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Research Article

Formulation And Evaluation of Poly-Herbal Medicated Baby Shampoo

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ABSTRACT

The present study aimed to formulate and evaluate a safe, effective, and natural poly-herbal medicated baby shampoo using herbal ingredients such as Amla (*Phyllanthus emblica*), Soapnut (*Sapindus mukorossi*), Shikakai (*Acacia concinna*), Bael fruit (*Aegle marmelos*), Curry leaves (*Murraya koenigii*), Rice water, Sunflower oil, Guar gum, Cedarwood oil, and Jasmine oil. These ingredients were selected for their cleansing, conditioning, nourishing, moisturizing, and hair-strengthening properties. The herbal baby shampoo was prepared using suitable extraction and formulation techniques and evaluated for various physicochemical parameters including appearance, odour, pH, viscosity, washability, pourability, dirt dispersion, texture, foaming capacity, and solubility. The formulated shampoo exhibited good cleansing action, satisfactory foam formation, acceptable pH, and excellent conditioning properties. It was found to be mild, safe, and suitable for the sensitive scalp and hair of infants. The study concludes that the formulated poly-herbal medicated baby shampoo can serve as a natural alternative to synthetic shampoos, providing effective hair cleansing and nourishment with minimal risk of irritation or adverse effects. The formulation promotes healthy hair growth, maintains scalp health, and offers a gentle hair care solution for babies.

INTRODUCTION

According to drug and cosmetic act 1940 and rule 1945 - Term "cosmetic" refers to any item intended to be rubbed, poured, sprinkled, sprayed, introduced into, or otherwise applied to the human body or any part thereof for cleansing, beautifying, promoting attractiveness, or altering the

appearance, and includes any article intended for use as a component of cosmetic.[1]

1).ANATOMY OF HAIR-

The hair is made up of 95% keratin a fibrous, helicoidal protein (shaped like a helix) that forms part of the skin and all its attachments (body hair,

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nails etc.). The hair structure consists of 3 different parts:

1. Medulla: It is the innermost layer of the hair shaft, made up of an amorphous, soft, oily substances.
2. Cuticle: Thin protective outer layer that contains nutrients beneficial for hair growth. It is highly keratinized with cells shaped like scales that are layered one over the other,

measuring about 60 micro-meters long and about 6 micro-meters wide.

3. Cortex: It is the main constituent of the hair, containing long keratin chains which gives elasticity, suppleness and resistance to the hair. The cells of the cortex are joined together by an intercellular cement rich in lipids and proteins.[2]

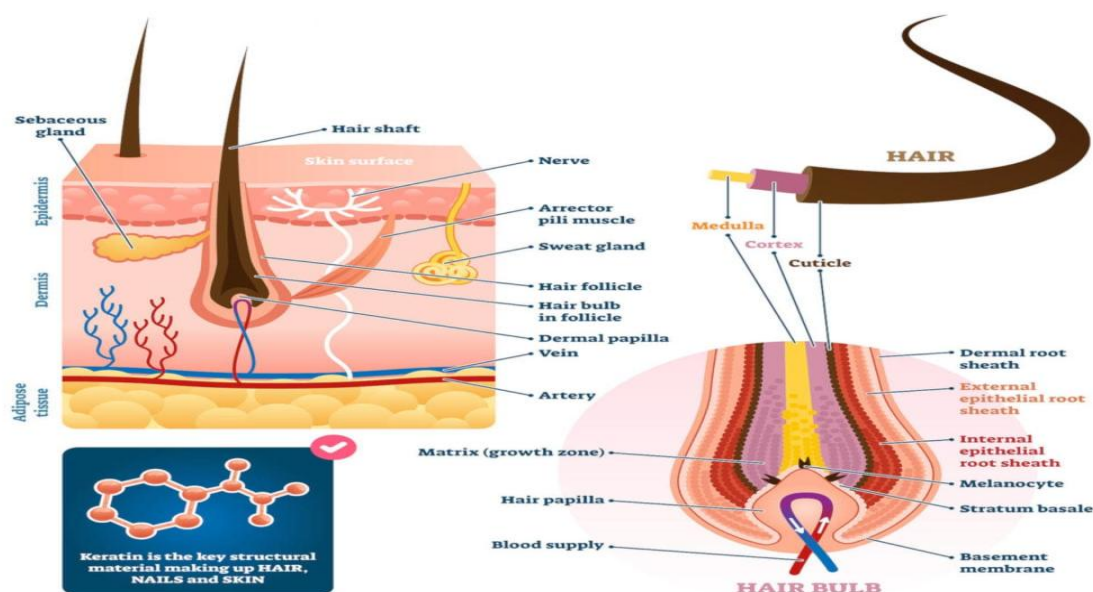


FIG- 1.1).ANATOMY OF HAIR

2).PROBLEMS RELATED TO HAIR:-

- Split ends
- Hair loss
- Dandruff
- Dry hair
- Oily hair
- Frizzy hair
- Limp hair
- Heat damage
- Color damage
- Gray hair[3]



Fig -1). split end



Fig-2). Hair Loss Problem



Fig- 3).Dandruff Problem in Hair

3). HERBAL SHAMPOO-

Without hair, a person lacks complete beauty. Herbs have been used for hair care and cleaning since ancient times. Hair shampoo is used to give hair more shine in addition to cleaning it. Shampoos infused with natural ingredient extracts are known as herbal shampoos. Herbal shampoos are cosmetic preparations that are used for cleansing purposes using traditional Ayurvedic herbs. Herbal products hurt fever and are less expensive. Herbal shampoo can be either basic or uncomplicated. They include protein, hydrolasate, vitamins, and amino acids. Many individuals, both males and females, wash their hair with shampoo. Shampoo's main purpose is to clean the hair scalp of debris. Nowadays the use of herbal shampoo is increased, and there is high demand for herbal cosmetics.

In essence, a shampoo is a detergent solution with appropriate additives for additional benefits like lubrication, medication, and improved hair conditioning. Synthetic surfactants are added to synthetic shampoos primarily for their cleansing and foaming properties. However, frequent use of these surfactants can have serious side effects, including dryness, irritation of the scalp and eyes, and hair loss. We can use natural herbal shampoos as an alternative to synthetic ones. Shampoos contain synthetic surfactants mainly for foaming and cleaning purposes; however, frequent use of these surfactants can cause hair loss, irritation to

the scalp, and dry eyes. Herbal formulations are seen as a synthetic shampoo substitute, but creating cosmetics with only natural raw materials is challenging. Shampoos are formulated with synthetic surfactants primarily as a foaming and cleansing agent. Numerous medicinal plants are widely used in shampoo formulation because of their purportedly positive effects on hair. Hair problem such as hair loss, white hair and a dandruff and split ends tension, Scalp infection, hormone disruption, low vitamin and food human problem [4]

4).CLASSIFICATIONS OF SHAMPOO:[3]

A. Based of Appearance:

- a) Powder shampoo
- b) Liquid shampoo
- c) Gel shampoo
- d) Oil shampoo

B. Based on use or function: -

- a) Conditioning shampoo
- b) Antidandruff shampoo
- c) Baby shampoo
- d) Clarifying shampoo

C.Basedon Origin: -

g) Colours, perfumes and preservative

5) The ideal characteristic of herbal shampoo-

- a) Should be effectively wash hair.
- b) Should be produce good amount of foam
- c) The shampoo should be easily removed by rinsing with water.

6). Composition of shampoo:

- a) Surfactant
- b) Antidandruff agents
- c) Conditioning agents.
- d) Pearlescent agents
- e) Sequestrates
- f) Thickening agents

1. BABY SHAMPOO-

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. Every baby is different, and no shampoo will work well for everyone. Consider fragrance-free products. 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.[5]



Figure - 4) Baby Shampoo

In this study, formulate herbal baby shampoo using natural extracts and evaluated Physico-chemical parameters, conditioning effects, Moisturizing 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. 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. 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.

1. DESIRED PROPERTIES OF HERBAL SHAMPOO

- Ease of Application
- Removal of More Debris
- Easy Wet Combing
- Fragrance

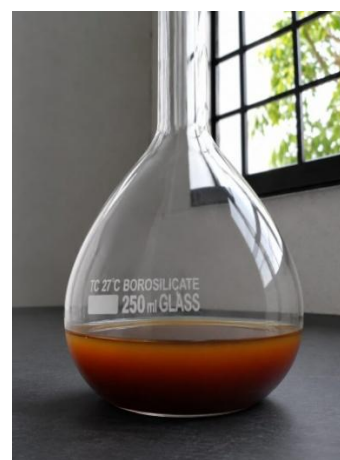


FIG- 5) AMLA

CHEMICAL CONSTITUTENTS

1. Vitamin C

2. Tannins (Emblicanin A, Emblicanin B)
3. Gallic acid
4. Ellagic acid

1. MATERIALS & METHODS

• AMLA

Amla powder is traditionally recognized for its rich vitamin C content and is included for its nourishing effect on hair.[6]

• Amla Extract-

Strengthen the Scalp and Hair, Reduce premature pigment loss from hair, or greying, Stimulate Hair Growth, Reduce Hair Loss, Prevent or treat dandruff and dry scalp, Prevent or treat Fungal and Bacterial hair and Scalp infections. Improve overall appearance of Hairs. [7]

2) SOAPNUT (REETHA)

1. Reetha is a well-recognized component in numerous Ayurvedic shampoos and cleansing products. The kernels within Reetha seeds are abundant in proteins and display a well-proportioned composition of amino acids, as stated by the World Health Organization. Its

fruit is rich in vitamin A, D, E, K, saponin, sugars, fatty acids and mucilage.

Reetha extract is useful for the promotion of hair growth and reduced dandruff. Soapnuts, also known as washing nuts, have been significant in natural hair care for a long time. These nuts contain saponins that contribute to maintaining the

health, shine, and luster of hair when applied regularly..[8]



FIG-6) SOAPNUT

Sapindus mukorossi. Reetha, or soapnut, contains natural surfactants called saponins that produce mild lather and cleanse the scalp without stripping natural oils.

Chemical Constituents:-

1. The main constituent of reetha is Saponins. Other constituent are, Spondaic acid, Oleanolic acid Saponin do side A&B, Mukuroziosides, Trifoliosid Chemical constituents. The major constituents present in reetha are saponins, sugars and mucilage.
2. The seed kernels of reetha are a rich source of proteins and show a balanced amino acid composition.[8]

USES-

1. Reetha is employed because the main ingredient in soaps and shampoo laundry hair because it is taken into account good for the health of hair.

2. Reetha is additionally used for removing lice from the scalp, because it has gentle insecticide properties.
3. It is employed as cleanser, surfactant. In addition, it's used for the treatment of eczema psoriasis, and for removing freckles.
4. It may help relieve joint pain. It may have de-tanning properties.
5. The plant is thought for its antimicrobial properties. [9]

3) SHIKAKAE

Shikakai is rich in saponins, vitamins A, C, D, and E, which help in gentle cleansing, reducing scalp irritation, and preventing hair fall.

1. Shikakai Extract –
2. Cleanses Hair, Add more Shine to the Hairs, Prevents Grays, Crubs Hair Loss, Prevents Lice, Psoriasis, Eczema & Scabies.
3. Shikakai is a natural herbal plant (*Acacia concinna*) commonly used in Ayurvedic medicine as a hair cleanser and conditioner due to its rich saponin content, which produces

mild foaming and cleanses the scalp naturally.

[7]

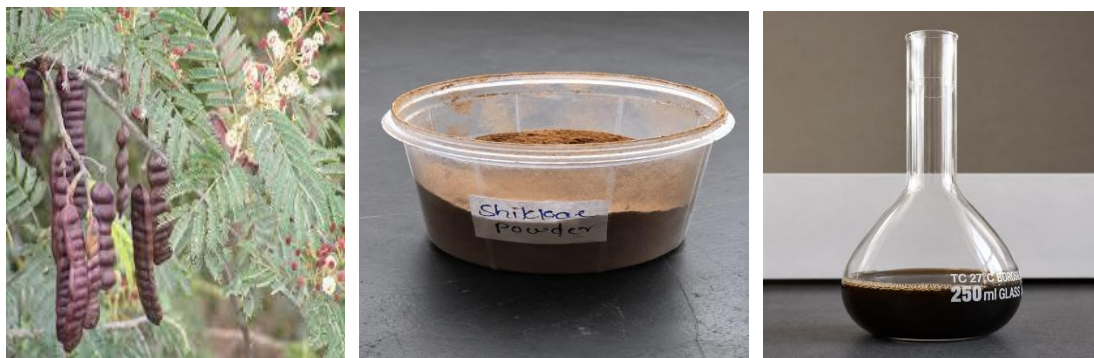


FIG-7)SHIKAKAE

- Chemical
The chemical constituents of shikakai are spinosterol, Acacia acid, Lactose, Glucose, Arabinose

USES

:-

Shikakai gives healthy, beautiful and bouncy hair causes you to look better. It is rich in anti ophthalmic factor, D, E and K and other antioxidants which very essential for healthy and quick growth of hair naturally

- Shikakai is employed in many shampoos and hair medicines for its hair strengthening and conditioning [9]

Bael also known as golden apple, Japanese bitter orange, stone apple, wood apple. It belonging to family Rutaceae found in Himalayan tract and throughout India.

The uses of bael for hair is it reduces hair loss, fights against dandruff, prevent premature greying of hair and strengthens hair. Bael contains marmelosin A, B and C as well as protein, volatile oil and vitamin C [7]

4) BAEL FRUIT



FIG- 8) BAEL FRUIT

1. Chemical constituent :-
2. Vitamins :- Certain vitamins, such as biotin (vitamin B7), are often included in hair care

products. Biotin is believed to promote hair growth and improve hair health.

3. Proteins :- proteins such as keratin and hydrolyzed wheat protein, are commonly found in hair care Products. These proteins can help strengthen the hair strands and improve their overall appearance

- Promotes hair growth
- Bael for hair is it reduces hair loss, fights against dandruff .[10]

5) CURRY LEAVES

Curry leaves, also known as sweet neem leaves, are an important herb in Indian cuisine. It belonging to family Rutaceae. South Asia is home to this plant and it is found in countries like Sri

Lanka, Bangladesh, China and India. Curry leaves have been used for centuries in traditional Indian hair care for their beneficial properties. curry leaves are known to have darkening agents, antioxidants and vitamin B complex which can turns hair back to natural colour. [7]

1. It is an important ingredient in Indian curries due to its fragrance and aroma. The oil of *Murraya Koenigii* is reported to possess antibacterial, antifungal, hypolipidemic, hypoglycemic, antioxidant, and anti-hypertensive properties.



FIG 9)- CURRY LEAVES

1. **Chemical Constituent** :- Carbazole alkaloids (Mahanimbine, Murrayanine, Koenimbine), Essential oil, Flavonoid, Tannin, Glycoside, Vitamins A, B, C, E, Calcium, iron, phosphorus, Antioxidant.

6) RICE WATER

1. Fermented rice water for hair- if you want strong, healthy hair. The rice water's amino acids fortify the hair roots. Additionally, it contains inositol, an antioxidant that gives the hair strength. It is simple to detangle hair using fermented rice water, which reduces hair breakage and nourishes.
2. It is a chemical free hair cleanser Using it as a shampoo to wash out your hair may not be as

convenient as a store bought shampoo, but it comes without chemicals and preservatives, and you don't even need to follow it up with a conditioner.

3. It maintains a pH equilibrium on the scalp.
4. For frizzy hair protection According to a 2010 study published in the International Journal of Cosmetic Science, utilising fermented rice water as a hair treatment has various advantages, including enhanced elasticity, the prevention of hair loss, a smoother texture, less friction, and less frizz. This is largely because inositol, an antioxidant, is present. [11]



FIG- 10) RICE WATE

1. Chemical Constituent:- Carbohydrat (starch), protein, Amino Acids, Vitamins, Vitamin B complex (B1, B2, B3, B5, B6), Vitamin E, Iron, Zinc, Magnesium

USES :-

- Promot and hair strengthening
- Hair conditiotes hair growth
- Improves hair shine
- Skin soothing agent
- Moisturizing effect

- Antioxidant activity
- Used in herbal/cosmetic preparations [12]

7)SUNFLOWER OIL-

The Sunflower is a bright yellow flowering plant that belongs to the daisy family. It is known for its large flower head and its ability to face the sun. Sunflowers are grown for decoration, seeds, and oil. Their seeds are nutritious and commonly used as snacks or for making sunflower oil.



FIG- 11) SUNFLOWER

2. Chemical Constituents:-

1. Fixed oils (30–40%)
2. Rich in linoleic acid
3. Oleic acid
4. Palmitic acid
5. Stearic acid
6. Proteins

7. Albumins and globulins
 8. vitamin E (tocopherols) – antioxidant
- Phytosterols

Uses:

- It gives strong and shiny hair.
- It keeps the scalp and the hair hydrated.

- It has protective properties which limits the proliferation of bacteria.[13]

8) GUAR GUM POWDER

Guar Gum is a natural thickening and stabilizing agent obtained from guar beans. It is widely used in shampoos, cosmetics, food products, and pharmaceuticals.



FIG- 12) GUAR GUM POWDER

3. Chemical Constituents :- Galactomannan polysaccharide (major component) Composed of Mannose backbone, Galactose side chains, Proteins (small amount), Lipids (trace amount), Fiber (high soluble fiber content), Moisture & ash: Thickening property

2. USES :-

1. Thickening agent
2. Stabilizing agent
3. Binding agent
4. Conditioning agent
5. Emulsifier support
6. Food industry[13]

5.9) CEDARWOOD OIL

1. Cedarwood oil is an essential oil extracted from various types of conifer trees, particularly from species in the pine and cypress families. The oil is derived from the wood, roots, and foliage, often from the leftover material after logging.
2. Typically, 8-10 drops of cedarwood oil are used in hair care treatments.
3. The name Cedarwood is derived from the Latin word "Cedrus."Benefits
4. Helps with hair loss, Treats scalp conditions, including dandruff cleanses the skin by removing dirt and impurities Categories Atlas cedarwood, Chinese cedarwood ,Himalayan cedarwood, Port Orford cedarwood, Texas cedarwood. [14]



FIG- 13) CEDARWOOD OIL

1. Chemical Constituents:-

2. Cedarwood oil
3. Cedrol
4. Cedarol
5. Cedrene (α -cedrene, β -cedrene)
6. Thujopsene

USES :-

1. Antifungal & Antibacterial
2. Dandruff control

3. Aromatherapy

4. oily skin balance

10) JASMINE OIL

Jasmine oil used in hair care products for its fragrance. Regular use of jasmine oil can make your hair soft, silky, more manageable and can stimulate hair growth.[11]



FIG- 14) JASMINE OIL

1. Chemical Constituents:

1. Linalool
2. Benzyl alcohol
3. Indole
4. Jasmone
5. Methyl anthranilate
6. Farnesene

Uses:

1. Fragrance
2. moisturizing
3. Aromatherapy
4. mood improve
5. antimicrobial activity

Table -1) Material and their properties

SR.NO	INGREDIENTS	PROPERTIES USED
1.	Amla	B-Carotene, hair tonics
2.	Shikakae	Natural surfactant
3.	Soapnut	Foaming agent
4.	Curry leaves	Antioxidant, Vitamins A,B,C,E
5.	Guar gum	Stabilizers
6.	Rice water	Conditioners
7.	Veg glycerine	Moisturizers
8.	Sunflower	Hypoallergics
9.	Jasmine oil	Fragrance

10.	Buffer powder	PH adjuster
11.	Cedarwood oil	Preservative
12.	Bael fruit	Nourishment

The some ingredients obtained from botanical garden of the DJPS College Of Pharmacy in Pathari is where all the herbal ingredients, including Amla, Curry leaves, Bael fruit. Other ingredients like Shikakae, Soapnut collected from herbal store in Pathari. Guar gum, Rice water, Veg glycerine, Sunflower, Jasmine oil, Buffer powder, Cedarwood oil, Bael fruit from college Lab.

Method of preparation –

1. Ingredients in herbal Shampoo formulas for Guar base.
2. Prepare the herbal shampoo extract of below formulas.

1. Guar gum base –

Weigh the 2.5gm of guar gum transfer into the beaker. Add 10 ml of veg glycerine with continuously stirring for dissolution. After that add 50 ml of water with proper mixing And finally prepare guar gum base.

2. Herbal Extract-

Weigh all the ingredients contain Amla powder, Shikakae powder, Soapnut powder, Bael fruit powder, Curry leaves powder each containing 5gm into the separate beaker. Then add 50 ml water into each beaker with mixing. After that all container put on the hot water bath for prepare extraction for 15 to 30 min. Cool the all extracted container 10 min and transfer into mortar-pestle for trituration.

• Curry leaves Extract-

Preparation of water extract by dissolve 5g of curry leaves powder in 50 ml of distilled water. Which has proportion (1:10 w/v), Covered with

filtered paper and kept aside for 30min in dark area at room temperature. Filtered supernatant was collected and solvent is evaporated by incubating at room temperature for 20min. Prepared curry leaves extract used for experiment. [14]

• Bael Fruit Extract –

Give 5gm of bael fruit powder Boil a handful of bael fruit powder in 50ml of water for 10-15 minutes. Allow the mixture to cool, then strain the liquid to obtain the bael fruit extract. [15]

• Amla Extract -

Fresh amla fruit were finely chopped and shed dried for 15 days and powdered using mortar and pestle. The powdered amla weigh 5g mixed with 50ml distilled water. Stir it for 30 mins boil and after Filter the solution and allow it to evaporate in rotary evaporator. Take the filtrate out of rotary evaporator and completely dry it on hot water bath. Keep the extract in desiccator for cooling. g. Collect and weigh the obtained extract. [11]

• Shikakai Extract-

Take 5 gram shikakai powder in beaker Add 50 ml of distilled water in beaker stir the powder continuously and boil the mixture on water bath until 20 ml water reduced. Then mixture filtered through muslin cloth, and the resulted filtrate was collected in a beaker. [8]

• Reetha Extract-

Take 5 gram reetha powder in beaker Add 50 ml of distilled water in beaker stir the powder continuously and boil the mixture on water bath until 20 ml water reduced. Then mixture filtered



through muslin cloth ,and the resulted filtrate was collected in a beaker. [8]

Procedure-

1. Firstly measure the all hebal extract in given quantity.
2. Take all herbal extract into the mortar pestle and triturate them.
3. And add shampoo base into the extract with gentle stirring.
4. Add rice water into the formulation.
5. Add sunflower oil and add preservative cedarwood oil.
6. After that formulation transfer into the measuring cylinder.
7. And also add veg glycerine and jasmine oil quantity sufficient.
8. Finally prepare herbal baby shampoo.

Table- 2) Formulation of Herbal shampoo for 10 ml

Ingredients	F1	F2	F3	F4	F5
1.Amla	1ml	1.25ml	1.25ml	1.25ml	1.25ml
2.Shikakae	1ml	1.25ml	1.25ml	1.25ml	1.25ml
3.Soapnut	1ml	2ml	2ml	1ml	2ml
4.Curry leaves	1ml	1.25ml	1.25ml	1.25ml	1.25ml
5.Bael fruit	1.25ml	1.25ml	1.25ml	1.25ml	1.25ml
6.Rice water	2.5ml	2ml	1.5	2.5ml	2.5ml
7 .Guar gum	0.1gm	0.5gm	0.5gm	0.50gm	0.50gm
8. Cedarwood oil	0.01ml	0.01ml	0.01ml	0.01ml	0.01ml
9. Sunflower oil	0.25ml	0.30ml	0.20ml	0.20ml	0.20ml
10. buffer powder	q. s	q. s	q. s	q. s	q. s
11. Jasmine oil	q. s	q. s	q. s	q. s	q. s
12. Veg glycerin	q. s	q. s	q. s	q. s	q. s

EVALUTION PARAMERES-

1. Physical appearance
2. Solubility
3. Washability
4. Foaming Capacity
5. Viscosity
6. Poorability
7. Odour
8. Dirt Dispersion
9. PH
10. Stability

Table -3 Evaluation Parameters for 10ml



EvalutionTest	F1	F2	F3	F4	F5
Physical apperance	Dark Brown	Light Brown	Dark Brown	Dark Brown	Dark Brown
Solubility	Insoluble particles	Slightly turbidity	Slightly turbidity	Insoluble particles	Insoluble particles
Washability	Easily	Easily	Easily	Easily	Easily
Foaming capacity	1Cm	0.5Cm	0.7Cm	0.5Cm	1Cm
Viscosity	Less	Moderate	Moderate	More	More
Pourability	High	Medium	Moderate	Low	Moderate
Odour	Strong	Mild	Mild	Mild	Mild
Texture	Less Smooth	More Smooth	Smooth	More Smooth	More Smooth
Dirt dispersion	Light	Light	Light	No	No
PH	5.7	7	6.3	5.6	5
Stability	Good	Good	Good	Good	Good

RESULT –

Table No- 4) Formulation of Herbal Shampoo for 100ml

Sr.No	Ingredients	Quantity
1.	Amla	10ml
2.	Curry leaves	10ml
3.	Bael fruit	10ml
4.	Soapnut	20ml
5.	Shikakae	10ml
6.	Rice water	25ml
7.	Guar gum	2.5gm
8.	Cedarwood oil	0.1ml
9.	Sunflower oil	2ml
10.	Veg glycerin	5ml
11.	Buffer powder	q. s
12.	Jasmine oil	q.s



Table No - 5) Evaluation parameters for 100ml

Sr.No	Evatution test	Result
3.	Physical appearance	Dark brown
4.	Solubility	Completely soluble
5.	Washability	Easily
6.	Foaming capacity	2 CM
7.	Viscosity	Moderate
8.	Pourability	Easily Pourable
9.	Odour	Mild
10.	Texture	More smooth
11.	Dirt dispersion	No
12.	PH	5.6-6.4
13.	Stability	Good

DISCUSSION-

The herbal baby shampoo formulations (F1–F5) were evaluated for various physicochemical parameters such as physical appearance, solubility, washability, foaming capacity, viscosity, pourability, odour, texture, dirt dispersion, pH, and stability. Among all the formulations, F4 batch (Table No. 8.1) showed the best overall performance and was selected as the optimized formulation.

The F4 formulation exhibited a dark brown appearance with complete solubility and smooth texture, indicating good uniformity and homogeneity. It showed easy washability and moderate viscosity, which provided convenient application and pouring characteristics. The foaming capacity of F4 was found to be 1 cm, producing stable foam suitable for cleansing action.

The dirt dispersion test for F4 showed “No” ink concentration in foam, indicating excellent cleansing ability and preventing redeposition of

dirt on hair. The pH of the formulation was found to be 5.6, which is near the normal scalp pH and therefore suitable for baby scalp and hair. The formulation also exhibited very good stability without any significant change in colour, odour, or texture during storage.

Based on these evaluation parameters, F4 batch was considered as the best formulation and was further prepared (Table No. 6.2) calculate the formula for 100ml quantity. The final optimized herbal shampoo formulation contained Amla, Curry leaves, Bael fruit, Soapnut, Shikakai, Rice water, Guar gum, Cedarwood oil, Sunflower oil, Vegetable glycerin, Buffer powder, and Jasmine oil.

The evaluation results of the final 100 ml formulation (Table No. 9.2) confirmed that the prepared herbal shampoo possessed good physical appearance, complete solubility, easy washability, moderate viscosity, pleasant odour, smooth texture, good stability, and suitable pH range of 5.6–6.4.



Hence, the developed herbal shampoo formulation can be considered safe, stable, and effective for hair cleansing and care.

CONCLUSION-

This study successfully developed a poly-herbal medicated baby shampoo using natural herbal ingredients. The formulated shampoo showed good cleansing ability, suitable pH, satisfactory foam formation, easy washability, and good stability. The selected formulation was gentle on the scalp, provided nourishment to hair, and was free from the harsh effects commonly associated with synthetic shampoos. Therefore, the prepared poly-herbal baby shampoo can be considered a safe, effective, and natural product for maintaining healthy hair and scalp in babies.

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