 cm Patch of skin, if no any inflammation or rashes then it considered as free from sensitivity.

Irritations: - It is carried out by applying product on the skin for 10 minutes. If no irritation then it is considered as Non –irritation product.

Paper spread ability: - A pinch of product should be easily spread ability on Paper.

Antifungal activity: For antifungal activity a similar procedure was repeated; the malt extract, Glucose, yeast extract, and peptone (MGYP agar) agar plates were prepared using seed inoculation (2) using the candida albicans (NCIM 3466), and MGYP agar plates were incubated at 27°c temperature for 48 to 72 hrs. after incubation plates were examined for a zone of clearance around respective wells. The obtained antifungal results were compared with a standard, Fluconazole drug (100 mg/ml) as a positive control which sterile distilled water waskept as negative control for this study.

Stability Test: - Short term stability studies was done in the period of 8 days for theformulations. The sample was stored in different storage temperature i.e., room temperature 37°c and at refrigerator 2°c to 8°c. Sample was withdrawn on interval and analysed for visual appearance, clarity, pH and drug content.

RESULTS

Observations of Phytochemical screening

Table no. 2

Sr. no.	Phytochemical constituents	Type of test	Result	
			Neem	Lemon-grass
1	**Alkaloids**	Wagner's test	+	+
		Dragandroff's test	+	+
		Mayer's test	+	+
2	**Saponins**	Ferric chloride test	+	-
		Foam test	+	+
3	**Tannins**	Ferric chloride test	+	-
4	**Glycosides**	Killer – killiani test	-	+
		Bromine test	-	+
5	**Terpenoid**	Test for terpenoid	-	+
6	**Carbohydrates**	Benedicts test	+	-
		Molisch test	+	-

Chromatography

Paper chromatography of neem and lemongrass oil: The standard and drug sample were mixed with ethanol. Then, using small tubes, they were placed on a plate coated with chromatography paper. This allowed us to separate themeffectively using specific mixtures.

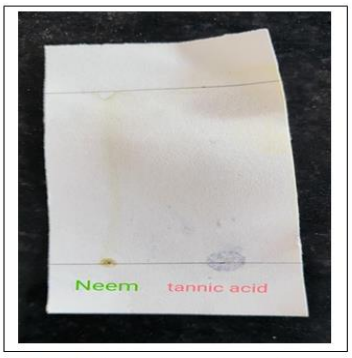

Fig 3 – Paper Chromatography

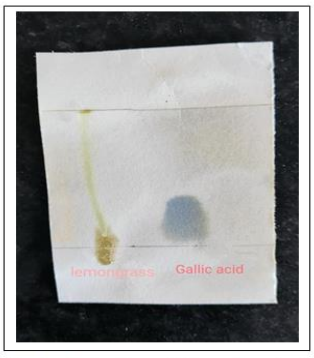

Fig 4 – Detection of Phenol content

Detection of Tannin content
Table no. 3

Sample	Neem extract solution
Standard	Tannic acid
Mobile phase	Toluene: ethylacetate:formic acid (6:4:0.3) v/v/v
Retention factor	0.22

Detection of phenols content
Table no. 4

Sample	Lemongrass extract solution
Standard	Gallic acid
Mobile phase	Cyclohexane: ethyl acetate:formic acid (4: 6: 1)
Retention factor	0.78

Thin layer chromatography of neem and lemongrass oil: The standard and drug sample were mixed with ethanol. Then, using small tubes, they were placed on a plate coated with silica gel. This allowed us to separate them effectively using specific mixtures.

Detection of Tannin content

Fig 5 - TLC

Fig 6 Detection of phenol content

Table no. 5

Sample	Lemongrass extractsolution
Standard	Tannic acid
Mobile phase	Toluene: ethylacetate: formicacid (6:4:0.3) v/v/v
Retention factor	0.37

Table no. 6

Sample	Neem extractsolution
Standard	Gallic acid
Mobile phase	Cyclohexane: ethylacetate: formic acid (4: 6: 1)
Retention factor	0.62

Calibration curve of neem
Table no. 7

Concentration	Absorbance
20	0.123
40	0.3
60	0.499
80	0.711

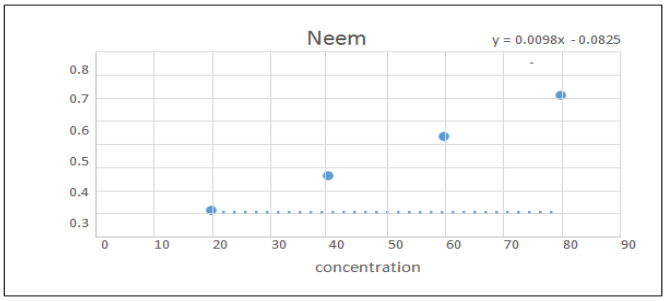

Fig no. 8 – Calibration curve.

Phenolic content was found to be: **22.19** mg NE/g of extract. extractTannin content was found to be: **4.5** mg NE/g of

Calibration curve of lemongrass
Table no. 8

Concentration	Absorbance
20	0.045
40	0.082
60	0.12
80	0.149

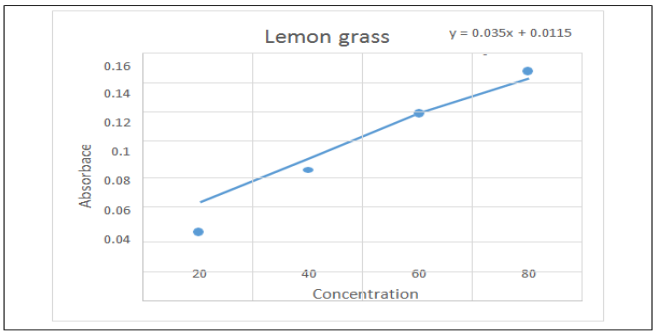

Fig 9 – Calibration curve lemongrass.

Phenolic content was found to be: **3.1** mg NE/g of extract Tannin content was found to be: **0.024** mg NE/g of extract.

Evaluation of antidandruff herbal paper soap
Physical Evaluation of soap paper: On the basis of Organoleptic properties of herbal extract i.e. neem and lemongrass leavesfollowing observations are shown.

Table no. 9 -Observations of organoleptic Properties.

Sr. no.	Test	Observations
1	Colour	Yellow
2	Odour	Aromatic
3	Greasiness	Less greasy
4	Consistency	Smooth

pH Determination: With the help of pH meter the pH of formulation was found to be **7.22**

Fig 10 – pH detection.

Other parameters
Table no. 10

Sr. no.	Parameter	Result
1	Foam height (cm)	27
2	Sensitivity	Smooth
3	Irritation	No irritation
4	Paper spread ability	Easily spared

Antifungal activity: Zone of inhibition of control and herbal formulation and control against C. albicans with differentdilutions shown in following table.

Table no. 11- Zone of inhibition.

Bacteria used	Concentration of sample (mg/ml)	Zone of inhibition (mm)
C. Albicans	25	17.4
	50	17.9
	75	20.3
	100	22.8

Fig 11 - Zone of inhibition of control and herbal formulation against C. albicans.

DISCUSSION AND CONCLUSION

The goal of this project was to make a natural paper soap that works as well as regular synthetic ones. Wemade our anti-dandruff paper soap using plant extracts known for cleaning hair in Asia and used in traditional medicine. Our soap ingredients are safer than synthetic ones and can help pre movement hair loss or damage. Tests showed it reduces dandruff and fights infections. It has a skin-friendly pH of 7.22. we used ingredients like neem and lemongrass for their antidandruff and conditioning effects instead of synthetic ones. We compared our soap paper to commercial ones to make sure it's good. We test various evaluation parameters like pH, foaming index, skin irritation, antifungal activity against C. Albicans in agar well diffusion method our drug shows better antidandruff activity.

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