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"Development and Evaluation of Herbal Shampoo"

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Abstract:

A liquid or cream preparation of soap or detergent to wash the hair is called as shampoo. The main objective of this study was to eliminate harmful synthetic ingredient from herbal shampoo formulation and substitute them with a safe natural ingredient.

Aim and Objective: The aim of this present study is to prepare and formulate an herbal shampoo and to assess its physiochemical function that emphasis on safety, efficacy, eliminating harmful synthetic ingredient, and substitute with safe natural ingredients.

Methods: The formulation of shampoo using the extracts of Emblica officinalis, Hibiscus rosa-sinensis, Acacia concinna, Sapindus indica, Eclipta prostrata, Aloe barbadensis, and Cassia auriculata in different proportions. Evaluation of organoleptic, physicochemical, and performance tests in terms of visual assessment, wetting time test, pH, assurance of solid contents, surface tension, detergency, dirt dispersion, conditioning performance, foam volume, and stability was performed.

Results: The created cleanser was clear and good appealing. It demonstrated good froth stability, detergency, good cleansing, small bubble size, low surface strain, and execution of good conditioning.

Conclusion: The physicochemical evaluation of the formulated shampoo showed ideal results. However, to improve its quality, product performance, and safety, further development was required.

Keywords: Herbal shampoo; Sapindus indica, Evaluation , Formulation of shampoo.

INTRODUCTION:

Cosmetics: This are the items with mild action on the human body for the purpose of cleaning, beautifying, adding to the attractiveness, altering the appearance, or keeping or promoting the skin or hair in good condition.

Difference between Herbal and Synthetic Formulation

Herbal Formulation	Synthetic Formulation
Pure and organic ingredients	Contains one active principle in high concentration
Free from side effects	It is simple with single indication
No surfactants eg: SLS	Contains surfactant
No synthetic additives	Contains surfactant additives
No animal testing	
Earth and skin friendly	
No petroleum based ingredients	

Shampoos are probably the most widely used cosmetic products for cleansing hairs And scalp in our daily life (Ishi,1997). A shampoo is basically a solution of a detergent Containing suitable additives for other benefits such as hair conditioning enhancement, Lubrication, medication etc. Now-a-days many synthetic, herbal, medicated and non Medicated shampoos are available in the market but popularity of herbal shampoo among Consumers is on rise because of their belief that these products being of natural origin are safe And free from side effects (Manikar and Jolly , 2001).[1]

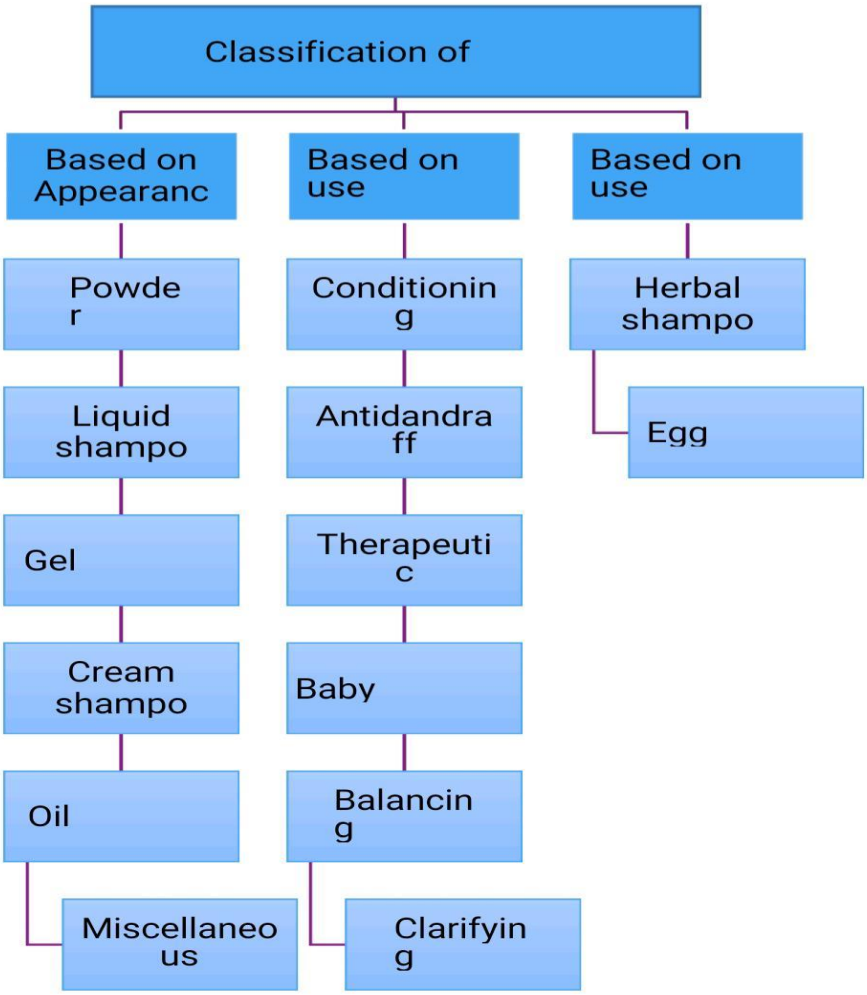
In synthetic shampoos, surfactants (synthetic) are added mainly for their cleansing And foaming property, but the continuous use of these surfactants leads to serious effects such As eye irritation, scalp irritation, loss of hair, and dryness of hairs. Alternative to synthetic Shampoo we can use shampoos containing natural herbals. However, formulating cosmetic Products containing only natural substances are very difficult. There are a number of Medicinal plants with potential effects on hair used traditionally over years around the world And are incorporated in shampoo formulation. These medicinal plants may be used in extracts Form, their powdered form, crude form, or their derivatives. To develop a shampoo Containing an only one natural substance which would be safer with milder effect, then the Synthetic shampoo containing an only one natural substance which would be safer with Middle effect, then the syenthetic shampoo is difficult and it should passes good foaming, detergency and solid content as such syenthetic shampoo. Hence, we considered in detailing and unadulterated natural clenser utilizing conventional technique using regularly utilized plant material for hair washing.[2]

Ideal characters of herbal shampoo

- Should produce a good amount of foam
- The shampoo should be easily removed by rinsing with water.
- Should leave the hair non dry, soft, lustrous with good, manageability.
- Should impart a pleasant fragrance to the hair.
- Should not make the hand rough and chapped.
- Should not have any side effects or cause irritation to skin or eye.

Composition of Herbal shampoo

- Active agents
- Foaming agents
- Conditioning agents
- Thickening agents
- Colors, perfumes and preservatives



Ritha

Synonym –Soapnut

Biological Source – It consist of pods of sapindus trifoliatus, Sapindus mukorassi.

Family – *Sapindaceae*

Description – It is shrub with linear pods, the dried powder of the pods is brown in colour And have soap like Properties.

Chemical Constituents – All parts of the Reetha are rich in phenolic acids llike Protocatechuic acid, p-hydroxybenzo acid, cis -P-coumaric acid, and cinnamic acid. The major proximate components of the fruits are sugars (10%), saponins (11.5%), and mucilaginous polysaccharide.

Uses-

1. It is used as detergent
2. It is used as hair cleanser
3. It is used as hair growth promoter

AMLA

Synonym - Indian gooseberry

Biological source - It consist of dried And fresh fruit of phyllanthus emblica Linn.

Family - *Phyllanthaceae* OR *Euphorbiaceae*

Description – It is small tree with number of globular fruits which are yellowish green in color . They have sour and astringent taste

Chemical Constituents – The fruit of Amla is rich in vitamin C (ascorbic acid) and contains several bioactive phytochemicals, of which majority are of polyphenols (ellagic acid, chebulinic acid, gallic acid, chebulagic acid, apeigenin, quercetin, corilagin, leutolin, etc.)

 Uses –

1. It is used as hair growth promoter.

2. It is used as hair nourisher.

3. It is used as hair conditioner.

4. It is used colorant. (prevent grying)

5. It is used Antioxidant.

Methi

Synonym - Methi , Methika

Biological source - It consist of dried ripe seeds of trigonella foenum graecum

Family – *Leguminaceae*

Description - Fenugreek (Trigonella foenum-graecum L.) is an annual herbaceous legume suitable for dryland are where moisture is not sufficient for berseem, for example. Fenugreek plant and seeds have a characteristic strong odour (Ecocrop, 2017). The seeds are used as condiments. Fenugreek is sometimes used as a short- rotation catch crop after sugarcane or cotton.

Chemical constituents – Alkaloids: Trimethylamine, Neurin, Trigonelline, Choline, Gentianine, Carpaine and Betain.Amino acids: Isoleucine, 4-Hydroxyisoleineuc, Histidine, Leucine, lysine, l-tryptophan Saponins Graecunins, fenugrin B, fenugreekine, trigofoenosides A–G.

 Uses -

1. It is used as Detergent
2. It is used for hair growth
3. It is used in itchy scalp ,shiny Lustrous, locks
4. It is used for dandruff treatment , split end solution excess oil control , Conditioner

Liquorice

Synonym - Glycyrrhizin

Biological source - It consist of peeled and unpeeled roots & stolons , stems of Glycyrrhiza glabra linn.

Family – *Leguminosae*

Description - Liquorice is a herbaceous perennial, growing to 1 metre (40 in) in height, with pinnate leaves about 7–15 cm (3–6 in) long, with 9–17 leaflets.

Chemical Constituent – The root of Glycyrrhiza contains triterpenoid saponins (glycyrrhizin, glycyrrhizic acid), which are the major characteristic constituents of liquorice, and they are responsible for the sweet taste (Blumenthal et al. 2000).

 Uses -

1. It is used as Detergent.
2. It is used as Pure protective & precious formula for shiny smooth & silk hair.
3. It helps to remove dandruff.
4. It Stimulates hair growth.

Hibiscus Leaves

Synonym – Jaswand

Biological sourec – It consist of dried Flowers and leaves of Hibiscus rosa sinessis.

Family – *Malvaceae*

Description – Red and White varities are generally used in hair care preparation.

Chemical constituents – The leaves contain protein (3.3 g/100 g), fat (0.3 g/100 g), Carbohydrate (9.2 g/100 g), minerals (phosphorus (214 mg/100 g), iron (4.8 mg/100 g),Thiamine (0.45 mg/100 g), β carotene (4135 µg/100 g), riboflavin (0.45 mg/100 g) and Ascorbic acid (54 mg/ (Ismail, Ikram, & Nazri, 2008).

 Uses –

1. It used as hair growth promoter.
2. It used as Antigreying agent.
3. It used as Hair conditioner.
4. It used to Shine hair and gives smoothness.

Senna

Synonym - Mehendi

Biological source - it consist of fresh and dried leaves of awsonia in ermis.

Family - *Lythraceae*

Discription - It is flowering plant and it's leaves are used to color and decorate the skin and hair.

Chemical constituents - Senna contains anthraquinone derivatives , which are dimeric glycosides & are the active constituents of the drug . They are sennoside A , sennoside B , sennoside C & sennoside D.

 Uses -

1. It is used as hair colorant .

2. It is used as hair dyes.

3. It is used as hair Conditioner.

4. It is used as Nourisher.

Mentha

Synonym - Papper mint

Biological source - Papper mint leaf consist of dried leaves of mentha piperata .

Family - *Labiatae*

Discription - Mints are aromatic, almost exclusively perennial herbs. They have wide-spreading underground and overground stolons and erect, square, branched stems.

Chemical constituents - The active chemical in mint is a terpene alcohol called menthol or peppermint camphor, 2-isopropyl-5-methylcyclohexanol, but let's stick with menthol for now. Traditionally, it is extracted from the leaves of plants like peppermint (Mentha piperita), in which it may act as a natural insecticide.

 Uses

1. It is used as coolant

2. It is used as Antimicrobial

Objectives:

1. To formulate the herbal shampoo

2. To evaluate the herbal shampoo

3. The part used for formulation is leaves, fruit and root.

4. To reduce side effects of chemical formulation.

5. To improve hairs texture.

6. To darkening the hair color.

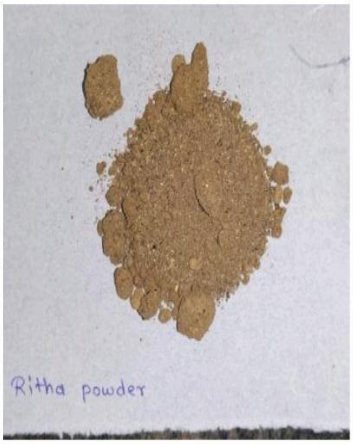
7. To imparting gloss to hair and to maintain their manageability and oilyness for hairs.

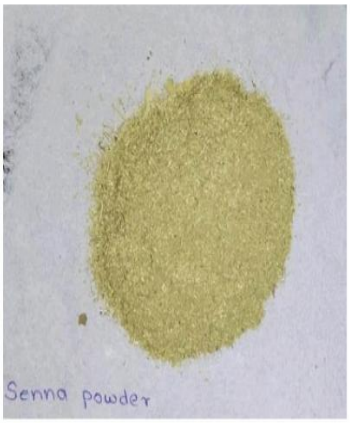
Experimental Work

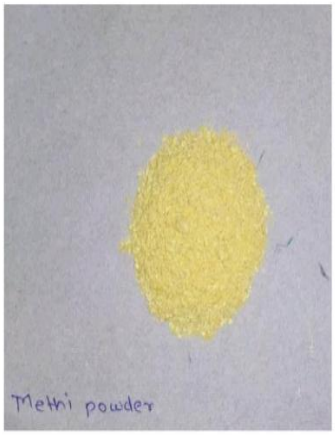
A] Collection of Plants

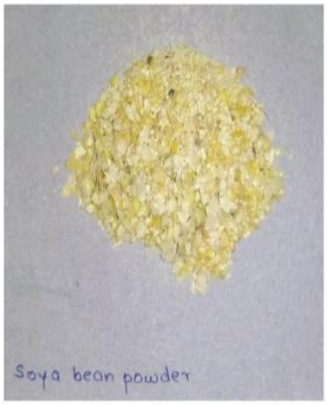
Fresh parts of Hibiscus rosea sinesis (hibiscus leaves), Lawsonia inermis (senna leaves) were collected from herbal garden and Mentha leaves are collected from local market and all leaves are washed under running water

to remove contaminants while Sapindus mukorossi (reetha), Phyllanthus emblica (amla), Glycyrrhiza glabra (Liquorice), Glycine max (soya bean) and Trigonella foencum (methi seeds) were collected in dried form from local market . All the green fresh ingredients were dried in shade, converted into coarse powders and sieved. Almond oil was collected from local medical shop. The raw materials were given with their biological source and uses respectively mentioned in introduction part.









Sr. No	Constituents	Part of plant used	Quantity (100 ml)
1.	Hibiscus leaves	Leaves	5gm
2.	Methi powder	Seeds	5gm
3.	Ritha powder	Fruit	10gm
4.	Amla powder	Fruit	10gm
5.	Liquorice powder	Rhizomes	10gm
6.	Senna powder	Leaves	10gm
7.	Mentha	Leaves	5gm
8.	Soyabean	Seeds	10gm
9.	Lemon juice	Fruit	q.s
10.	Gelatin	.....	q.s
11.	Almond	Fruit	q.s
12.	Methyl Paraben	.....	q.s

B] Extraction of crude drugs :

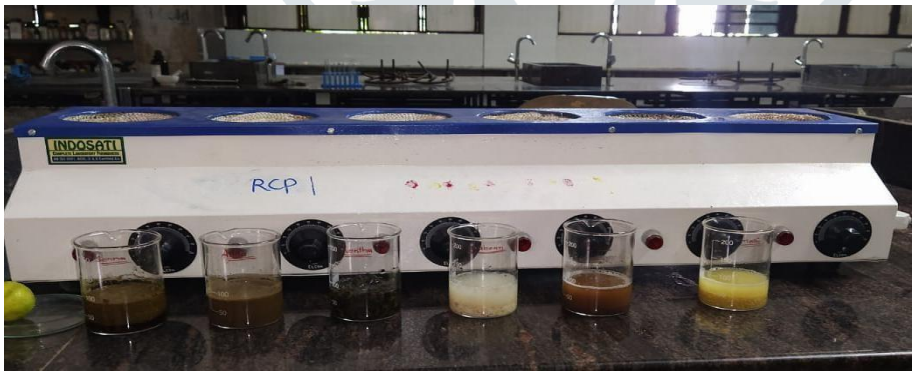


Figure Extraction of Crude Drug

 By Decoction Method :Weighed all the ingredients according to the formula. Decoction method is used for Extraction of crude drug.

 Hibiscus leaves: 5gm of hibiscus leaves in 100 ml of water and boil.

 Methi Extract:5gm of methi powder in 100 ml of water and boil.

 Ritha Extract :It is prepared by decoction method. 10gm of ritha powder in 100 ml of water and boil.

 Amla Extract: 10gm of amla powder in 100 ml of water and boil.

 Liquorice Extract: 10gm of liquorice powder in 100 ml of water and boil.

 Senna Extract: 10gm of senna powder in 100 ml of water and boil.

 Mentha Extract : 5gm of Mentha powder in 100 ml of water and boil.

 Soyabean Extract:10gm of soyabean powder in 100 ml of water and boil. Filter all extract by using muslin cloth. Collect filtrate.

Formulation of Herbal Shampoo:

Ingredient	Quantity in ml	
	Formula 1 (F1)	Formula 2 (F2)
Ritha extract	10ml	10ml
Amla extract	10ml	10ml
Liquorice extract	10ml	5ml
Methi extract	-	5ml
Senna extract	-	10ml
Mentha extract	-	5ml
Hibiscus extract	-	5ml
Soyabean extract	-	10ml
Lemon juice	q. s	q. s
Gelatin	q. s	q. s
Almond Oil	q. s	q. s
Methyl paraben	q. s	q. s

Table No: 3 Formulation

Procedure : Formulation of the herbal shampoo was done as per the formula given in Table 1. To The gelatin solution (0.1%), added the herbal extract and mixed by shaking continuously at The time interval of 20 min. Lemon juice was also added with constant stirring to adjust pH. To improve aroma in the formulation, sufficient quantity of essential oil (almond oil) was Added and made up the volume with gelatin

D] Evaluation of Herbal shampoo-

1. Visual assessment – Physical appearance/visual inspection The prepared formulation was assessed for color, clarity, odour, and froth content .The Formulations prepared were evaluated in terms of their clarity, with brown colour and good in Odour with foam producing ability and fluidity.

2. Determination of pH -The pH of shampoo solution in distilled water was determined at room temperature by using pH paper. The pH of 10% shampoo solution in distilled water was determined at 25°C. 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.

3. Foaming Index: -Cylinder shake method was used for determining foaming ability. - 5 ml of shamp00 was taken into measuring cylinder and volume was make upto 25 ml and shaken properly for ten times. - Than 5 test tubes were taken and stock solution was measured as given in following observation table. And each test tube was adjusted for volume upto 10 ml by adding water.Then foam in each test was measured in cm and foaming index was calculated.

Observation Table :

No. of test tube containing ml of stock solution	Height of foam in cm	
	F1	F2
1ml	0.2	0.2
2ml	0.4	0.5
3ml	0.6	0.5
4ml	1	0.7
5ml	2	0.9

Table no: 1

Calculation:

1. For formulation 1 (F1) : Foaming Index = 1000 /A

Where A = valume of decoction having exact 1cm height

Therefore, Foaming Index = 1000 / 4

=250

2. For formulation 2 (F2)

Foaming Index = 1000 /A

Where A = valume of decoction having exact 1cm height

Therefore, Foaming Index =1000/5

=200

5. Test to evaluate foaming ability and foam stabilityFoaming ability was determined by using cylinder shake method. Briefly, 50 mL of The 1% commercial or formulated shampoo solution was placed into a 250 mL graduated Cylinder; it was covered with one hand and shaken 10 times. The total volume of the foam Content after 1 min of shaking was recorded.Foam stability was evaluated by recording the foam volume after 1 min and 4 min of Shake test (Klein, 2004).
6. 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.
7. Dirt dispersion Two drops of 1% each shampoo powders 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 shaken for 10 Times. The amount of ink in the foam of was estimated as None, Light, Moderate, or Heavy.
8. % of solid contents Good shampoos usually have 20% to 30% solid content as it is easy to be applied and Rinse out from the hair. If it doesn't have enough solid it will be too watery and wash away Quickly, similarly too many solids will be hard to work into the hair or too hard to wash out. The percent solid contents of all the tested shampoo was found within the range of 22 to 25% And are expected to wash out easily.

Observations & calculation :

1. For formulation 1(F1):
1. Weight of empty petri plate (A)= 63.87 gm
2. Weight of plate after evaporation (B)=64.44 gm
3. Weight of sample = (B) – (A)

= 64.44 – 63.87

= 0.57 gm

Total solid content =0.57 gm

Therefore % solid content = (B – A)/ 4 x 100

= 0.57 / 4 x 100

= 14.25%

2. For formulation 2(F2):
1. Weight of empty petri plate (A)= 63.16 gm
2. Weight of plate after evaporation (B)=63.95 gm
3. Weight of sample = (B) – (A)

= 63.95 – 63.16

= 0.79 gm

Total solid content =0.79 gm

Therefore % solid content = (B – A)/ 4 x 100

= 0.79 / 4 x 100

= 19.75%

9. Nature of hair after washes
   Nature of hair after wash can be done by collecting the responses by using hair samples. The hair samples were collected from local ladies parlour.
10. Skin sensitization test This test is performed on skin of human volunteers and checks whether it irritation on skin or Not.
11. Speed of dryingThe speed of driyng was performed by applying 5ml of the sampoo in hair and dried after Washing .The drying of hair was performed by using table fan with constant speed and Distance from the subject.
12. Easy of combing –Easy of combing was performed by passing a comb through the dry hair and checking whether the comb glides smoothly

RESULT:

Chemical test	Ritha extract	Amla extract	Liquorice extract	Methi extract	Senna extract	Mentha extract	Hibiscus extract	Soya milk
Alkaloid	Present	Present	Present	Present	-	Present	-	Present
Carbohydrate	-	Present	Present	-	-	Present	-	-
Cardiac glycosides	Present	Present	Present	Present	Present	Present	-	Present
Saponins	Present	Present	Present	Present	Present	-	Present	Present
Tannins	Present	Present	-	Present	Present	Present	Present	-
Protein and amino acid	-	-	Present	Present	Present	-	Present	Present
Flavonoids	Present	Present	Present	Present	Present	Present	Present	-

Table no: 4 Phytochemical test

Final Formulation: **HERBAL SHAMPOO**

Ingredients		Mfg. Lic No. 2021
Ritha extract	10 ml	Batch No. A
Amla extract	10 ml	Mfg. By. YRCP Nesari
Liquorice extract	q. s	Mfg. Dt. 19 Nov 2021
Lemon juice	q. s	Exp. Dt. 20 Aug 2022
Gelatin	q. s	
Almond oil	q. s	
Methyl paraben	q. s	
Category :- Hair growth, Antidandruff		
Storage : Store in cool and dry place		
YRCP Nesari		

HERBAL SHAMPOO		
Ingredients		Mfg. Lic No. 2021
Ritha extract	10ml	Batch No. A
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Hibiscus extract	5ml	
Soyabean extract	10ml	
Lemon juice	q. s	
Gelatin	q. s	
Almond oil	q. s	
Methyl paraben	q. s	
Category :- Hair growth, Antidandruff		
Storage : Store in cool and dry place		
YRCP Nesari		

 Physical appearance

The prepared shampoo showed good characteristics in terms of foaming effect and Appearance on the visual inspection of the formulation. The results are shown in Table 5.

 pH Determination :

For enhancing and improving the hair quality, pH of the shampoo is very important and
Also for stabilizing the scalp and minimizing irritation to the eyes [18]. For minimizing the Damage of hair using shampoo, one of the ways in the present trend is to develop shampoos Having lower pH value. Lowering of pH (mild acidity) promotes tightening of the scales and Prevents swelling, thereby producing sheen. The results are presented in Table 5.

 Foaming index

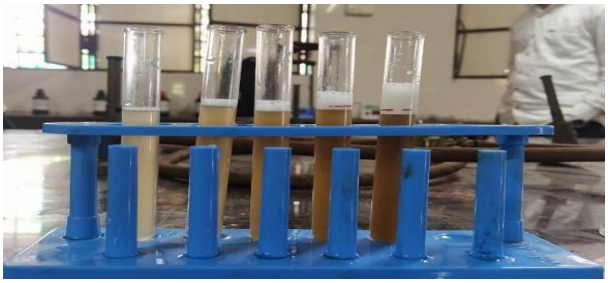

Figure No. 1 – Formulation 1

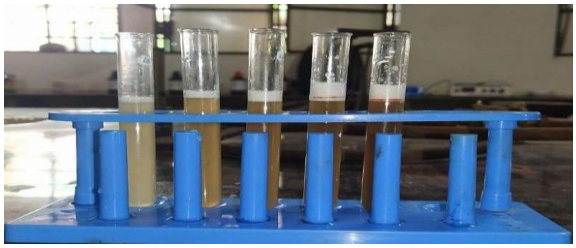

Figure No. 2– Formulation 2

Foaming ability and foaming stability

From the consumer point of view, foam stability is one of the important needs of a shampoo. Important parameter that was considered in the shampoo evaluation was determination of foaming stability. The foam volume produced by the formulated shampoo is above 35 ml in both formulation. The prepared shampoo generates uniform, small sized,
compact, denser, and stable foam. The foam volume remains same throughout the period of about 5 min showing that the generated foam by the shampoo has good stability and the
prepared shampoo exhibits higher foam property which may be due to the presence of
soapnut [20]. (Table 5).

 Wetting time

To test the efficacy of the shampoo, wetting ability of a surfactant needs to be calculated which depends on the concentration of surfactant [19]. For the evaluation of wetting ability of the shampoo, canvas disc method is used which is an efficient, quick, easy, and reliable
method. The prepared shampoo shows the wetting time of the about 100 s and 110 s . The
maximum of wetting time shows that the shampoo contains lower amount of detergents (Table 5).

 Dirt dispersion

Dirt dispersion is an important criterion for evaluation of cleansing action of shampoo. Shampoos that cause the ink to concentrate in the foam are considered of poor quality because ink or dirt that stays in foam is difficult to rinse away and gets re-deposited on the
hair (Ali and Kadhim, 2011).Therefore, the dirt should stay in the water portion for achieving better cleansing action. All shampoo concentrated the ink in the water portion, ensuring their satisfactory cleaning ability and actual effectiveness (Table 5).

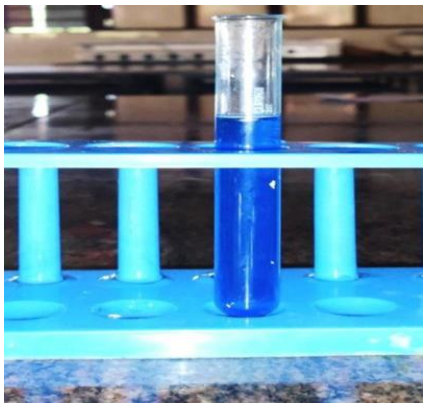

Fig. No 1

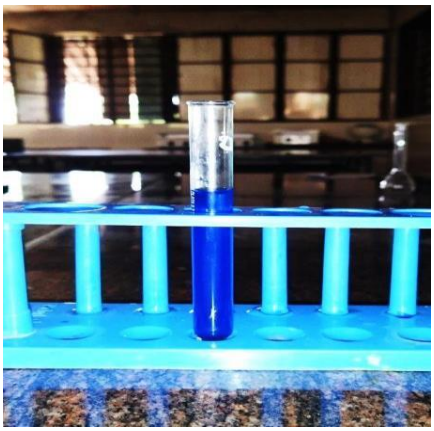

Fig. No 1

Percent of Solid content

Shampoo with high solid content will be very difficult to rinse and hard to work with the hair. The prepared shampoo contains 14.25 % in Formulation 1 and 19.75 % in Formulation 2 of solid content. Thus, they considered easy to wash out when having less solid content during preparation of shampoos (Table 5).

Fig. No 1

Fig. No 2

 Speed of drying: In speed of drying formulation F2 took more time whereas other formulations showed no Difference in speed of drying. (Table 5).

Easy of combing: In ease of combing only control shampoo combed without friction whereas other formulations showed combing with friction. (Table 5).

Evaluation test	**Observation**	
	Formulation 1 (F1)	**Formulation 2 (F2)**
1. Visual assessment /Physical appearance	Greenish brown	Greenish brown
2.Determination of pH	7.4	7.2
3.Foaming index	250	200
4.Test to evaluate foaming ability and foam stability	10 cm	10 cm
5.Wetting time	100s	110s
6. Dirt dispersion	No dirt	No dirt
7.% of solid contents	14.25	19.75
8. Nature of hair after washes	Soft manageable	Soft and smooth
9.Skin sensitization test	No irritation	No irritation
10.Speed of drying (min)	10	15
11.Easy of combing (dry)	Easy	Easy

Table no: 5 Evaluation of Formulation

CONCLUSION:

The intension of this preparation was to incorporate herbal antimicrobial agent instead of using chemical agent and it is achieved. The resultant product that is the herbal shampoopassed all tests carried to evaluate the same. This research will definitely change thinking towards herbal ingredients. Research like this will help to increase approach toward herbal shampoo and other personal care products.

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