

Formulation and Evaluation of Polyherbal Hair Oil Containing Vitamin B7

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Abstract: *In the last few years there has been an extraordinary growth in the field of herbal & ayurvedic medicines. Herbal formulations have less side effects and are safe to use. The goal of the present study is involves preparation & evaluation of polyherbal hair oil using plant materials. The different extracts of different part of plant showed promising pharmacological activities. Formulation of polyherbal hair oil prepared by using extract of hibiscus rosa sinensis flower and powder of curry leaves, henna leaves, fenugreek seeds, tulsi leaves & shikakai. After preparation capsules of vitamin B7 is added in oil, it stimulates keratin production. The prepared polyherbal hair oil evaluated different parameters such as phytochemical screening, organoleptic characterization, physical evaluation, specific gravity, pH and also stability study. Antimicrobial assay of the polyherbal hair oil was carried out by using cup plate method and these helps reduces dandruffs and scalp of hairs. And to provide nutrition's to hairs. The antioxidant activity of the oil was studied by DPPH radical scavenging activity. Hence, these polyherbal hair oil increases hair growth, reduces hair loss, providing protection against dandruff.*

Keywords: Polyherbal hair oil, antioxidant activity, anti-dandruff assay, herbs.

I. INTRODUCTION

1.1 Structure of Hair

Hair grows out of follicles located in the junction between the deep layers of the dermis and the hypodermis. These follicles are also known as hair bulbs. Blood flow is supplied by a small vessel that passes through the inside of the hair shaft, thus providing the hair with all the vital elements it needs to remain healthy such as amino acids, mineral salts or vitamins. The hair shaft is surrounded by glands, the most important being the sebaceous gland, which produces sebum that acts as a natural lubricant for the hair. On the surface of the scalp, pores evacuate the sweat produced by the sweat glands. The hair is made up of 95% keratin, a fibrous, helicoidal protein (shaped like a helix) that forms part of the skin and all its appendages (body hair, nails, etc.). Keratin is synthesized by keratinocytes and is insoluble in water, thus ensuring permeability and protection for the hair. Some 18 amino acids can be found in the hair, such as proline, threonine, leucine and arginine. Keratin is particularly rich in cysteine (a type of sulfurated amino acid), which forms disulfide bonds between molecules, adding rigidity and resistance to the entire structure.

1.2 Common Hair Problems:

- **Hair Loss:** Although historically discussed as a problem among men, hair loss/thinning hair is also common among women. For most men, it may be male pattern balding. Female hair loss is often caused by stress, medication, changing hormones, and even menopause. Additionally, many hair styling products (chemicals/excessive heat) can contribute to hair loss.
- **Dandruff:** Dandruff, scaly particles that cling to the root of the hair, can be caused by a poor diet, an infection, or even a sluggish metabolism.
- **Dry Hairs:** Shampooing too often causes dry hair. Although squeaky-clean hair is a good thing, many overdo it by washing once, sometimes twice, per day. That will strip away all of the hair's natural oils.
- **Split Ends:** Over-brushing hair, excessive perming, too much heat, and lack of a good conditioner cause split ends.

- **Oily/Greasy Hair:** Oily hair is caused when the scalp produces too much of a natural oil called sebum. Sebum is produced by sebaceous glands, which can sometimes “work overtime”, resulting in excessive amounts of oil.

1.3 Benefits of Herbs for Hairs

Herbs & herbal drugs are clinically proved good for hair growth. Hair loss problem is of great concern to both males & females & the main problems associated with hair loss are hair fading, dandruff & falling of hair. Various synthetic medicines are available for hair loss which does not treat permanently & also shows severe side effects. The main objective of this work is to develop such an herbal hair oil formulation which can resolve the problem related to hair fall & other hair diseases. Herbal drugs like Vitamin b7, Hibiscus rosasinesis, Curry leaf, Aloe Vera leaf, Shikakai (Acacia concinna), Henna (Lawsonia inermis), Tulasi (Ocimum tenuiflorum) And fenugreek seeds (Trigonella foenum graecum) were selected for the formulations of poly herbal hair oil. The hair oil was prepared individually and in a varying concentration of all the herbs and a mixture of all the herbs in fixed proportion using coconut oil as base. The formulated oil in varying concentration was evaluated physical, chemical and hair growth properties of formulated oil.

The aim of present study involves preparation of polyherbal hair oil using plant materials. The prepared polyherbal hair oil evaluated different parameters within the acceptable limits. Such as phytochemical screening, organoleptic characterization, specific gravity, pH, viscosity, acid value, saponification value, refractive index, and also stability study. Antimicrobial assay of the polyherbal hair oil was studied by the zone inhibition method. And these helps reduces dandruffs and scalp of hairs. And to provide nutrition’s of hairs. The antioxidant activity of the oil was studied by DPPH radical scavenging activity. The primary skin irritation test is carried out. Hence, these polyherbal hair oil increases hair growth, reduces hair loss, providing protection against dandruff. Herbal hair oils are formulated with herbal extracts in oil base In our study, we have formulated herbal hair oils from Hibiscus Rosasinesis, Murraya koenigii, Aloe barbadensis, Phyllanthus embilica, Acacia concinna, Coconut oil used for the best medicine of hair growth.

1.4 What is Vitamin B7 or Biotin?

It is a water-soluble vitamin known as B7. It helps your body to convert food into energy. You will find biotin in various foods such as egg yolks, almonds, mushrooms, sweet potatoes, and other sources. There is a significant link between biotin and hair loss. Biotin is an important B vitamin that plays a crucial role in the hair growth process, skin, and nail health. It also affects the metabolism of your scalp oils. People who suffer from hair loss are known for having a substantial biotin deficiency. Without enough biotin, you may lose your hair, eyebrows.

Can biotin be absorbed through the scalp?

If you want to fight or prevent hair loss, you may have an interest in using topical biotin. Before using this application, you need to learn facts about this product. This information makes it easier for you to determine if it’s the best hair solution for you. Let’s take a closer look at biotin and why you need it for your daily use. Topical Biotin Is Beneficial for Hair Loss. And may also experience insomnia, dry skin, and fatigue. To fix this problem, you can consume biotin-rich foods and supplements. You also get benefits using a biotin product externally. Hair growth requires patience, but you can speed up the process with topical biotin. You will find biotin in various products to treat hair loss. Some of these are scalp oils, leave-in sprays, shampoos, and hair conditioners. There is clear evidence that using biotin could improve the growth of your hair. Biotin is a b vitamin often recommended for hair health. since biotin deficiency can lead to thinning of the hair, some people claim that taking biotin supplements can thicken hair and stimulate growth.

1.5 Characteristics of Biotin

- Biotin, vitamin H or vitamin B7 is very important for the health of the skin, nails and hairs.
- It is used to treat dermatitis, dandruff or skin problems.
- Vitamin B7 deficiency may manifest as hair loss, dandruff or skin problems.

1.6 Benefits of Polyherbal Hair oil

- Prevent dandruff.
- Increase hair growth and slows down hair loss.
- Keeps hair moisture, strong.

- Antibacterial, antifungal and soothes the scalp.
- Promote hair growth.
- Makes hair thicker and stronger.
- Improve circulation of blood in the scalp.

II. MATERIALS AND METHODS

Table 1: Materials & Methods

Sr. No.	Materials & Excipients	Quantity	Properties
1.	Hibiscus Extract	2gm	Nourishing property & thickens Hairs
2.	Curry Leaves Powder	5gm	Antioxidant activity
3.	Henna Leaves Powder	5gm	Repairs damaged hairs & acts as a conditioner
4.	Tulsi Leaves Powder	6mg	Improves blood circulation & Anti itching activity
5.	Fenugreek Seeds Powder	2gm	Antifungal & Antibacterial Property
6.	Shikakai Powder	6mg	Cleansing & Antifungal Property
7.	Vitamin B7 Capsules	50mg	Stimulates Keratin Production
8.	Almond Oil	50ml	Moisturizing & Softening Property
9.	Cinnamon Oil	5ml	Preservative
10.	Peppermint Oil	5ml	Cooling agent

III. EXTRACTION METHODS

EXTRACTION OF HIBISCUS ROSA SINENSIS BY SOXHLET EXTRACTOR:

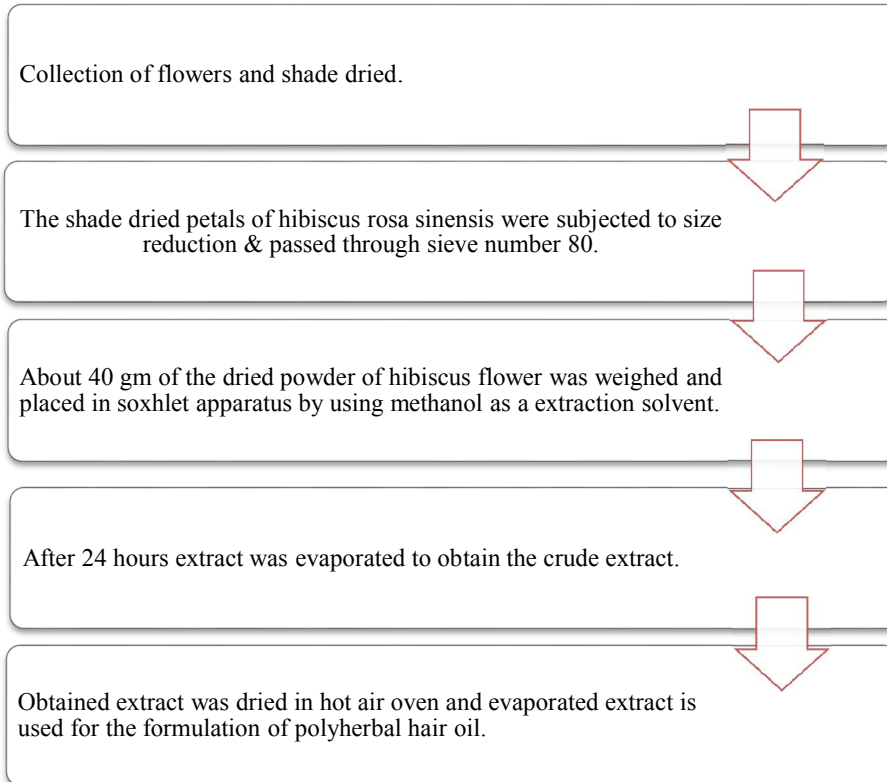




Fig 1: Extraction of Hibiscus by Soxhlet Extraction

METHOD OF PREPARATION OF POLYHERBAL HAIR OIL

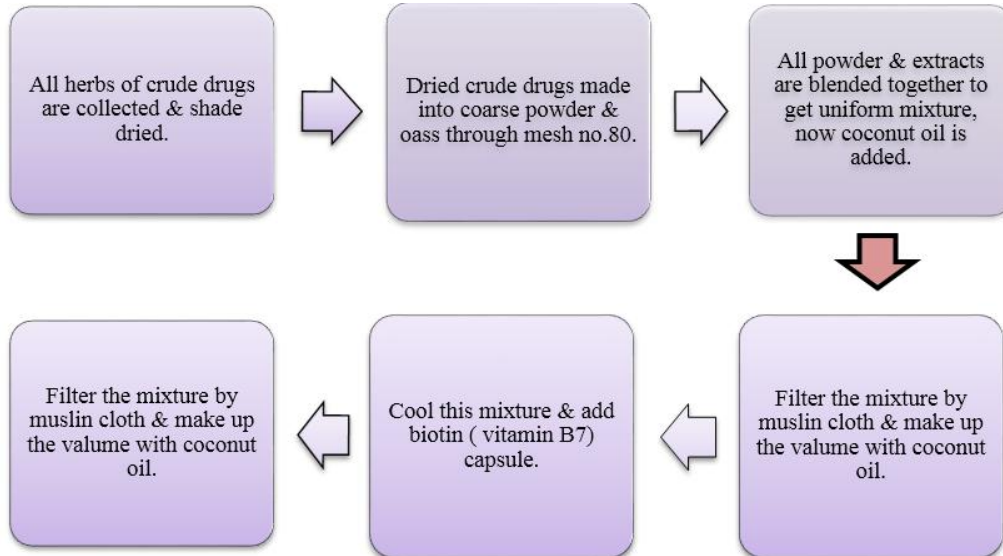


Fig 2: All Dried Powder

IV. EVALUATION

The prepared oil formulation was evaluated for following parameters:

4.1 Morphological Evaluation

- Morphological parameters like colour, odour & texture were checked visually.
- Colour: The colour of the formulation was checked against white background.
- Odour: The odour of the oil was checked by smelling it.
- Texture: The developed oil is tested for texture by visual inspection after the oil have been set in the container.

4.2 Physicochemical Evaluation:

- Physical state: Liquid
- Solubility: Add a drop of oil into 0.5 ml of solvent in a test tube. Tap the tube with figure to mix or stir gently with a glass stirring rod. Record the sample as soluble or insoluble.
- Measurement of pH: Within 24 hours of preparation, the pH was testing using a digital pH meter.

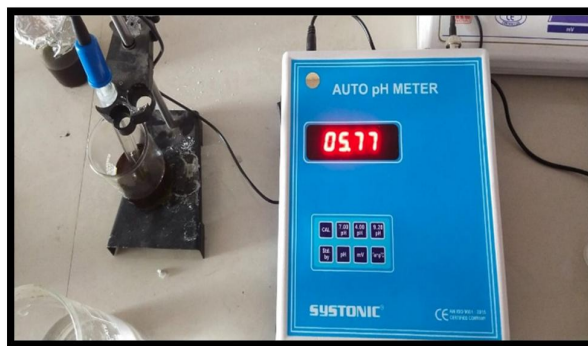


Fig 3: pH meter

- **Density:** Take the density bottle and wash it with distilled water and dry it, take empty weight of the bottle. Fill the density water with distilled water and record the weight, again wash with distilled water and dry it. Fill the bottle with oil and record the weight of bottle. Calculate the density by using formula:
Density of oil = Weight of oil / Weight of water
- **Specific Gravity:** Take the density bottle and wash it with distilled water and dry it, take empty weight of the bottle, fill the density water with distilled water and record the weight, again wash with distilled water and dry it. Fill the bottle with oil and record the weight of bottle. Calculate the density by using formula:
Specific Gravity = Density of oil/ Density of water

4.3 Stability Study

The prepared polyherbal hair oil is observed for stability condition. The polyherbal hair oil was kept aside and observed for 1-, 2- and 3-months intervals.

4.4 Antimicrobial Assay

Preparation of growth media:

Nutrient agar was taken (2.3 gm with 100 ml of distilled water) for preparation of growth media. Prepared nutrient agar was autoclaved at 121°C 9 and 15 lb. pressure and then nutrient agar was poured in petri plates under the laminar flow with suitable sterile conditions.

Determination of zone of inhibition:

Antifungal & antibacterial activity was checked by agar well diffusion method. In this method a previously liquefied medium was inoculated with 0.2 ml of fungal & bacterial suspension having a uniform turbidity at temperature of 40°C. 20 ml of culture medium was poured into the sterile petri dish having an internal diameter of 8.5 cm. After complete solidification of liquefied inoculated medium, the wells were made aseptically with cork borer having 6mm diameter in

each of these plate oil solutions was placed carefully. Plates were incubated at 37°C for 24 hours in case of bacteria & at 27°C for 48 hours in case of fungi. After incubation period was over, the zone of inhibition was measured with help of hi-antibiotic zone scale.

Table 3: Antimicrobial Assay

Test	Organism	Standard
Anti- bacterial	<i>Staphylococcus aureus</i>	Ciprofloxacin
Anti- Fungal	<i>Candida albican</i>	Fluconazole

4.5 Antioxidant Activity (DPPH Radical Scavenging Test)

Prepare 1ml of oil solution of 20, 30, 40, 50 and 60 µg/ ml in acetone. Leave one ml of oil solutions was added to DPPH solutions after 30 minutes at room temperature, the absorbance was measured at 520nm. The antioxidant activity of the formulation is measured by taking ascorbic acid as standard.

Table 4: Antioxidant Activity

Concentration (µl / ml)	Absorbance
20ml	0.256
30ml	0.321
40ml	0.343
50ml	0.414
60ml	0.456
Standard (Ascorbic Acid)	0.06

4.6 Phytochemical Screening

TEST	PROCEDURE	OBSERVATION
Flavonoids: Shinoda Test	2-3 ml oil + 5 ml of 95% ethanol + few drops of conc. HCL + 0.5 gm Magnesium turnings	Orange, pink, red to purple colour appears.
Alkaloids: Dragendorffs Test	2-3 ml of oil + few drops of Dragendorffs reagent.	Formation of Orange brown precipitate.
Steroid: Salkowski Reaction	2ml of oil + 2 ml of chloroform + 2 ml of concentrated H ₂ SO ₄ , shake well.	Chloroform layer appears red and acid layer shows greenish yellow fluorescence.
Glycosides: Keller killani test	2 ml oil + 1-2 drops of glacial acetic acid + 1 drop of 5% FeCl ₃ + Conc.H ₂ SO ₄	Reddish brown colour appear at junction and upper layer appears bluish green.
Tannins and Phenolic compounds: Lead acetate test	2 ml oil + few drops of lead acetate solution	Formation of white precipitate.

V. RESULT AND DISCUSSION

5.1 Organoleptic Evaluation

The organoleptic characteristics of the oil was evaluated for its colour, odour, texture and the results are given in the following table:

Table 5: Organoleptic Evaluation

Sr. No.	Parameters	Observation
1.	Colour	Green
2.	Odour	Pleasant
3.	Texture	Smooth

5.2 Physicochemical Parameters

Physicochemical parameters like pH, solubility, stability study, density and specific gravity were evaluated.

Table 6: Physicochemical Evaluation

Sr. No	Parameters	Observation
1.	Physical state	Liquid
2.	Solubility	Soluble in Polar solvents
3.	pH	5.77
4.	Density	0.89
5.	Specific gravity	0.89

5.3 Antimicrobial Assay

Table 7: Antimicrobial Assay

Sr. No.	ORGANISM	Zone of inhibition (in mm)
1	Staphylococcus aureus	32mm
2	Candida Albicans	28mm



Fig. 4: Antibacterial Assay



Fig. 5: Antifungal Assay

5.4 Phytochemical Screening

Table 8: Phytochemical Screening

Sr. no	Test	Result
1	Flavonoids	+
2	Alkaloids	+
3	Steroids	-
4	Glycosides	+
5	Tannins & Phenolic Compounds	+



Fig. 6: Phytochemical Screening

5.5 Antioxidant Activity (DPPH Radical Scavenging Test)

Antioxidant activity of the prepared formulation was carried out by DPPH radical scavenging activity. By taking ascorbic acid as a standard. Three concentrations of polyherbal oil showed more scavenging activity as compared to other concentrations

Table 9: Antioxidant Activity

Concentration (µl / ml)	Absorbance
20ml	0.256
30ml	0.321
40ml	0.343
50ml	0.414
60ml	0.456
Standard (Ascorbic Acid)	0.06

VI. CONCLUSION

Polyherbal hair oil is one of the most well recognized hair treatments. Herbal formulations provide best mixture of vitamins, antioxidants, essential oils, and also provides nutrients of hair growth. These formulations maintaining good hair growth of hairs, stopping hair loss, reduces dandruff of hairs, also shining of hairs. Biotin (Vitamin B7)) stimulates keratin production in hair and can increase the rate of follicle growth. Polyherbal hair oil containing a mixture of synergistic chemicals can be used effectively to deal with the hair problems such as antimicrobial, antifungal and other ailments associated with the hairs. Tus in the present work, it is very good attempt to formulate the polyherbal hair oil containing naturally available ingredients like hibiscus, curry, fenugreek etc. It is suggested that the prepared formulation was physicochemical and microbiologically stable.

VII. ACKNOWLEDGEMENT

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VIII. CONFLICT OF INTEREST

The author declared no conflict of interest.

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