E-ISSN: 2788-9270
P-ISSN: 2788-9262
www.pharmajournal.net
NJPS 2022; 2(1): 10-16
Received: 26-10-2021
Accepted: 08-12-2021

Manju M Nair
Student, K.R. College of Pharmacy, Bengaluru, Karnataka, India

Gogula Bhargava
Assistant Professor, Department of Pharmaceutical Chemistry, K.R. College of Pharmacy, Bangalore, Karnataka, India

Dr. Kavitha PN
Principal, K.R. College of Pharmacy, Bengaluru, Karnataka, India

Dr. Saraswati CD
Rosy Royal College of Pharmacy, Bengaluru, Karnataka, India

Corresponding Author:
Manju M Nair
Student, K.R. College of Pharmacy, Bengaluru, Karnataka, India

Preparation and evaluation of herbal antidandruff shampoo

Manju M Nair, Gogula Bhargava, Dr. Kavitha PN and Dr. Saraswati CD

Abstract
The aim of the present study is to formulate a pure herbal shampoo and to evaluate its physicochemical properties. The shampoo is enriched with herbal extracts without any synthetic additives. The herbal extracts used in the formulation are Reetha (*Sapindus mukorossi*), Neem (*Azadirachta indica*), Tulsi (*Ocimum tenuiflorum*), Banana root (*Musa acuminate*), Lavender oil (*Lavendula angustifolia*), Mint (*Mentha piperita*), Black cumin (*Nigella sativa*), Xanthum gum are added and prepared by simple mixing process. These herbals are enriched with saponins, polyphenols, tannins, vitamins, antioxidant which helps in hair growth. The herbal shampoo was tested for physicochemical properties. Some of the methods are visual inspection, pH determination, solubility, cleansing action, determination of percentage solid content etc. The formulated shampoo was clean and qualitative. It showed cleansing and detergency, low surface tension, good foam, stability, and antidandruff property. The pH of herbal shampoo was found to be around 6.2 which is good for scalp. The shampoo was quite good product fairly producing foams. It is having moderate dirt detergency activity. However further research and development is required to improve the product quality and safety.

Keywords: Cosmetics, herbal anti dandruff shampoo, black cumin

Introduction
Cosmeceuticals have become the fastest-growing segment of the personal care industry. Nowadays, herbal extracts and herbal powders are used in the preparation to enhance beauty and increase the attractiveness of the person. These herbal preparations are used for treating sunburns, complexion, brighteners and hair growing formulas. Cosmetics that include herbs can be classified on the basis of dosage form such as powder, cream and shampoo solutions according to organ or part of the body to be applied such as cosmetics for skin, hair, nail, teeth and mouth.
Herbal cosmetics have been dominating the synthetic industry. Herbs were used as food rather medicine till the present date as they are natural and fulfill the nutritional requirement of human beings. But several herbal extracts have proved themselves fruitful for their utilization in curing diseases related to scalp. In today's scenario synthetic market is strongly dominated by the herbal one. The main problems associated with hair are pigmentation (fading), dandruff and falling of hair.

Shampoo
Shampoo is a hair care product, typically in the form of a viscous liquid that is used for cleansing hair. The goal of using shampoo is to remove the unwanted debris in between the hair without stripping out so much sebum as to make hair unmanageable. Synthetic shampoos may cause side effects so keeping this in view an herbal anti-dandruff shampoo has been formulated and evaluated. "Herbal shampoos are the cosmetic preparations that are prepared with the use of traditional herbs which are meant for cleansing the hair and scalp like the regular shampoo".
A shampoo can be described as a preparation containing (i.e., Surface active agent) in a suitable liquid, solid, or powder form which when used under the specified conditions will remove surface grease, dirt, skin debris from the hair and scalp.

Ingredients of a Shampoo
The common ingredients of a shampoo are:
- Detergents
- Conditioners

- Thickeners
- Fragrances
- Preservatives

Detergents: Shampoo generally include artificial detergents or surfactants as cleansers. A detergent or surfactant is amphiphilic in nature, which means the detergent molecules includes both lipophilic and hydrophilic sites. The lipophilic sites assist to bind sebum, oily dust and hydrophilic end binds to water.

Conditioners: Hair conditioning features are to impart manageability, gloss and residues of hair. This may be included in the shampoo which then serves dual function of cleaning and conditioning.

Thickeners: These are introduced to alternate the physical and optical properties of the shampoo. Many shampoos are pearlescent. Thickeners like sodium chloride are used to grow the product viscosity. These does not show any effect on hair cleansing.

Preservatives: Preservatives withstand germs and save us from decomposition of the shampoos. They also prevent various other health risks that accompany infection through germs and bacteria.

Types of shampoo
- Conditioning shampoo
- Antidandruff shampoo

Conditioning shampoo: These are the shampoo which are formulated to cleanse the hair and scalp, remove dirt and grime without stripping away too much of natural sebum and condition the hair to keep it shining and healthy.

Antidandruff shampoo: This medicated shampoo is used to treat dandruff and certain scalp infection like seborrheic dermatitis. It reduces itching, flaking, irritation, and redness of the scalp. Selenium sulfide is commonly used in anti-dandruff shampoo.

Dandruff

Dandruff is becoming the major and common problem with hair nowadays.

The causative factors behind dandruff in most of the adults are dry skin, sensitivity to hair products or contact dermatitis and other skin conditions, such as psoriasis and eczema.

Dandruff is caused by a fungus called “Malasseziarestricta and Malasseziaglobosa”. It mostly occurs after puberty between 20-30 years and dandruff effects males more than females. Dandruff is caused due to warm and humid atmospheres poor personal hygiene promotes the growth of the fungus Malassezia.

Herbal Anti-dandruff Shampoo

In Indian system of medicine, various plants its parts have been used for treatment of dandruff. Ingredients of herbal anti dandruff include Reetha as Natural surfactant, Neem and Black cumin as anti-dandruff agents, Mentha as coolant, Xanthum gum as thickener, Banana root as coloring agent, Tulsi and Lavender oil as preservative. These herbal extracts contain phytochemicals such as saponins, flavonoids, polyphenols, tannins, antioxidants, volatile oil which promote hair growth. So, I intended to carry out the formulation of anti-dandruff shampoo using herbal extracts and its physicochemical parameters.

Advantages
- No synthetic surfactants like Sodium lauryl sulphate are used.
- It is free from adverse effects.
- It is skin friendly
- It is eco-friendly
- Pure and organic ingredient used promotes hair growth and helps in maintaining moisture in the hair.

Disadvantages
- Herbals have slower effects as compared to other dosage form.
- Most of the herbal drugs are not easily available.
- Manufacturing process is time consuming.
- No pharmacopoeia defines any specific procedure to be used in any herbal shampoo.

Methodology

Table 1: List of herbs used

Name of herbs used	Uses of herbs
Reetha	Used as natural surfactant Cleans and moisture the scalp
Neem	Used as anti-dandruff Promotes the hair growth
Black cumin	Used as anti-dandruff It also prevents hair fall Prevents premature greying of hair
Mentha	Increases circulation Cooling agent
Tulsi	Strengthens the hair follicles Antimicrobial effect
Banana root	Imparts color
Lavender oil	Antimicrobial Hair growth

Table 2: Formulation

Sl. No	Ingredients	Quantity
1.	Reetha	15ml
2.	Neem	3ml
3.	Banana root	1ml
4	Mentha	2ml
5.	Black Cumin	5ml
6.	Xanthum gum	1gm
7.	Tulsi	2ml
8.	Lavender oil	1ml

Materials and Methods

Crude drugs
1. Reetha
2. Neem
3. 3 Mentha
4. Black cumin
5. Xanthum gum
6. Banana root
7. Tulsi
8. Lavender oil

Collection methods

All the medicinal plants were collected for Herbal anti-dandruff shampoo stud namely as Reetha, Neem, Xanthum gum, Reetha, Mentha, Banana roots, Lavender oil, Tulsi. The plant specimen was collected from Local market.

Extraction methods

Reetha Extraction: 25gm of Reetha fruits were weighed accurately. To the Reetha fruits 50ml of water was added, mixed well and heated in a water bath for 60 minutes. Later it was cooled. Then the solution was filtered and collected.

a) Reetha b) Extraction of Reetha c) Extract of Reetha

Fig 1: Extraction process of Reetha

Neem Extraction: 7.5 gm of Neem leaves were weighed, 50 ml of water were added to the neem leaves and heated on water bath for 45 minutes. Then the solution was cooled. Then the solution was filtered and collected.

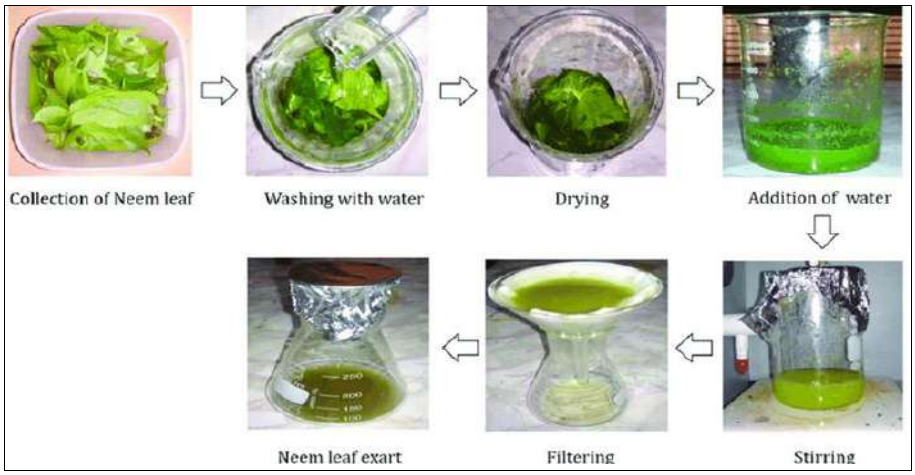

Fig 2: Neem extraction

Mentha Extraction: - 10 gm of Mentha leaves were weighed accurately. 25 ml of water was added and heated on water bath for 30 minutes. After the solution was cooled. Then the solution was filtered and collected.

a) Mentha b) Extraction of Mentha c) Mentha extract

Fig 3: Extraction process of Mentha

Banana Roots Extraction

20 gm of Banana roots was extracted with 150 ml of water (60-80°) using Soxhlet apparatus for 48 hours. All the solvent extract were filtered with Whatman filter paper and concentrated.

1. Soxhlet apparatus have been set up.
2. Then the washed banana roots were cut into a small piece and made it to fine powder.
3. Then the crude drugs were placed in the tumble.
4. And finally observed for the cycles in the Soxhlet apparatus.

a) Banana roots b) Extraction of Banana roots c) Extract of Banana Roots

Fig 4: Extraction process of Banana Roots

Black cumin Extraction:-25gm of black cumin seed were weighed accurately.100ml of water were added and heated on water bath for 1hour.After the solution was cooled. Then the solution was filtered and collected.

(a) Black cumin (b) Extraction of black cumin (c) Extract of black cumin

Fig 5: Extraction process of Black Cumin

Methods of Preparation

The Herbal anti-dandruff shampoo was prepared by simple mixing process. The ingredients used in the shampoo are Reetha as Surfactants, Neem and black cumin are used as anti-dandruff agent, Xanthum gum is used as thickening agent, Tulsi are used as anti-bacterial agents, Menthol is used as cooling agent, Banana root as colorant and Lavender oil used as a perfume.

Preparation Process

1. All the plant materials were collected from Ayurveda store.
2. All the ingredients were accurately weighed and soaked in water overnight individually.
3. Then the ingredients are boiled in the same water.
4. Later the mixture were cooled, filtered and collected.
5. Then thickening agents were added and the solution were gently stirred.
6. Later preservatives, coloring agents &Perfuming agents are added to the mixture and gently stirred.
7. Finally, shampoo were prepared and stored in a container

Evaluation of Herbal Shampoo

Prepared shampoo were evaluated for product performance which includes physicochemical parameters.

1. Physical parameters

The prepared herbal shampoo were evaluated for physical characters like color and odor.

2. Determination of pH

1ml of prepared shampoo were diluted with 10ml of distilled water and the pH of shampoo were estimated using pH paper at room temperature.

3. Solubility check

2ml of shampoo were added to 100ml of water and the solution formed were shook and were heated to enhance the solubility. After 10 mins, the solution were cooled and then the quantity of residue were measured.

4. Cleansing action

5gms of wool yarn were added in grease and it were placed in flask containing a mix of 200ml of water along with 1ml of shampoo. Temperature of content in flask were maintained at room temperature. Then the flask were shaken for 4minutes at rate of 50 shakes per minute. The solution were removed, and sample were taken out, dried and weighed. The amount of grease removed were calculated by using the following equation,

$$DP = 100(1-T/C)$$

Where DP = Percentage of detergency power,
C = Weight of sebum in the control sample
T = Weight of sebum in the test sample

5. Determination of percentage solid content

A clean dry China dish was weighed and 4 ml of shampoo were added to it. The weight of dish and shampoo were noted. The exact weight of shampoo was calculated. Place the China dish with shampoo on hot plate until the liquid portion were evaporated. The weight of shampoo (solids) after drying were calculated.

6. Viscosity measurement

The viscosity of prepared shampoo was estimated by Ostwald's viscometer at room temperature. The viscosity of prepared shampoo was calculated by using the equation,

$$\eta 2 = \frac{\eta 1 \times \rho 2}{\rho 1 \times t1}$$

η1= Absolute viscosity of water
t1= Time of flow of water
ρ1= Density of water
η2= Absolute viscosity of liquid
t2= Time of flow of liquid
ρ2= Density of liquid

7. Foam determination
Cylinder shake method were used for foam determination. 50ml of 5% shampoo solution was put into a 250 ml measuring cylinder and covered with hand and shaken for 12 times (inverted and reverted position). After that the cylinder were kept aside for 60sec.

8. Dirt detergency
2 drops of shampoo were added in a largest test tube that contained 10ml of distilled water. To it 1drop of India ink were added then the test tube were stoppered and shook it for 10 times. The amount of ink in the foam were estimated as None, Light, Moderate or Heavy.

9. Surface tension measurement
Dilute the shampoo using distilled water to fix 10% as concentration. Measurements were carried out using stalagmometer. Dip the flattened end of stalagmometer into beaker containing sample of developed shampoo and suck it until the level reaches the mark. Fix that in the stand and allow the sample to run slowly from the mark. Count the number of drops formed when the level of liquid reaches from A to B. Repeat the experiment with distilled water. The data were calculated by using the following equation,

$$R2 = \frac{(W3\text{-}W1)\ N1 \times R1}{(W2\text{-}W1)\ N2}$$

Where, W1 is weight of empty beaker.
W2 is weight of beaker with distilled water
W3 is weight of beaker with shampoo solution
N1 is the no. Of drops of distilled water
N2 is no. of drops of shampoo solution
R1 is surface tension of distilled water at room temperature and
R2 is surface tension of shampoo solution

10) Stability studies
It was performed by keeping the prepared shampoo in a closed container at cool and dry place for 3 days. The changes like color, texture of shampoo were observed at particular time period.

11. Nature of hair after washing
Nature of hair after washing by using prepared shampoo were observed by the reactions of individual volunteers

Result
Evaluation of Anti-dandruff Herbal Shampoo
1. Physical Appearance / Visual Inspection:
The Result of inspection of series of formulation are listed below

Table 3: The table showing in formation and visual inspection

Sl. No	Formulation	Visual Inspection
01	Sample 1	Brick red, pleasant smell
02	Sample 2	Brick red, pleasant smell
03	Sample 3	Brick red, pleasant smell

Evaluation for physical appearance

2. Solubility Check
The Shampoo were soluble in water. So, the shampoo was easy for applying in hair.

Fig 6: Solubility

3. Determination of pH (Potential of Hydrogen)
The pH of herbal shampoo have been shown to be important and enhancing the qualities of hair, minimizing irritation to the eyes, and stabilizing the ecological balance of the scalp. The current trend to promote herbal shampoo followers. PH is one of the ways to minimize damage to the hair. Mild acidity prevents swelling promote tightening of the scales, there by inducing shine. As seen from below table all the shampoos were acid balanced were ranged 6.1 to 6.4, which were near to the scalp pH.

Table 4: Table showing in formulation and pH

Sl. No	Formulation	pH
01	Sample 1	6.4
02	Sample 2	6.2
03	Sample 3	6.1

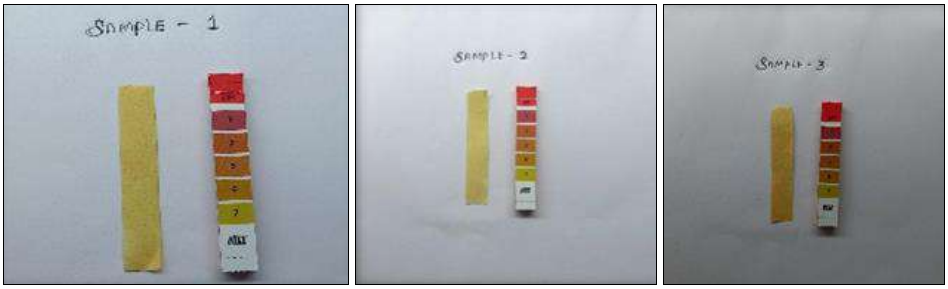

Fig 7: pH sample

4. Cleansing Action

The result of detergency ability, when compared with the marketed formulation and it was found between 30-33%.

Table 5: Cleansing Action

Sl. No	Formulation	Cleansing (%)
01	SAMPLE 1	31.16
02	SAMPLE 2	32.49
03	SAMPLE 3	32.74

Normally it is considered that forming ability of natural shampoo is not comparable with its synthetic counterpart. But the study proves that combination of natural surfactants such as reetha in optimized concentration can generate sufficient foam for the shampoo. This data may prove the ability of natural surfactants like reetha in optimized concentration as the best replacement for the harsh synthetic detergents. The anti-dandruff activity of developed formulation showed positive results**.**

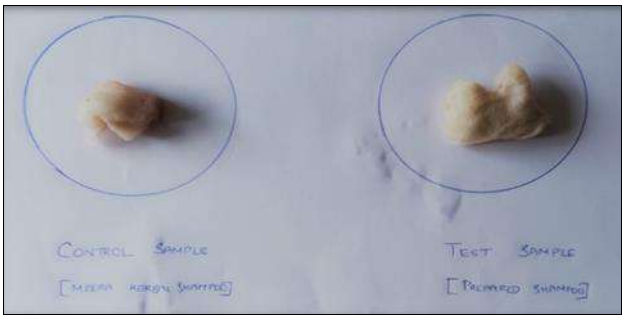

Fig 8: Cleansing action

Marketed formulation possesses lower anti-dandruff activity as compared with our formulation. Formulated shampoo (test sample) is more stable than the (control sample) 1, 2, 3 formulations (Meera)

5. Determination Percentage Solid Content

A Clean dry China dish was weighed, and 4 grams of shampoo was added to it. The weight of dish and shampoo was noted. The exact weight of shampoo was calculated. Place the China dish with herbal shampoo on hot plate until the liquid portion was evaporated. The weight of shampoo (solids) after drying was calculated.

Table 6: Solid Content

Sl. No	Formulation	Solid content
01	Sample 1	21.11
02	Sample 2	22.58
03	Sample 3	26.57

Fig 9: Determination of Percentage Solid content

6. Viscosity Evaluation

The viscosity was in the range 1.10 -1.30 poise which gives great fluidity, which makes formulation easy to apply on and easy to spread on hair. Formulated shampoos did not show any skin irritation on application as the shampoo is fully prepared by natural herbs and was found between 1.10-1.40 Pa s

Table 7: Viscosity Evaluation

Sl. No	Formulation	Viscosity Pa s
01	SAMPLE 1	1.12
02	SAMPLE 2	1.21
03	SAMPLE 3	1.17

Viscosity of Herbal Shampoo

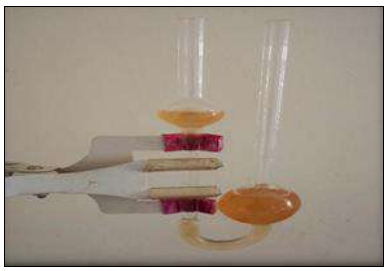

Fig 10: Viscometer

7. Stability Study

Stability and acceptability of organoleptic properties of formulations during the storage period indicated that they are chemically and physically stable. The shampoo was observed for physicochemical changes for 3 days. No change were observed. The shampoo were found to be stable.

8. Nature of hair after washing

The hair was found to be soft and silky.

9. Foam Determination

Foam production has little to do with cleansing activity of shampoos, it is key importance to the consumer and is therefore an important criteria in evaluating shampoo. The shampoo showed good foaming properties.

Table 8: Foam Determination

Sl. No	Number of test containing ml of solution	Height of foam in cm
1	1ml	0.5
2	2ml	0.7
3	3ml	1.2
4	4ml	1.5
5	5ml	2

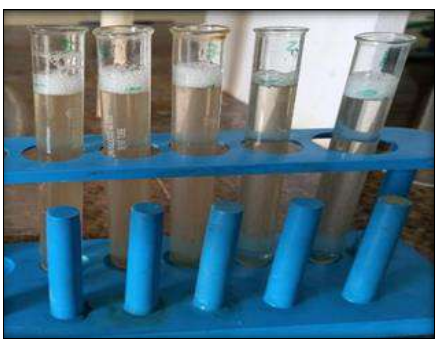

Fig 11: Foam Determination

10. Dirt Detergency

It was performed as the evaluation procedure. The dirt detergency activity of shampoo was found to be as moderate.

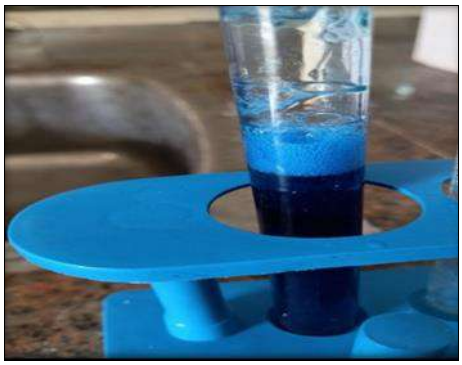

Fig 12: Dirt detergency

11. Surface Tension Measurement:

A proper shampoo should be able to decrease the surface tension of pure water to about 40dynes/cm.it is one of the main mechanisms of detergency. The reduction in surface tension of water from 72.8 dynes/cm to 34 dynes/cm by the herbal shampoos is an indication of their good detergent action.

Table 9: Surface tension

Sl. No.	Formulation	Surface Tension
1	F1	33.14
2	F2	31.22
3	F3	34.09

Conclusion

An herbal anti-dandruff shampoo preparation was formulated based upon theoretical knowledge and Aim of the study was to formulate an effective and stable product.it was found to be harmless and effective formula. The shampoo is enriched with beneficial constituents like polyphenol, flavonoids, saponins, vitamins, antioxidants, tannins, volatile oils which contribute antibacterial, antioxidant activity, anti-hair fall which enhances the cleaning ability of shampoo and promote growth of healthy hair The awareness and the need of herbal anti-dandruff shampoo is on demand at present due to lesser side effects, low cost and more effective than synthetic shampoos. The results obtained during experimentation clearly indicate a promising formulation of quality enhanced herbal shampoo with a unique aroma, color and potential for cleaning anti-dandruff and foaming ability

References

1. Shreya Kothari, Kalpana Patidar, Rakesh Solauki Polyherbal Antidandruff Shampoo. Basic Concept Benefits, and Challenges Asian Journal of Pharmaceutics 2018;12(3):S849.
2. Pandey Shivanand, Meshya Nilam. Herbs play an important role in the Field of cosmetics 2010;2(1):632-639. ISSN: 0974-4304.
3. Prashant Pingale L, Daude RB. A review on Alopecia and its remedies international journal of Pharmacology and Pharmaceutical Sciences 2014:2(3):45.
4. Revansiddappa M, Sharadha R, Abbuluk Formulation. Evaluation of Herbal Antidandruff Shampoo Journal of Pharmacognosy and Phytochemistry published on 2018;7(4):764-767. E.ISSN- 2278-4136.
5. Rashmi Pal S, Ankita Wal. Preparation and Assessment of Polyherbal Anti-Dandruff formulation. The open Dermatology Journal 1874-3722/20 Journal 2020, 14.
6. Gaurav Lodha. Formulation and Evaluation of Polyherbal Shampoo to promote Hair Growth and provide Antidandruff Action Journal of Drug Delivery and Therapeutics 2019:9(4-A):296-300.
7. Sharma RM, Shah K, Janki Patel. Evaluation of prepared herbal shampoo formulations and to compare formulated shampoo with marketed shampoos. International journal of pharmacy and pharmaceutical sciences 2011;3(4):402-405.
8. Chandran S, Vipin KV, Augusthy AR, Lindumol KV, Shirwaikar A. Development and evaluation of antidandruff shampoo based on natural sources. J Pharm Phototherapeutics 2013;1(4):10-4.
9. Shinde PR, Tatiya AU, Surana SJ. Formulation Development and Evaluation of Herbal Antidandruff Shampoo. International Jnl of research in Cosmetic Science 2013;3(2):25-33.
10. Balsam SM, Gershon Rieger MM. Sagarin Cosmetics Science and Technology, 2nd Edition, john wiley India, New Delhi 2008, 2.
11. Ashwini Sukdev, Sujatha P. Ingale Formulation and Evaluation of Herbal Liquid Shampoo World Journal of Pharmaceutical Research 9(5), 901-911.
12. Suhagia BN, Rathod IS, Sunil Sindhu. Review of Literature phytochemical constituents of Reetha, International Journal Pharmaceutical Sciences and Research 2011;1(8):1905-1913.
13. Sharma Pankaj. Tomar Lokeshwar in their review of Literature phytochemical constituents of Neem, International Research Journal of Pharmacy 2011;2(12):97-102.
14. Sivalingam Elayabalan, Sreeramanan Subramaniam, Shobhana VG, Ashok Kumar K. An Overview on Phytochemical composition of Banana (Musa spp), Indian Journal of Natural sciences 2017;7(42):12408-12419.
15. Sudhir SP, Deshmukh VO, Verma Nigella Sativa Seed HN. A Novel Beauty care Ingredient: A Review, International Journal of Pharmaceutical Sciences and Research 2016;7(8):3185-3196.
16. Abhishek Singh, Abhishek Saxena. Formulation and Evaluation of Herbal Anti-dandruff Shampoo 2020, 1.