

## Original Research Article

### Formulation and Evaluation of Herbal Baby Shampoo

#### ABSTRACT

Shampoos are most probably used as cosmetics. In general, hair care products are used for cleaning scalp and also used for beautifying agents. It contains suitable additives preservatives and active ingredients. The purpose of using shampoo is to remove dirt that is build up on the hair without stripping out much of these bum. The herbal shampoo popularized due to formulated from herbal sources which is safer with milder effect. In this study, herbal shampoo was formulated containing suitable ingredient such as *Lawsonia inermis* L. (Henna), *Azadirachta indica* A.Juss. (Neem), *Hibiscus rosa-sinensis* L. (Hibiscus), *Ficus aurea* (Banyan), *Embllica officinalis* (Amla), *Sapindus mukorossi* Gaertn. (Ritha), *Acacia concinna* *Senegalia rugata* (Lam.) Britton & Rose. (Shikakai) and *Aloe barbadensis* (Aloe vera) different proportions to formulate and evaluate its physicochemical properties. The dry fruits of Ritha, products of Amla and units of dried Shikakai used for framework for purging hair. Ritha and Shikakai when shaken with water create rich foam impact. Amla fruit and *Hibiscus rosa-sinensis* L. flowers are used to promote hair growth, anti-dandruff agent, strengthen hairs, and prevent hair fall. Dried roots of *Ficus aurea* (Banyan) produce Lustrous effects on hairs. *H. rosa-sinensis* flower and *A. barbadensis* used as a conditioning agent and also moisturizing agent.

**Keywords:** Natural plants, Hair cosmetic, Conditioning effect, Non-irritant, Herbal shampoo.

**Comment [S1]:** write all botanical name in etalics.

**Comment [S2]:** Write author citation.

**Comment [S3]:** Write author citation.

**Comment [S4]:** *Ficus aurea* Nutt. This species not reported from india till today. You have collected this species from india ? if yes then it is new record to the flora of india. But I think author not collected this species from india. I THINK IT IS *Ficus benghalensis* L. please correct it. Please refer Chaudhary et. al. 2012 . Synopsis of the Genus *Ficus* L. (Moraceae) in India. *Taiwania* 57(2):193-216 DOI: 10.6165/tai.2012.57(2).193

**Comment [S5]:** Now this species *Embllica officinalis* Gaertn. name is not in use But the correct name now in use is *Phyllanthus emblica* L.

**Comment [S6]:** Old name = *Acacia concinna* (Willd.) DC. New name = *Senegalia rugata* (Lam.) Britton & Rose. Use new name here.

**Comment [S7]:** Old name = *Aloe barbadensis* Mill. New name = *Aloe vera* (L.) Burm.f. Use new name here

**Comment [S8]:** Refer comment S4

**Comment [S9]:** Refer comment S7

## INTRODUCTION

In this study, formulate herbal baby shampoo using natural extracts and evaluated Physico-chemical parameters, conditioning effects, Moiturizing effect and anti-dandruff effect this determination is very simple, reproducible and quantitative. 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, hair loss and hair dryness. We use shampoo containing natural herbals instead of synthetic shampoo ~~shampoo~~. However, formulating cosmetic products containing only natural substances are very difficult. These medicinal plants may be used in extracts form, their powdered form, crude form, or their derivatives. They develop shampoo containing natural substance for safer and milder effect, then commercial shampoo is difficult and it posses good foaming, detergency, and solid content as such synthetic shampoo.[1]

You can start using a few drops of a gentle herbal baby shampoo on their hair. Small amount of skin protective oils intact with skin surface. If the baby get older and grows a full head of hair, you may begin to use a little more shampoo to get their hair clean.[13] Baby skin is thinner and dries out much faster than adult skin, so choosing a gentle, baby-friendly shampoo can help keep their skin from getting dry and itchy.[2]

Herbal baby Shampoo can help loosen spit-up, food, oils, and anything else that gets into the baby's hair. The right baby shampoo is gentle enough to use regularly, and will not dry out the skin or hair.[12] Every baby is different, and no shampoo will work well for everyone. Consider fragrance-free products.[9] They may be less irritating. Herbal baby shampoo will not cause a baby to grow hair or make the hair grow faster. Hair growth associated with hormonal and genetic effects. Herbal baby shampoo can keep the hair healthy so that it grows long and strong. [3]

## MATERIAL AND METHODS OF FORMULATION

1.

1. Preparation of crude extracts:

**Comment [S10]:** Please check it.

**Comment [S11]:** ADD HEADING LIKE COLLECTION AND IDENTIFICATION OF PLANTS USED IN THIS STUDY

**Comment [S12]:** Please clearly mention the exact place of plant collection like location with GPS, young or mature condition, mention date or month and year. (Because, different seasons and age of plant also affects its phytochemical contents and its antibacterial activity in many plants).

**Comment [S13R12]:** Please mention how you have indentified these plants by using any flora or from any faculty member,.

**Comment [S14R13]:** Please mention place of the herbarium were both plant species deposited like in your college herbarium or elsewhere.

Lawsonia inermis (Henna), Azadirachta indica (Neem), Hibiscus rosa-sinensis(Hibiscus),Ficusaurea(Banyan), Emblica officinalis(Amla), Sapindus mukorossi(Ritha) and Acacia concinna(Shikakai) which anti-dandruff and conditioning properties already reported were homogenized and extracted using ethanol(70% v/v).The extract were filtered and concentrated to dryness under reduced pressure and controlled temperature (50-55°C) to obtain solvent free semisolid extracts. The solvent free extracts was washed, weighed and packed into plastic containers and stored in room temperature.[6]





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## 2. Preparation of extract (Decotion method)

About 100 g of each powdered plant materials, namely Lawsonia inermis (Henna), Azadirachta indica (Neem), Hibiscus rosa-sinensis(Hibiscus),Ficusaurea(Banyan), Emblica officinalis(Amla), Sapindus mukorossi(Ritha), Acacia concinna(Shikakai) were homogenized. The powdered material was extracted with distilled water by boiling for 4h.The extract of each plant material was separated and evaporated.[7]

**Comment [S16]:** REFFER ABOVE COMMENTS

**Comment [S17R16]:** Correct all the botanical name in use everywhere as suggested by the above comments.

S. No.	Common name	Pictures	Botanical name	Family	Parts used	Application
1	Henna		Dried leaves of Lawsonia inermis	Lythraceae	Leaf	<ul style="list-style-type: none"> <li>Growth of hair conditioner.</li> </ul>
2	Neem		Dried leaves of Azadirachta indica	Meliaceae	Leaf	<ul style="list-style-type: none"> <li>Prevent the dryness of hairs</li> <li>flaking of hairs.</li> </ul>
3	Hibiscus		Hibiscus rosa-sinensis	Malvaceae	Flower	<ul style="list-style-type: none"> <li>Conditioning effect</li> <li>Prevents hair loss</li> <li>hair growth promoter.</li> </ul>
4	Banyan		Dried roots of Ficusaurea	Moraceae	Root	<ul style="list-style-type: none"> <li>Lustrous effects on hairs.</li> </ul>
5	Amla		Emblica officinalis	Euphorbiaceae	Fruit	<ul style="list-style-type: none"> <li>Anti-dandruff agent</li> <li>Darkening of hairs</li> <li>hair growth promoter.</li> </ul>





**Comment [S18]:** Delete it from here and write in plant part column

**Comment [S19]:** See S18

**Comment [S20]:** CORRECT SPECLING Meliaceae Juss.

**Comment [S21]:** See S18

**Comment [S22]:** ?

						
6	Ritha		<i>Dried fruits of Sapindus mukorossi</i>	Sapindaceae	Fruit	<ul style="list-style-type: none"> <li>Detergent and antidandruff.</li> </ul>
7	Shikakai		<i>Acacia concinna</i>	Mimosaceae	Powder	<ul style="list-style-type: none"> <li>Detergent.</li> <li>Foam base and anti dandruff.</li> </ul>
8	Aloe vera		<i>Aloe barbadensis</i>	Liliaceae	Leaf	<ul style="list-style-type: none"> <li>Coolant.</li> <li>Conditioner and moisturizing effect.</li> </ul>

**Comment [S23]:** See S18

**Comment [S24]:** CURRENT ACCEPTED FAMILY NAME Fabaceae Lindl.

**Comment [S25]:** MENTION PLANT PART USED HERE

**Comment [S26]:** CURRENT ACCEPTED FAMILY NAME Asphodelaceae Juss.

**Comment [S27]:** MENTION LEAF PULP OR WHOLE LEAF USED HERE

### 3. Formulation of herbal baby shampoo

The formulation of herbal baby shampoo involves gaur gum powder(10%), added to the herbal extract and mixed by shaking continuously at the time interval of 20 min. 0.5% of methyl paraben was also added with constant stirring. To improve aroma in the formulation, sufficient quantity of essential oil (rose oil) was added and made up the volume to 100 ml with gelatin.[10]

**Table 2: Formulation of herbal baby shampoo using different concentration**

S.NO	Ingredients	Formulation F1	Quantity for 25g	Formulation F2	Quantity for 25g	Formulation F3	Quantity for 25g
1	Henna extract	5%	1.25g	20%	5g	5%	1.25g
2	Neem extract	10%	2.5g	9%	2.25g	10%	2.5g
3	Hibiscus extract	25%	6.25g	12%	3g	20%	5g
4	Banyan extract	5%	1.25g	25%	6.25g	10%	2.5g

5	Amla extract	20%	5g	25%	6.25g	25%	6.25g
6	Ritha extract	5%	1.25g	1%	0.25g	1%	0.25g
7	shikakai extract	10%	2.5g	1%	0.25g	1%	0.25g
8	Aloe vera gel	20%	5g	7%	1.75g	28%	7g
9	Gaur gum powder	q.s	q.s	q.s	q.s	q.s	q.s
10	Methyl paraben	q.s	q.s	q.s	q.s	q.s	q.s
11	Distilled water	q.s	q.s	q.s	q.s	q.s	q.s

Different concentration of formulation (F1, F2, F3) were used for the study. Each shampoo in the study was used in its different concentration forms. Add Gaur gum powder is used as an emulsifying agents. And, also add methyl paraben is used as a preservative.

## RESULTS AND DISCUSSIONS

### 1. Organoleptic characters:

Colour: Brown

Odour: Pleasant

Appearance: Turbid

Texture: Smooth viscous

### 2. Determination of pH:

The pH of the prepared herbal baby shampoo in distilled water (10% v/v) was evaluated by means of pH analyzer at room temperature.[4]

✓ pH of the prepared herbal baby shampoo is 6.21

[Note: Ideal pH of herbal baby shampoo=6-7]



Figure 1: pH determination of Herbal baby shampoo

### 3. Determination of percentage solid content:

Weight of empty evaporating dish (A) = 120.75g

Weight of evaporating dish with sample = 124.31g

Weight of evaporating dish after evaporation (B) = 121.5g

Weight of sample = (B) - (A) = 121.5 - 120.75 = 0.75g

Total Solid Content = 0.75g

% Solid Content =  $(B-A)/4 \times 100$

$$= 0.75/3 \times 100$$

$$= 25\%$$

Figure 2: Determination of Solid Content percentage

[Note: % solid content of good herbal baby shampoo = 20%-30% of solids)

4. Surface tension measurement:

$$R_2 = (W_2 - W_1)n_1 R_1 / (W_2 - W_1)n_2$$

W1 = Weight of empty beaker = 52.94

W2 = Weight of beaker with distilled water = 63.3

n1 = Number of drops of distilled water = 50

n2 = Number of drops of Shampoo solution = 45

R1 = Surface tension of distilled water at room temperature = 35

R2 = Surface tension of Shampoo solution = ?

$$R_2 = (W_2 - W_1)n_1 R_1 / (W_2 - W_1)n_2$$

$$R_2 = (63.3 - 52.94)50 \times 35 / (63.3 - 52.94)45 = 38.88 \text{ dynes/cm.}$$

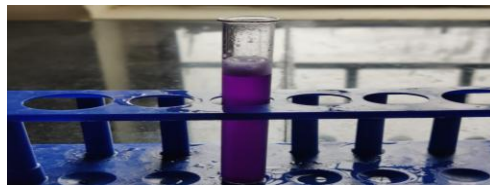
[Note: Standard surface tension of Herbal baby shampoo: 38.36 +/- 1.14)

5. Test of wetting time:

✓ The wetting time of Herbal baby shampoo = 90 sec.

6. Foam stability test:





S.No	Number of test tube containing ml of stock solution	Height of foam in cm
1	1ml	0.5cm
2	2ml	1.2cm
3	3ml	2.5cm
4	4ml	2.5cm
5	5ml	2.7cm

Foaming index =  $1000/A$  , Foaming volume = 25ml

Where, A= Volume of decoction having exact 1cm height

$$\text{Foaming index} = 1000/2.5 = 400$$

#### 8. Dirt dispersion test

Volume of ink = 1 drop of ink (0.1ml)

Colour of the foam = Light colour.

Figure 3: Dirt dispersion test

#### 9. Rheological evaluation:

The viscosity profile of the herbal shampoo formulation was measured using Brookfield viscometer at 25°C, Instrument model: DV-E viscometer and Spindle type: S62 spindle.

S.NO	Rpm(Rotation per min)	Cp(Centipoise)	Torque
1	10 Rpm	195	%6.5
2	20Rpm	185	%12.3
3	30Rpm	179	%17.9
4	50Rpm	170	%28.5
5	60Rpm	169	%33.4
6	100Rpm	159.3	%53.1

## DISCUSSION

The laboratory formulation ( Formulation F3: Ritha and shikakai extract of foam base were found to be better with respect to Foaming ability and produce anti-dandruff effect then the formulation F2 which was formulated with higher concentration of foam base. Formulation F3 provided stable foam, surface tension reduction, good cleaning and wetting effect. Aloe vera contains 75 potentially active constituents, due this phytoconstituents resulted conditioning and moisturizing effect on baby scalp.[5]

Table 3: Physicochemical study of herbal baby shampoo

S.NO	Evaluation test	Formulated herbal baby shampoo	Commercial herbal baby shampoo
1	Colour	Brown	Brown
2	Transparency	Clear	Clear
3	Odour	Pleasant	Good
4	pH of 10% solution	6.5	7
5	Solid Content (%)	25	23.25
6	Foam volume (ml)	25	26
7	Foam type	dense, small	dense,small
8	Surface tension (dynes/cm)	38.88	35.18
9	Wetting time (s)	90 s	120s
10	Viscosity (Cp)	159.3 at 100rpm	200 at 100rpm

## 7. CONCLUSIONS

The present study was carried out with the aim of preparing the herbal baby shampoo that reduces hair loss during combing, safer than the chemical conditioning agents as well as to strengthen the hair growth. Herbal shampoo was formulated with the aqueous extract of medicinal plants that are commonly used for cleansing hair traditionally. To use conditioning agents, which decrease hair loss. To produce effective conditioning effects, uses of shikakai, amla, and other plant extracts insted of synthetic cationic conditioners.

The main purpose of the formulation involves to develop functionally effective shampoo by excluding all synthetic additives, which are generally incorporated in such formulation. To evaluate for good product performance of the prepared herbal baby shampoo, many tests were performed. The results of the evaluation study of the developed herbal baby shampoo revealed a comparable result for quality control test, but further scientific validation is needed for its over all quality. The pH of the shampoos has been shown to be important for improving and enhancing the qualities of hair, minimizing the irritation to the eyes and stabilizing the ecological balance of the scalp. The novel approaches which involves lower the pH of shampoo is one of the ways to hair damage.

Mild acidity prevents swelling and promotes tightening of the scales, there by inducing sheen. Detergency of in house formulation F3 was showed similar to standard marketed shampoo. Cleansing and soil/sebum removal action is the primary aim of shampoo, However, it should not have more detergency because it removes natural oil from hair and gives the drying-out effect. In comparative studies of conditioning effect of different test shampoos, formulation F3 gives very good conditioning effect on hair. This indicates that despite the damage to the cuticle by the detergent, the conditioning agents used in the shampoo formulation are successful in preventing cuticle uplift. Hence we could conclude that it is a very crucial step for quality control of herbal baby shampoo.

Nowadays there is strong demand for natural therapies, and this is increasing in western countries. The herbs which area cheapest of phyto constituents are on wheals to attain their role in Poly herbal formulation so as to have synergistic role. From the present study, tested herbal baby shampoo formulations possess all evaluation parameters which satisfy an ideal shampoo property.

**NOTE:**

The study highlights the efficacy of "herbal", "medicinal" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

**8.REFERENCES**

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**Comment [S28]:** Please check all the references . In the ms total 13 references given but the list only 12 references mentioned

**Comment [S29]:** Coorrect according to format

**Comment [S30R29]:** PLEASE CHECK ALL THE REFERENCES ACCORDING TO THE JOURNAL FORMAT.

- 7) Gavazzoni Dias, M.F.R. Hair Cosmetics: An Overview. Int. J. Trichol. 2015, 7, 2–15.
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