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FORMULATION AND EVALUATION OF POLY HERBAL SHAMPOO

Parthibarajan R.*, Jeeva V., Govindharaj R., Brakanitha V.K., Midhunasree P., Soundarya M. and Ravichandran S.

Department of Pharmaceutics, P.S.V. College of Pharmaceutics Science and Reasearch Krishnagiri, Tamilnadu, India.

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***Corresponding Author**
Parthibarajan R.
Department of Pharmaceutics, P.S.V. College of Pharmaceutics Science and Reasearch Krishnagiri, Tamilnadu, India.

ABSTRACT

The aim of this study is to compile and evaluate a polyherbal shampoo for cosmetic purposes from plant ingredients. Hibiscus powder, Neem powder, Henna powder, Amla powder, Shikakai powder, Ritha powder, Alo-vera gel was obtained from local market in powder form, then it is prepared decoction of these ingredients and their mutual mixing and evaluated in terms of organoleptic and physico-chemical properties. Herbal shampoo is used to clean hair also conditioning, smoothing, hair surface, good health of hair, hair free of dandruff, grease and lice, its safety benefit is expected above all. The advantage of herbal cosmetics is its non-toxic nature, the reduction of allergic reactions and the time-proven usefulness of many components. So, in this work, we found out the good properties of herbal shampoo and another optimization study of the benefits of herbal shampoo for human use as a cosmetic product.

1. INTRODUCTION

1.1. COSMETICS

A cosmetic is any substance used to clean, improve or change the complexion, skin, hair, nails orteeth. Shampoo is a basic hair product representing a large segment of hair cosmetics. A viscous cosmetic product with a synthetic detergent used to wash hair and scalp, packaged in a form suitable for hair, is called shampoo. It is a surfactant preparation in a suitable form such as a liquid, solid or powder which, when used under specified conditions, will remove surface oil, dirtand skin debris from the hair shaft and scalp without adversely affecting the user. Its primary function is to cleanse the hair of accumulated sebum, scalp dirt and residues

of hair care products. Added shampoo functions include lubrication, conditioning, body building, anti-static, medicinal, etc. Finally, the entire shampoo formulation must be medically safe for long-term use.[7]

1.2. ANATOMY OF HAIR

Hair is a keratin fiber growing from the epidermis. Hair strands originate from an epidermal penetration of the dermis called a hair follicle. The hair shaft is the part of the hair that is not anchored to the follicle, and much of it is exposed on the surface of the skin. The rest of the hair, which is anchored in the follicle, lies below the surface of the skin, is called the hair root. The hair root ends deep in the dermis at the hair bulb and includes a layer of mitotically active basal cells called the hair matrix. The hair bulb surrounds the hair papilla, which is made up of connective tissue and contains blood capillaries and nerve endings. The hair shaft and root consistof 3 layers of cells.

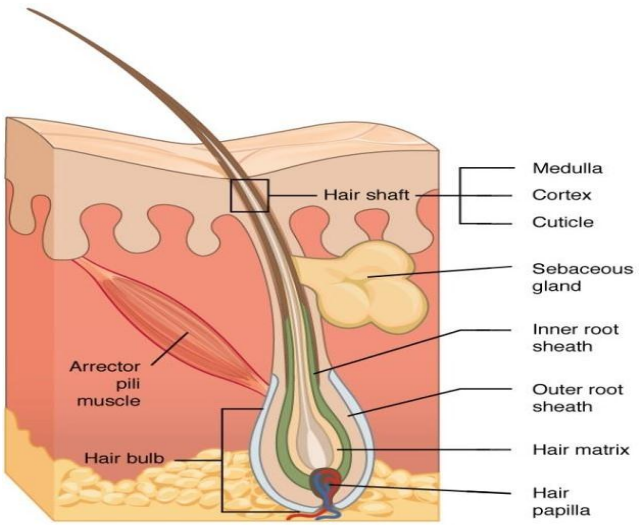


Fig. 1: Anatomy of hair.

- Medulla.
- Cortex.
- Cuticle.

The **medulla** forms the central core of the hair, which is surrounded by the **cortex**, a layer of compressed, keratinized cells that is covered by an outer layer of very hard, keratinized cells known as the **cuticle**.

1.2.1 Hair Growth cycle

All hair follicle goes through growth cycle contains growth stage (Anagen), regression stage(Catagen) and resting stage (Telogen).

Growth stage - Here the cells of the matrix divides as new cells from hair matrix are added tothe base of the hair root.

Regression stage - When hair cells stop dividing the hair follicle shrinks and hair growth stopsgrowing.

Resting stage - A new growth cycle begins the old hairs root falls out of hair follicle and newhair begins to grow.

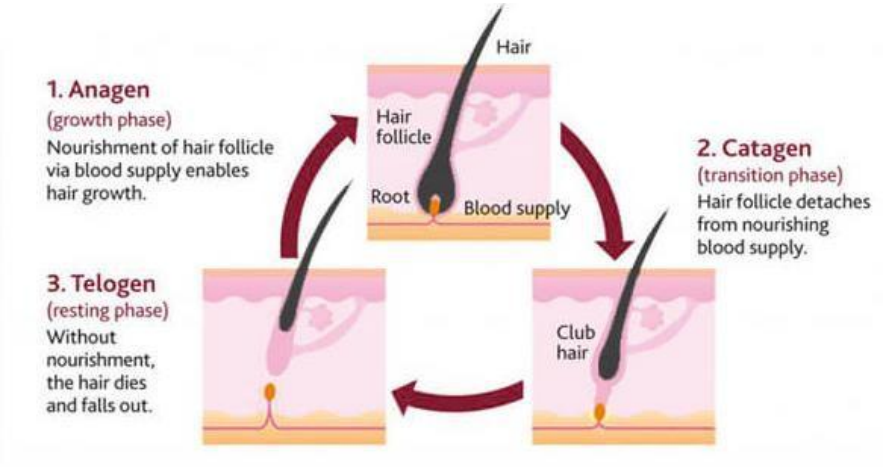


Fig. 2: Hair growth cycle.

1.2. Types of hair

Hair is of **four** types.

Straight hair - tends to have more shine but less in volume.

Wavy hair - thicker than straight hair, and texture falls between straight and curly.

Curly hair - tends to be in loose ringlets or tight spirals.

Kinky hair - also known as coily, these curls looks like "S" or "Z" shaped.

Straight **Wavy** **Curly** **kinky**

Fig. 3: Types of hair.

1.3. SHAMPOO

Shampoos are cleansing agents containing synthetic detergents and various additives. After shampooing, it leaves the hair, so that it may easily combed and shaped and the hair will be soft nonstickyky and grossy. Shampoos are used for the hair and scalp.

1.3.1 GENERAL METHOD OF PREPARATION OF SHAMPOOS

The detergents, preservatives and other ingredients are dissolved in a suitable solvents(e.g. water, alcohol). The colouring agent is dissolved in a suitable solvents. The colouring agent solution is added to the detergent solution and mixed well. Finally the preparation is flavoured.

1.3.2 IDEAL PROPERIES OF A SHAMPOO

The ideal properties of shampoo may not always be attainable, but the following are important:

1. **Ease of application:** The shampoo should be viscous enough to stay in the head before application to the hair and scalp, yet during application the shampoo must spread easily and disperse quickly over the head and hair.
2. **Lather:** The shampoo must develop a dense and luxurious lather, and this requires the use of amuch higher concentration of surfactant than really needed for cleaning of the hair and scalp.
3. **Removal of debris:** The shampoo should effectively (if not completely) remove dust or soil, excessive sebum, or other fatty substances, loose corneal cells from the hair, and other residual substances from the previously used cosmetics, if any.
4. **Rinsing:** The shampoo should rinse out easily and should not leave a residual tackiness or stickiness. It should not precipitate in hard water, since insoluble calcium and magnesium salts form a dulling film on the hair.
5. **Easy wet combing:** Ideally, after rinsing, the hair should comb through easily without tangling. Hair conditioning surfactants and polymers can help this if it is quite difficult to achieve.
6. **Manageability:** The hair should be left in a manageable condition when combed dry. There should be no "fly away" or frizziness.
7. **Luster:** The hair should be left in a lustrous condition.
8. **Body:** The hair should have "body" when dry, that is, the hair should not limp or over conditioned.

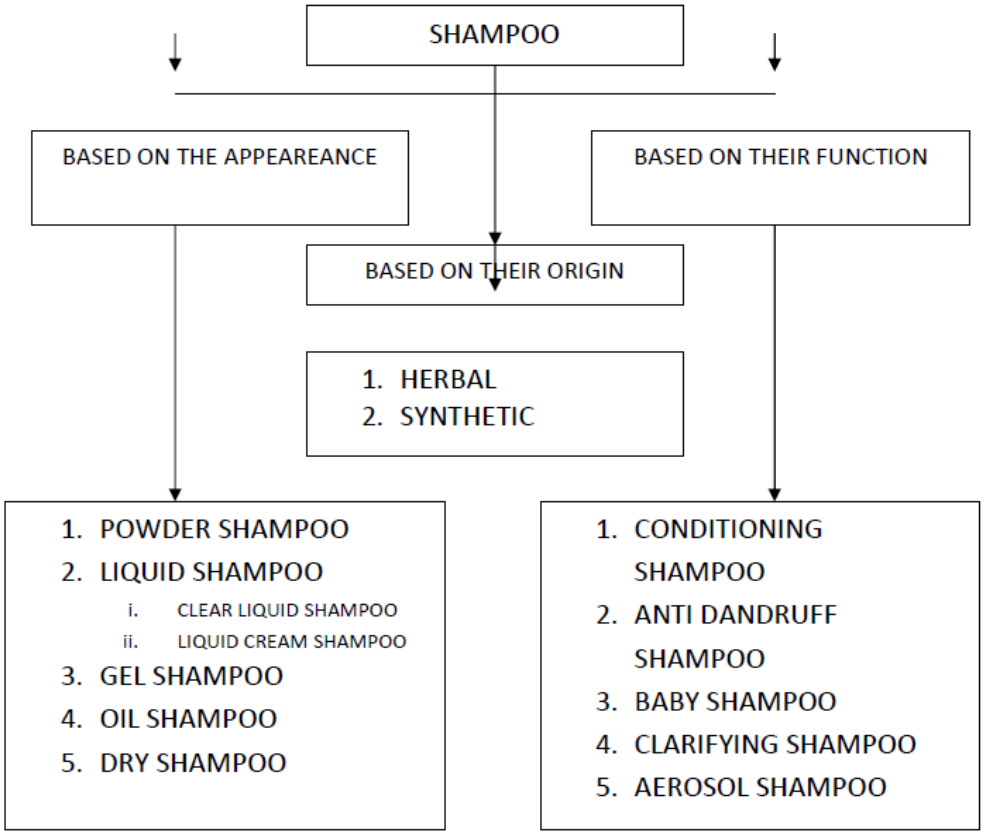
9. **Fragrance**: A fragrance should be used that not only covers any objectionable odour due to components used to formulate shampoos but which develops a clean refreshing scent during shampooing and leaves a clean residual scent on the hair. This could be a major factor in consumer acceptance of the product.
10. **Low level of irritation**: All the above functions of a shampoo should be achieved while keeping the irritation level as low as possible.
11. **Well preserved**: The product must be properly preserved against microbial and fungal contamination.
12. **Good stability**: The product should have good stability for at least two to three years at room temperature as well as when stored in daylight or in warehouses with or high ambient ttemperatures
13. **Economical** The product should not be "over-formulated". The formulation should be as simple as possible using only those raw materials that are necessary to accomplish the desired goal.

1.3.3 FORMULATION OF SHAMPOO

Typical formulation of a shampoo consists of following components:

1. Surfactants
2. Foam boosters and stabilizers
3. Conditioning agents
4. Special additives
5. Preservation
6. Sequestering agents
7. Viscosity modifiers (thickening thinning agents)
8. Opacifying or clarifying agents
9. Fragrance
10. Colour
11. Stabilizers (suspending agents anti-oxidants, UV-Stabilizers)

1.4 CLASSIFICATION OF SHAMPOO[7]



Components	Botanical name	Family	Uses	Image
Tulsi	OCIMUM TENUIFLORUM	LAMIACEAE	Cure fever, treat to heart disease, respiratory problems and skin problems.	
Fenugreek	TRIGONELLA FOENUM-GRAECUM L	LEGUMINOSAE	Usedto dandruff, Cardio tonic, diuretic, hypoglycemic and hypertensive.	
Aloevera	ALOE BARBADENSIS	LILIACEAE	Smoothening agent and conditioning agents	
Amla	EMBLICA OFFICINALIS	EUPHORBIACEAE	Stimulate hair growth and develops immunity	

Henna	LAWSONIA INERMIS	LYTHRACEAE	Pacify hair fall, grayingof hair, treat skin diseases	
Soapnut	SAPINDUS EMARGINATUS	SAPINDACEAE	Used as detergent, shampoos,treat skin complaint	
Hibiscus	HIBISCUS ROSA-SINESIS	MALVECEAE	Loss of appetite, cold, flavour, odour, hair growth	
Neem	AZADIRACHTA INDICA	MALIACEAE	Remove dandruff, hair fall, strengthen, purify blood and improve immunity.	
Shikakai	ACACIA CONCINNA	LEGUMINOSAE	Used for hair care, Ayurvedic shampoo, Cleansing, Anti dandruff.	
Vettiver	CHRYSOPOGON ZIZANIOIDES	POACEAE	Reduces inflammation and itch, Heal heat rashes, Helps to cool body.	
Bhringraj	ECLIPTA PROSTRATE	ASTERACEAE	Treats hair and skin problems, reduces migraine and blood pressure, Aids scorpion bite.	
Tanners cassia	CASSIA AURICULATA	LEGUMINOSAE	Protects damaging from UV rays, Keeps skin moisturized, reduces hair loss	

2. METHODOLOGY

2.1 Materials and method[8,23,25]

2.1.1 Instruments Names & Supplie

Table 1: Instruments names & supplier.

S.NO	INSTRUMENTS	SUPPLIERS
1	PH meter	Hasthas scientific instruments
2	Brookfield Viscometer	Labman scientific instruments
3	Hot Plate	Deep Vision
4	Weighing balance	Ishtaa scales
5	Orbital shaker	Hasthas scientific instruments
6	Stalagmometer	Borosilicate glass
7	Heating mandle	Hasthas scientific instruments

2.1.2 Chemicals used and manufacturer

Table 2: Chemicals and manufacturer.

S.NO	CHEMICALS	MANUFACTURER
1	Citric acid	Nice
2	Gelatin	Nice
3	Sodium lauryl sulphate	Hi-media
4	Methyl paraben	Hi-media
5	Jasmine oil	ASG mantra
6	Lavender oil	ASG mantra
7	Rose oil	ASG mantra
8	Brilliant blue	Noor chemicals
9	Tartrazine	Noor chemicals
10	Sunset yellow	Noor chemicals
11	Bromocresol green	Hi-media
12	Crystal violet	Nice

2.2 Formulation

Table 3: Formulation.

INGREDIENTS	FORMULATION 1	FORMULATION 2	FORMULATION 3
Amla	5gm	-	-
Cassia	5gm	-	-
Neem	5gm	-	-
Tulsi	5gm	-	-
Bhringraj	-	5gm	-
Fenugreek	-	5gm	-
Henna	-	5gm	-
Vetiver	-	5gm	-
Aloevera	-	-	5gm
Hibiscus	-	-	5gm
Shikakai	-	-	5gm
Soapnut	-	-	5gm
Citric acid	0.1gm	0.1gm	0.1gm

Gelatin	6gm	6gm	6gm
Sodium lauryl sulphate	3gm	3gm	3gm
Methyl paraben	0.1gm	0.1gm	0.1gm

2.2.1 Formulation procedure

Procurement of materials

The different parts of plants were selected for the study having hair care property. Fresh parts of Amla, Cassia, Neem, Tulsi, Bhringraj, Fenugreek, Henna, Vetiver, Aloevera, Hibiscus, Shikakai and soapnut were obtained from local market, cleaned, powdered and passed through sieve no:60.

2.2.2 Formulation no: 1 (F1)

preparation of extract: Decoction method

About 5gm of each powdered plant material like Amla, Cassia, Neem and Tulsi was extracted using 500ml of distilled water by boiling for 4 hrs. Then cooling the extract and filtered.

Formulation of herbal shampoo

About 5ml of herbal extract and 0.1gm of citric acid were added to the gelatin solution (6%) and mixed thoroughly. And add 3gm of sodium lauryl sulphate used as a foaming agent and add 0.1gm of methylparaben used as a preservative action. Finally, add a little amount of Brilliant blue and Tartrazine. To impart fragrance to the preparation sufficient quantity of jasmine oil was added and the volume was made up to 100ml using gelatin solution.

2.2.3 Fmulation no: 2(F2)

Preparation of extract: Decoction method

About 5gm of each powdered plant material like Bhringraj, Fenugreek, Henna and Vetiver was extracted using 500ml of distilled water by boiling for 4 hrs. Then cooling the extract and filtered.

Formulation of herbal shampoo

About 5ml of herbal extract and 0.1 gm of citric acid were added to the gelatin solution (6%) andmixed thoroughly. And add 3gm of sodium lauryl sulphate used as a foaming agent and add 0.1gm of methylparaben used as a preservative action. Finally, add a few drops of bromocresol green and Crystal Violet. To impart fragrance to the preparation sufficient quantity of Lavender oil was added and the volume was made up to 100 using gelatin

solution.

2.2.4 Formulation no: 3 (F3)

Preparation of extract: Decoction method

About 5gm of each powdered plant material like Aloe vera, Hibiscus, Shikakai and Soapnut was extracted using 500ml of distilled water by boiling for 4 hrs. Then cooling the extract and filtered.

Formulation of herbal shampoo

About 5ml of herbal extract and 0.1gm of citric acid were added to the gelatin solution (6%) and mixed thoroughly. And add 3gm of sodium lauryl sulphate used as a foaming agent and add 0.1gm methylparaben used as a preservative action. Finally, add a little amount of Tartrazine, sunset yellow and sodium chloride. To impart fragrance to the preparation sufficient quantity of Rose oil was added and the volume was made up to 100 using gelatin solution.

Fig. 3: Formulation of herbal shampoo2.3.Evaluation parameters.

2.3.1. Organoleptic evaluation

The prepared shampoo were evaluated in terms of their clarity, colour and odour. In watch glass was taken 5ml of final herbal shampoo preparation and thenit placed against white background ina white tubelight. It was detected for its color by nacked eyes.

2.3.2. Determination of ph

PH of your 10% shampoo solution. Dip one strip of pH paper in the solution and compare the color of the strip to key. pH meter can also be used after calibration. Most shampoos are neutralor slightly acidic. Acidic solutions cause the cuticle (outer layer) of the hair to shrink and lay flatter on the shaft of the hair. Basic solutions cause the cuticle to swell and open up. Acidic solutions make the hair seem smoother. Basic solutions make hair seem frizzier. Neutral pH = 7 Acidic pH < 7 Basic pH >7

2.3.3. Determination of percentage solid content

A clean dry evaporating dish was weighed and added 4 grams of shampoo to the evaporating dish. The dish and shampoo was weighed. The exact weight of the shampoo was calculated only and put the evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the shampoo only (solids) after drying was calculated. If a shampoo has too many solids it will be hard to work into the hair or too hard to wash out. If it doesn't have enough it will be too watery and wash away quickly. A good shampoo will be between 20% – 30% solids.

2.3.4. Rheological evaluation

Fig. 4: Rheological evaluation.

The viscosity of the shampoo was determined by using brookfield viscometer. 10ml of shampoois taken in a beaker and spindle is dipped in it for about 5minutes and then reading is taken.

2.3.5. Surface tension measurement

Measurements were carried out with a 10% shampoo dilution in distilled water at room

temperature. Thoroughly clean the stalagmometer using chronic acid and purified water.

Because surface tension is highly affected with grease or other lubricants. The data calculated by the follow the equation given below

$$\gamma_T = \frac{n_R d_T}{n_T d_R} X \gamma_R$$

Where γ_R =surface tension of ref. liquid

n_R = number of drops of ref. liquid

d_R = density of ref. liquid

γ_T =surface tension of test liquid

n_T = number of drops of test liquid

d_T = density of test liquid

2.3.6. Foaming ability and foam stability

Cylinder shakemethod was most widely used for determining foaming ability. 50 ml of the 1% shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1 minute shaking were recorded. The foam volume was calculated nly. Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded.

2.3.7. Wetting time

The canvas was cut into 1 inch diameter discs having an average weight of 0.44 g. The disc was floated on the surface of shampoo solution of 1% w/v and the stopwatch started. The time required for the disc to begin to sink was measured acutely and noted as the wetting time.

2.3.8. Dirt dispersion

Two drops of shampoo were added in a large test tube contain 10 ml of distilled water. 1 drop of India ink was added; the test tube was stoppered and shakes it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy. Shampoos that cause the ink to concentrate in the foam are considered poor quality. The dirt should stay in the water portion. Dirt that stays in the foam will be difficult to rinse away. It will redeposit on the hair.

2.3.9. Conditioning performance evaluation

Artificial hair strands are collected from salon and are divided into two batch(control and test) length 10 cm approximately. The test hair sample is washed with formulated shampoo and control is the one without washing. The test sample has to be washed with shampoo at least for 10 times and sir dried. Blind touch test method is used for determining the conditioning effect of shampoo. About 20 student volunteers are selected and are made to touch the hair samples. The conditioning performance of the shampoo is rated in terms of score1-4 (4-excellent, 3-good, 2- satisfactory and 1-poor).

2.3.10. Cleaning action

5 grams of wool yarn were placed n grease, after that it was placed in 200 ml. of water containing 1 gram of shampoo in a flask. Temperature of water was maintained at 350C. The flask was shaked for 4 minutes at the rate of 50 times a minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated by using the following equation:

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

In which, DP is the percentage of detergency power, C is the weight of sebum in the control sample and T is the weight of sebum in the test sample.

2.3.11. Eye irritation test

Animals (albino rabbits) were collected from animal house. About 1% shampoo solutions was dripped into the eyes of six albino rabbits with their eyes held open with clips at the lid. The progressive damage to the rabbit's eyes was recorded at specific intervals over an average periodof 4 seconds. Reactions to the irritants can include swelling of the eyelid, inflammation of the iris, ulceration, hemorrhaging (bleeding) and blindness.

3. RESULT AND DISCUSSION

3.1 FORMULATION

3.1.1 FORMULATION: 1 (F1)

Formulation 1 was prepared by ingredient's such as neem, tulasi, cassia, alma, these ingredients are mixed with 500ml of water and boiled for 4 hrs from this 5ml of solution are taken and mixed with 6% of gelatin solution .add 0.1mg of methyl paraben, 0.1gm of citric acid and 3gm of SLS were added to the above solution .tartrazine brilliant blue bromocresol green are used as an indicator to produced green colour .the final herbal shampoo was prepared.

3.1.2 FORMULATION:2 (F2)

Formulation 2 was prepared by ingredient's such as bhringraj, fenugreek seeds, vetiver, henna leaves these ingredients are mixed with 500ml of water and boiled for 4 hrs from this 5ml of solution are taken and mixed with 6% of gelatin solution. add 0.1mg of methyl paraben, 0.1gm of citric acid and 3gm of SLS were added to the above solution. bromocresol green(20 drops)+crystal violet (6 drops) are used as an indicator to produced black colour. the final herbal shampoo was prepared.

3.1.3 FORMULATION:3 (F3)

Formulation 3 was prepared by ingredient's such as hibiscus, shikakai, soapnut, aloe Vera these ingredients are mixed with 500ml of water and boiled for 4 hrs from this 5ml of solution are taken and mixed with 6% of gelatin solution. add 0.1mg of methyl paraben, 0.1gm of citric acid and 3gm of SLS were added to the above solution. tartrazine sunset yellow are used as an indicator to produced orange colour. the final herbal shampoo was prepared.

3.2 EVALUVATION

The physical parameters like organoleptic evalution, pH, percentage of solid content, rheological evalution, surface tension determination, foaming ability and foaming stability, wetting time, dirt dispersion test, conditioning performance, cleaning action for the formulated herbal shampoo (F1,F2,F3) was evaluated.

3.2.1 Organoleptic Evaluation

The prepared shampoo was evaluated in terms of their clarity, colour and odor. In watch glass was taken 5ml of final herbal shampoo preparation and then it placed against white backgroundin a white tube light? It was detected for its colour by nacked eyes.

Table 4: Examination of colour.

SI.NO	FORMULATION	COLOUR
1	F1	Green
2	F2	Black
3	F3	Orange

Table 5: Odour.

SI.NO	FORMULATION	ODOUR
1	F1	Jasmine
2	F2	Lavender
3	F3	Rose

3.2.2 pH measurement

PH of your 10% shampoo solution. Dip one strip of pH paper in the solution and compare the color of the strip to key. PH meter can also be used after calibration. Most shampoos are neutral or slightly acidic. Acidic solutions cause the cuticle (outer layer) of the hair to shrink and lay flatter on the shaft of the hair. Basic solutions cause the cuticle to swell and open up. Acidic solutions make the hair seem smoother. Basic solutions make hair seem frizzier.

Table 6: PH Measurement.

SI.NO	FORMULATION	P^H
1	F1	6.3
2	F2	6.5
3	F3	6.1

3.2.3 Determination of Percentage of solid content

A clean dry evaporating dish was weighed and added 4 grams of shampoo to the evaporating dish. The dish and shampoo was weighed. The exact weight of the shampoo was calculated only and put the evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the shampoo only (solids) after drying was calculated. If a shampoo has too many solids it will be hard to work into the hair or too hard to wash out. If it doesn't have enough it will be too watery and wash away quickly. A good shampoo will be between 20% – 30% solids.

Solid content= [weight of dried sample with china dish – weight of empty china dish] ×100

Table 7: Percentage of solid content.

SI.NO	FOMULATION	SOLID CONTENT (%)
1	F1	24
2	F2	27
3	F3	25

3.2.4 Rheological evaluation

The viscosity of the shampoo was determined by using Brookfield viscometer. 10ml of shampoo is taken in a beaker and spindle is dipped in it for about 5minutes and then reading is taken.

Table 8: Rheological evaluation.

SI.NO	FORMULATION	RHEOLOGICALEVALUATION(mpas)
1	F1	17.3
2	F2	19.9
3	F3	14.2

3.2.5 Surface tension measurement

Measurements were carried out with a 10% shampoo dilution in distilled water at room temperature. Thoroughly clean the stalagmometer using chronic acid and purified water. Because surface tension is highly affected with grease or other lubricants. The data calculated by following equation.

$$\gamma_T = \frac{n_R d_T}{n_T d_R} X \gamma_R$$

Where γ_R =surface tension of ref. liquid

n_R = number of drops of ref. liquid

d_R = density of ref. liquid

γ_T =surface tension of test liquid

n_T = number of drops of test liquid

d_T = density of test liquid

Table 9: Surface tension.

SI.NO	FORMULATION	SURFACE TENSION
1	F1	1.00148
2	F2	1.01083
3	F3	1.00444

3.2.6 Foaming ability and foaming stability

Cylinder shake method was most widely used for determining foaming ability. 50 ml of the 1% shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1 minute shaking were recorded. The foam volume was calculated only. Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded.

Table 10: Foaming ability and stability.

FORMULATION	Ml	HEIGHT OF FOAM
FORMULATION 1	1ml	0.5cm
	2ml	0.4cm
	3ml	0.5cm
	4ml	0.6cm

	5ml	0.6cm
FORMULATION 2	1ml	0.8cm
	2ml	0.9cm
	3ml	1.1cm
	4ml	1.3cm
	5ml	1.4cm
FORMULATION 3	1ml	0.3cm
	2ml	0.6cm
	3ml	0.4cm
	4ml	0.9cm
	5ml	1.1cm

3.2.7. Wetting time

The canvas was cut into 1 inch diameter discs having an average weight of 0.44 g. The disc was floated on the surface of shampoo solution of 1% w/v and the stopwatch started. Thetime required for the disc to begin to sink was measured acutely and noted as the wetting time.

Table 11: Wetting time.

SI.NO	FORMULATION	WETTING TIME
1	F1	12 seconds
2	F2	14 seconds
3	F3	13seconds

3.2.8 Dirt dispersion

Two drops of shampoo were added in a large test tube containing 10 ml of distilled water. 1 drop of India ink was added; the test tube was stoppered and shakes it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy. Shampoos that cause the ink to concentrate in the foam are considered poor quality. The dirt should stay in the water portion. Dirt that stays in the foam will be difficult to rinse away. It will redeposit on the hair.

Table 12: Dirt dispersion.

SI.NO	FORMULATION	DIRT DISPERSION
1	F1	None
2	F2	None
3	F3	None

3.2.9 Conditioning performance evaluation

Artificial hair strands are collected from salon and are divided into two batch (control and test) length 10 cm approximately. The test hair sample is washed with formulated shampoo

and control is the one without washing. The test sample has to be washed with shampoo at least for 10 times and sir dried. Blind touch test method is used for determining the conditioning effect of shampoo. About 20 student volunteers are selected and are made to touch the hair samples. The conditioning performance of the shampoo is rated in terms of score1-4 (4-excellent, 3-good, 2-satisfactory and 1-poor).

Table 13: Conditioning performance.

SI.NO	FORUMATION	CONDITIONING PERFORMANCE
1	F1	Excellent
2	F2	Excellent
3	F3	Excellent

3.2.10 Cleaning Action

5 grams of wool yarn were placed in grease, after that it was placed in 200 ml. of water containing 1 gram of shampoo in a flask. Temperature of water was maintained at 350C. The flask was shaking for 4 minutes at the rate of 50 times a minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated by using the following equation:

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

In which, DP is the percentage of detergency power, C is the weight of sebum in the control sample and T is the weight of sebum in the test sample.

Table 14: Cleaning action.

SI.NO	FORMULATION	CLEANING ACTION
1	F1	30.4%
2	F2	32.7%
3	F3	31.5%

3.2.11 Eye Irritation Test

Animals (albino rats) were collected from the animal houses. About 1% shampoo solutions was dripped into the eyes of six albino rabbits with their eyes held open with clips at the lid. The progressive damage to the rabbit's eyes was recorded at specific intervals over an average period of 4 seconds. Reactions to the irritants can include swelling of the eyelid, inflammation of the iris, ulceration, hemorrhaging (bleeding) and blindness.

Table 15: Eye irritation test.

SI.NO	FORMULATION	EYE IRRITATION TEST
1	F1	No Irritation
2	F2	No Irritation
3	F3	No Irritation

4. CONCLUSION

In the present study, "formulation and evaluation of polyherbal shampoo for the treatment of hair loss" the ingredients of the polyherbal shampoo formulation were selected due to the reported action of the preservative and treatable role in the prevention of hair loss.

The aim of this study was to formulate a completely poly herbal shampoo. We formulated a herbal shampoo by using plant extracts which are commonly used traditionally and lauded for their hair cleansing actions across Asia.

The Herbal product is high demand, because of the least possibilities of side effects. Several tests were performed to evaluate and compare the physicochemical properties of poly herbal shampoo. Our prepared poly herbal shampoo (F1,F2,F3) showed for quality control tests but further research and development is required to improve it's overall quality.

By concluding the Formulations, The Formulation (F2) is Best Effective and Safe for use.

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