International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 2 Mar–Apr 2025, pp: 1391-1402 www.ijprajournal.com ISSN: 2456-4494

Soapnut Shampoo: A Natural and sustainable hair care shampoo

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Date of Submission: 05-04-2025 Date of Acceptance: 15-04-2025

ABSTRACT: Since the shampoo is the widely used cosmetic product in our daily life, the shampoo industries or cosmetic industries have highest sales of different types of hair product. It helps to clean hair from dust and oil. A natural hair care shampoo is intended to protect hair from dust, oil and promote the hair growth, maintain strength and blackness while also getting rid of oil and dandruff. This polyhedral shampoo was formulated by using ingredients like Ritha, aloe Vera, Amla fruit with proven efficacy.

Keywords: Sapindus mukorossi, Herbal shampoo, Neem leaves, aloe Vera, Ritha and evaluation of shampoo.

I. INTRODUCTION:

Shampoo may be defined as a cosmetic preparation meant for the washing of hair and scalp, packed in a convenient form of use. Its primary function is cleaning the hair or accumulated debris, scalp debris and residues of hair grooming preparation**(1).**Synthetic surfactants such as sodium lauryl sulphate which are widely used in cosmetics are associated with several adverse effects. Market based shampoos contains artificial ingredients that are bad for the skin. They damage hair- follicles and irritate the scalp as well.

Owing to this, use of natural and biocompatible surfactants in cosmetic formulation is being explored. These includes sugar based non ethylated emulsifiers (sugar esters sucrose palmitate, sucrose diesterate) with a very wide Hydro lipophilic Balance ranges so they can work in both phases and considered natural. There are large numbers of plants which reported to have beneficial effects on hair and commonly used in shampoos. These are like Saponin, Shikakai etc. Saponins are commonly found in plants. Plants derived saponins are secondary metabolites mostly used in detergents due to its amphiphilic nature with the presence of a lipid- soluble aglycone and water – soluble chains in there structure.

Sapindus mukorossi, is also known as ‘Soapnut’ or ‘ritha’ , belongs to family Sapindaceae .It is use medicinally as an expectorant, contraceptive, and for cure of excessive salivation , epilepsy, choruses and migraine. (2)

It is also a popular ingredient for ayurvedic preparation such as shampoo, cleaners and medicines for cure of eczema psoriasis and for removing freckles and also have moderate insecticidal property and traditionally useful for removing lice from thescalp **.**(2)Saponins have been used in food processes as a natural surfactant and serve as preservative in controlling microbial spoilage of food.

Hair is one of the vital parts of the body derived from ectodrm of the skin and is protective appendages on the body and considered accessory structure of the integument along with sebaceous glands, sweat glands and nails.The traditional shampoo market is strongly dominated by the synthetic origin.These shampoos of synthetic ingredients are haramful due to regular usage. This cae severe dryness of hair and leading fall in hair.

The extract of soapnut is insecticidal; it is traditionaly used for the killing and removal of Pedicelshumans, human lice that infects the scalp. Also it is known to cure bacterial and fungal based scalp infections including dandruff by its antidermatophytic activity. The Saponins containing aqueous extract exhibits functional properties such as superior emulsification activity in comparison with synthetic surfactant sodium dodecyl sulphate, thus implying its utilization as a commercial, economical bio surfactant.

Bio surfactants are biological substituents, derived from plants, bacteria and fungi and typically used as emulsifiers, demulsifies, wetting and foaming agents, functional food ingredients and detergents. Plant based bio surfactants are renewable in nature,sustainable, easily available and less expensive, biocompatible and biodegradable under both aerobic and anaerobic conditions. They also exhibit lower human toxicity and alergencity. Also there production does not deplete the existing.

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Hair:
Hair is the most important part of human face and body. Hair also promotes confidence and personality in human. Hair is mainly composed of protein. Many of follicles present in human, hair follicles are one of them (3)(4).

Type of hair:(5)

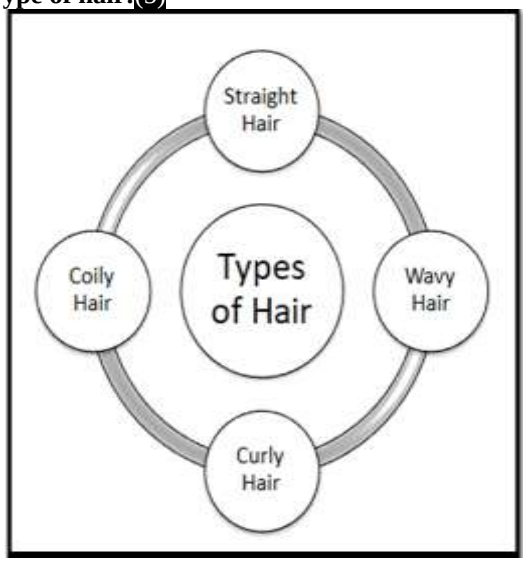

Fig 1: Types of Hairs

Hair problems:
At all ages hair problems are common due to now day's life style changes, chemotherapy, not proper care of hair and prolonged use of different drugs. Various types of hair problems are:

1. Dry hair
2. Dandruff
3. Dull hair
4. Hair fall
5. Scalp acne
6. Frizzy hair
7. Split ends(3)(6) .

Herbal formulations:
There are different type of hair formulation to overcome from the different kind of hair problems, these are:

1. Shampoos
2. Nourished
3. Conditioner
4. Oil
5. Hair cleanser
6. Hair toner
7. Hair serum
8. Hair dye
9. Hair gel(7)

Factors affecting hair growth:

- Rest and sleep
- Exercise, stress, genes
- Vitamin and minerals
- Climate

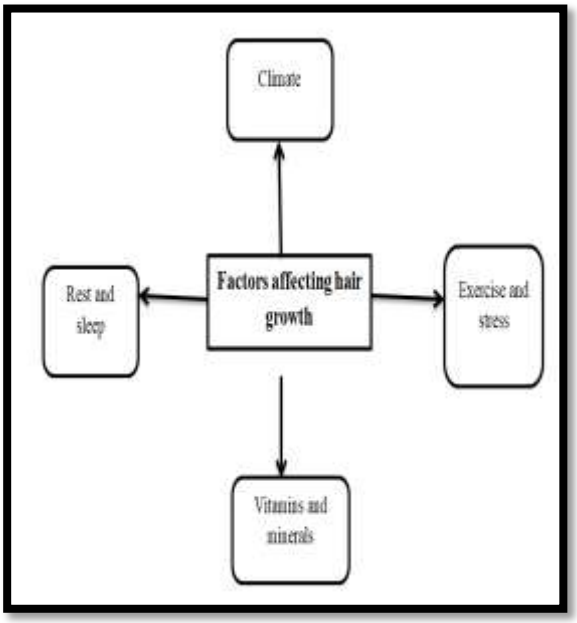

Fig2: Factors Affecting Hair Growth.

History:
Sapindus mukorossi is an ancient fruit, leaving some to claim the origin in China, while other states in India. Ancient Indian texts make references to soapberries. The book 'Saint Heritage of India' pointa out the Hatha yoga Founder Machindranath was converted under a soapnut tree aome time during his life in the 9^{th} to 10^{th} century. The 'Chronologically Dictionary of the Prehistoric India' explains that the paper title ' Some Notes on the History of Soapnut , Soap and Western of India between 300 BC and D 1900 hints at even earlier roots(2).

Geographical Region:
This species is commonly grown in higher reach of the Indo Gangetic plains, Shivaliks and outer Himalayas of Uttar Pradesh,Uttarakhand, Himachal Pradesh, Haryana and Jammu &Kashmir at altitudes from 200m to 1500m. It is a deciduous tree originates in north India, generally with 5-10 pairs of leaves with large drapes. This tree belongs to the order Sapindeae and family Sapindaceae Also known as soapnut tree; it is one of the most

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important trees of tropical and sub- tropical regions of Asia(2).

Chemical components of soapnut:

The active ingredients in soapnut are Saponins. About 103 different chemical compounds have been isolated from the fruit, with hederagenin being the main saponin isolated from the soapnut .The molecular weight of saponin in Sapindusmukorossi is 966. The saponin is classified as tritarpanoid and is mainly of three types The constituent saponin act as a natural surfactant and classified as the biosurfactant category. Also the vitamin present in the extract such as vitamin A, D, E and K act as a natural conditioner impart shine and smoothness to the hair after the application.

Chemical constituents:

Saponins: The main chemical constituent of Ritha. It is secondary plant metabolites with many biological activities. The name Saponins derived from their soap like properties. They are mainly classified according to their differences in aglycone structure or the number of sugar chain. Saponins are found in many families of vascular plants in the form of secondary metabolites.

1.	Sugars	About 10%of fruit made up of sugar.
2.	Mucilages	Found in fruits.
3.	Flavnoids	Found in stem of plant.
4.	Fatty acid	The seeds contain fatty acid such as behenic,lioleic,oleic etc.

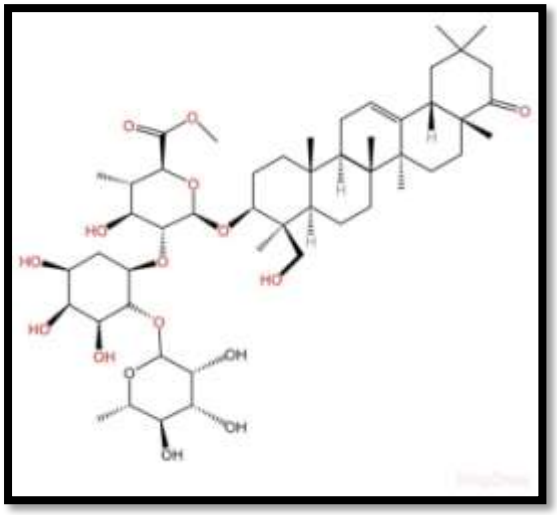

Fig3: Chemical structure of Saponins.

Morphology:(8)

Bark:

The bark of this plant is dark to pale yellow, fairly smooth, with verticle lines of lenticales and fine fissures sloughed off by irregular wood scales.

Fig4: Wet bark of soapnut tree

Fig5: Dried bark of soapnut tree

Leaves:

Leaves are compound, 30- 50 cm long, alternate, pinnate-pinnate, with 5-10 pairs of leaflets, paired or alternate.

Flowers:

Flowers about 5mm wide, polygamous, greenish-white, semi-sessile, numerous, mostly bisexual with his 5 sepals.

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Fruits:
Fruit glucose, fleshly, pleasantly scented, sweet then bitter, mostly single drupes, sometimes two together, about 1.8 to 2.5 cm in diameter.

Fig6:Fruit of soapnut tree

Seed:

Seeds are spherical, smooth, black, and loosely present in dried fruit. When ripe, the colour of the fruit changes from yellow orange to dark brown**.**

Fig7: Seeds of soapnut

Fig8: Roots of soapnut tree

Fig9: Fruit and bark of soapnut

Benefits of soapnut shampoo:

1. More shine:
Soapnutshampoo removes the debris from the hair and adds the shiny look to the hairs

2. Less Hair Loss:
It reduces the hair fall by strengthen the hair follicles.

3. Stronger and More fortified Hairs:
It provides strength to the hairs which makes the hair stronger and fortified.

4.All Naturals. No Chemicals:
Soapnut is the plant based ingredient and the preparation of shampoo does not include harmful chemicals.

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5. Won't irritate Skin and scalp:

Since it does not includes chemicals or other harmful ingredients so is want irritate the skin and the scalp

6. Keep healthy and Natural oils:

It helps to keep the healthy or natural oils within the scalp which are necessary for the growth of the hair (9).

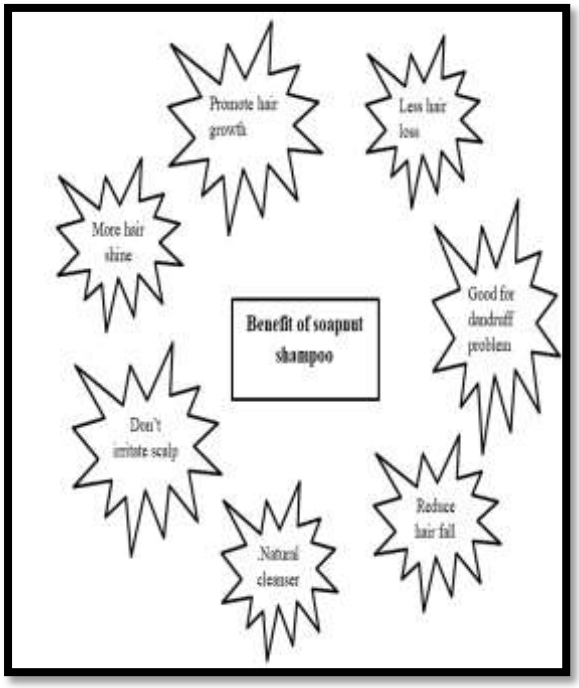

Fig10: Benefit of Soapnut Shampoo

Functions of Soapnut shampoo:

1. Lubrication:

Soapnut shampoo keeps natural oil of the scalp called as sebum within which reduce the friction between the hair strands and prevents the breakage

2 Conditioning:

Soapnut shampoo provides the conditioning effect which helps to soften the hair naturally. No need to buy conditioners.

3 Hair Growths:

It promotes the hair growth by strengthening the hair follicles.

4 Maintenance of Hair colour:

As the soapnut shampoo keeps the natural and healthy oil within, the natural color of hair is maintained for the long period of time. There is no need to apply artificial colors to the hair.

5 Medications:

It has the insecticides properties, so the soapnut shampoo is the best medication for lice without damaging tha scalp.

6 natural cleansers:

The soapy texture of the soapnut helps our hair to clean wash along with absorbing the enrichment. Over regular use hair gets smoother or long lasting shine. It imparts vitamin A, D, E and K to the hair roots. Thereby nourishing the scalp and haue follicles (10).

Desired Properties Of Soapnut Shampoo:

1. Ease of application:

It can be applied easily to the hair. There is no need to take special precautions before applying it.

2. Removal of more debris:

It removes the debris from the hair and scalp completely.

3. Easy wet combing:

As soapnut shampoo softens the hair so the combing on the wet hairs can be done easily.

4.Fragrances

5. Low level of irritation:

Soapnut is the natural or plant based ingredient and there is no chemical added in the preparation of the soapnut shampoo, so it causes low level of irritation or no irritation to the scalp

6.Good Stability:

Soapnut shampoo attains the good stability as compared to the other shampoos.

Advantages of Soapnut Shampoo:

1. Pure or organic ingredients:

The ingredients used in the preparation of the shampoo are pure, natural and organic and can be renewable.

2. Free from side effects:

As the ingredients used are natura no chemicals or other harmful agents are added l so it does not cause side effects

3. No surfactants:

Only plant based surfactant are used which are known as the biosurfactant.

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Biosurfactant lowers the human toxicity and alergencity

4. No synthetic Additives:

Only natural ingredients are added. Synthetic additives are not added well for sensitive or allergic skin

5. No animal testing:

There is no need of animal testing after the soapnut shampoo is prepared because it does not cause any side effects as it contains the natural ingredients

6. Earth and skin friendly.
7. No petroleum-based ingredients(10).

Medical uses of soapnut:

The plant is use in Indian Ayurveda healing system.it also use in Tibetan and unani medicines for asthma and cough. It is given as an expectorant and an effective ingredient in ayurvedic shampoo. It also has anti-fungal, anti-bacterial and insecticidal properties and the powdered seeds use in treatment of arthritis, common cold, constipation, nausea, dental care etc(11).

Vernacular names:(8)(12)

Sr.no.	Language	Traditional name
1	Sanskrit	Arishta, phenila
2	Hindi	Aretha
3	Marathi	Rinthi
4	Telugu	Kunkudukai
5	Bengali	Ritha
6	Gujarati	Arithi
7	Tamil	Boondi kottai

Taxonomical classification:(8)(12)

Kingdom	Plantae (plants)
Family	Sapindaceae
Class	Magnoliopsida
Order	Sapindales
Division	Magnoliophyte (flowering plant)
Genus	Sapindus
Species	Sapindus mukorossi

Pharmacological activities: (8)(12)

1. Anti-cancer
2. Anti-inflammatory
3. Wound healing activity
4. Contraceptive activity
5. Anti-platelet
6. Anti-bacterial
7. Anti-hypertensive
8. Anti-diabetic
9. Anti-oxidant
10. Anti-asthmatic
11. Cytotoxic activity
12. Anti-microbial
13. Insecticidal activity
14. Anti-pyretic
15. Anti-fungal
16. Anti-epileptic
17. Anti -trichomonas
18. Anti-dandruff
19. CNS activity
20. Anti-cardiovascular

Organoleptic parameters:

Sr.no.	**Organoleptic parameter**	**Inference**
1.	Colour	Brown
2.	Odour	characteristics
3.	Taste	bitter
4.	Nature	crystalline
5.	Texture	rough
6.	Solubility	Soluble in water

Other ingredients that use in shampoo these are:

AMLA: (3)(13)

It is grown in India, Sri Lanka and Myanmar. The dried and fresh fruit use for hair care. The Amla fruit contain vitamin C, tannins, fat. It can be used for hair conditioner, nourished and colour the hair. It shows antioxidant property and improves hair health.

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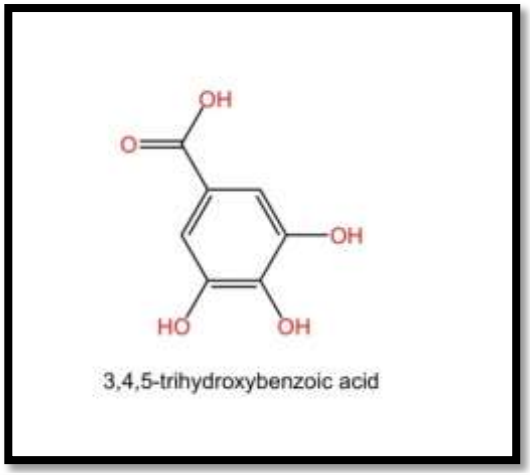
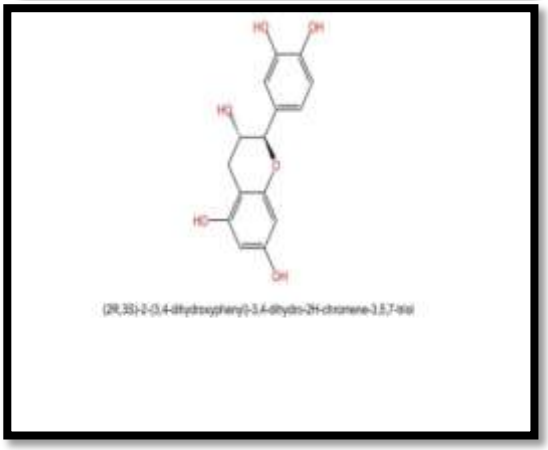
Fig11: DriedAmlapowderFig12:DriedAmla

Chemical constituents:

Tannins, flavonoids, vitamins C, minerals and amino acid





Taxonomical classification: (8)

Order	Euphorbiales
Family	Euphorbiaceae
Genus	Emblica
Species	Emblicaofficinalis

Health benefit:

- Laxative
- Anti-oxidant
- Diuretic
- Anti-bacterial
- Anti-carcinogenic
- Common cold
- Jaundice
- Asthma, headache, skin diseases

Fig13: Health Benefit of Amla

Neem: (3)(14)

Neem is very common tree in India, it found in India, Malaysia, sirlanka, Thailand, Africa etc. usually all part of Neem tree us in hair care. In oil formulation it helps in hair growth. It has green leave, brown bark, bitter in taste.

Fig14: Dried Neem leaves

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Fig15: Neem powder

Taxonomical classification:

Order	Rutales
Suborder	Rutinae
Family	Meliaceae
Subfamily	Melioideae

Chemical composition:
Azadirachit, nimbi, nimbidin, iron, vitaminC, minerals, thiamine etc.

Health Benefit:
- Antibacterial
- Anti-malarial
- Anti-inflammatory
- Diabetes
- Skin care
- WoundEtc.

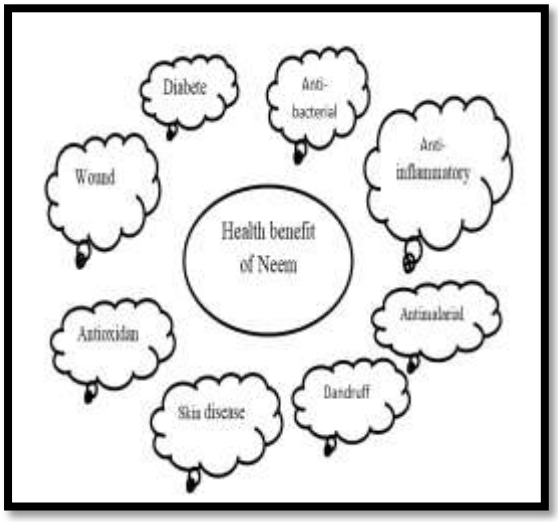

Fig16: Health Benefit of Neem

Aloe Vera:(3)(15)
Aloe Vera mostly found in India, Africa, and Europe etc. The extraction of the leaves use in hair care.The extraction use in skin cares and promotes hair growth. It maintain glossy and shine of hairs.

Taxonomical classification:

Kingdom	Plantae
Order	Asparagales
Division	Spermatophytes
Genus	Aloe
Class	monocotyledoneae

Chemical composition:
Water, polysaccharides, vitamin, minerals,

Health benefit:
- Reduce fizziness
- Strengthens
- Smooth natural curls
- Promote hair growth

Rose oil/water:(15)
- Repairs hair damage
- Reduce dandruff
- Improves hairs growth
- Provide fragrance to shampoo

Lemon juice:(9)
- Reduce hair fall
- Reduce dandruff
- Detox scalp
- Promote hair growth

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Description of different ingredient that use in formulation of soapnut shampoo:(15)(9)

Sr.no.	Common name	Botanical name	Parts used	category
1.	Soapnut	Sapindusindica	Fruit	Detergent
2.	Amla	Emblicaofficinalis	Fruit	Anti-dandruff agent
3.	Neem	Azadirachtaindica	Leaves	Anti-dandruff agent
4.	Aloe Vera	Aloe barbadensis	leaf	Moisturizing agent
5.	Rosemary leaves	Saliva rosmarinus	leaves	Anti-oxidant agent
6.	honey	Apismellifera	honey	Moisturizing agent

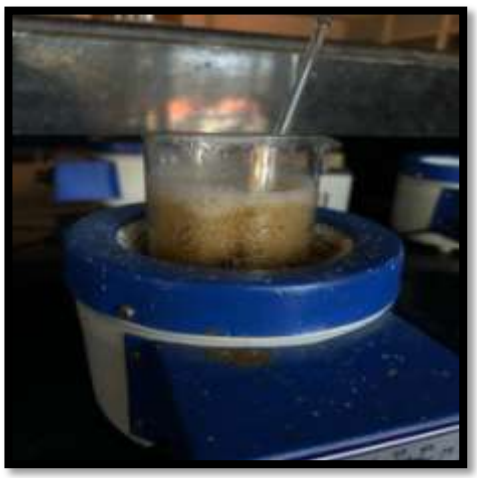
EXPERIMENTAL:

Procedure:

1. Soak soapnut, Amla, Neem, in water overnight in glass container.

2. In morning it become light brown in colour and boils it.

3. Boil the liquid for 45min at 100 degree.



4. Now filter the liquid with Whatman filter paper.

5. Put that liquid in beaker and add some rose marry, vitamin E and rose water.
6. Boil the mixture for 15 min and blend the mixture properly.
7. Filter the extracted liquid by using whatman filter paper.
8. And collect all the waste product.

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9. Let it cool and store in a volumetric flask.

10. After cooling we rub the extract in hand and that produce foam.

Evaluation of herbal shampoo:(16)(15)(17)(18)(19)(20)

1. Physical appearance/ visual inspection:
The formulation prepared was evaluated for the clarity,color, odor and foam producing ability.

2. Determination of pH:
The pH of shampoo solution in distilled water was measured by using pH meter at room temperature.

3. Determination of % of solid content:
A dry evaporating dish was weighed and 4 gram of shampoo was added. Then the dish was place in hot plate until the liquid evaporated and then calculates the solid content.

4. Surface tension measurement:
The surface tension of shampoo in distilled water was measured by using stalagmometer at room temp.

5. Foaming ability and foam stability:
The foam ability of shampoo was determined by using the cylinder shake method.A 250 ml graduated cylinder was filled with 50ml of 1%of herbal shampoo solution and shake for 10min. The foam volume remained constant for about 5 min, so it indicate good stability and high foam properties.

6. Skin irritation test:
The prepared herbal shampoo applied on skin for 5 min, after that washed and check the irritation and inflammation in skin.

7. Cleansing action:
The herbal shampoo cleansing properties were tested on hair that had not been washed for 7days and on human subject who applied oil for 4-5 hours before washing.

8. Conditioning attributes:
The shampoo conditioning effect on hair was assessed post wash, focusing on its desirable benefits like increased hair mass, improved lustre, softness.

9. Stability study:
The stability of the formulation was studied for a period of four weeks by keeping at temperature of 25-30degree.

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10. Microbial examination:

A study was conducted to determine the susceptibility or resistance of organisms to formulation ingredient.

II. RESULT AND DISCUSSION:

From the result it is concluded that the increase in soapnut concentration enhance the cleansing but if further concentration is increased in scalp it will become dry with frizzy hair.

Limitations of herbal shampoo:

- Seasonal variation of plant constituents.
- Less stable, so preservatives should be added.
- Natural product affects product uniformity.

III. CONCLUSION:

This formulation main aim is to create a stable and effective shampoo by using herbal natural extraction to reduce the side effects from different types of chemicals that use in shampoo and maintain the healthy scalp. The study suggests using soapnut, Amla, Neem, aloe Vera and other ingredient extraction instead of using synthetic agents. Herbal shampoo formulated by extraction of medicinal plants that are commonly used for cleaning hair traditionally.

Acknowledgement:

The authors would like to our sincere thanks to the management for providing the required facilities for the completion of the present work.

REFERENCES:

[1]. Chandran S, Vipin K V, Augusthy AR, Lindumol K V, Shirwaikar A. Development and evaluation of antidandruff shampoo based on natural sources. J Pharm Phyther. 2013;1(4):2321–5895.

[2]. Anjali; Saini, Rita; Juyal D. Sapindus mukorossi: A review article. Pharma Innov J [Internet]. 2018;7(5):470–2. Available from: www.motherherbs.com/sapindus_mukorossi_extrac

[3]. Bhattacharya S, Chakraborty S, Pal R, Roy A, Bhattacharjee A, Professor A. Role of Medicinal Plants in Management of Various Hair Related Troubles: An Overview. 2022;7(October):2456–4184. Available from: www.ijnrd.org

[4]. Using S, Hirta E, Jagtap PP, Desale BR, Chaudhari VA. Formulation and Development of Anti-Acne. 2020;2(May).

[5]. Satish Patil V, Pallavi VN, Jagruti VR, Varsha WB, Rajesh OJ, Vishal PS, et al. Development and Evaluation of Polyherbal Shampoo INTRODUCTION. 2023;29(1):239–66. Available from: https://www.researchgate.net/publication/377500396

[6]. Toshpulatov RI. International Journal of Pedagogics International Journal of Pedagogics. 2022;03(09):43–7.

[7]. JV Roopa, E Bhargav, Akkiraju Sudheer, Bhupalam Pradeepkumar, Kanala Somasekhar Reddy. Formulation and evaluation of herbal shampoo. Int J Sch Res Multidiscip Stud. 2023;3(1):069–74.

[8]. Das R, Ghosh P, Sharma C. World Journal of Pharmaceutical Research EXPLORING THE HERBAL TRIFECTA : AMLA REETHA , AND JACKFRUIT IN SHAMPOOS : - A PHARMACOGNOSTICAL AND. 2024;(July).

[9]. Shivaji GV. A REVIEW ON HERBAL SHAMPOO 1Janrao kaveri, 2Gaikwad Vishal Shivaji 1Students , 2Assistant Professor 1DBATU. 2022;10(10):393–414. Available from: www.ijcrt.org

[10]. Sonawane SK, Shinde PP, Shelke SJ. Shampoos: Hair Care Cosmetics. Res J Top Cosmet Sci. 2021;12(2):102–6.

[11]. Devi VNM, Rajakohila M, Syndia LAM, Prasad PN, Ariharan VN. Research Journal of Pharmaceutical , Biological and Chemical Sciences REVIEW ARTICLE Multifacetious Uses of Soapnut Tree – A Mini Review. R J Pharma, Bio Chem Sci. 2012;3(1):420–4.

[12]. Suhagia BN, Rathod IS, Sindhu S. Sapindus Mukorossi (Areetha): an Overview. Rev Artic Receiv [Internet]. 2011;2(8):1905–13. Available from: www.ijpsr.com

[13]. Hussain SZ, Naseer B, Qadri T, Fatima T, Bhat TA. Fruits Grown in Highland Regions of the Himalayas: Nutritional and Health Benefits. Fruits Grown Highl Reg Himalayas Nutr Heal Benefits. 2021;(November 2022):1–336.

[14]. Uddin DMS, Nuri DZN, Alam DMK, Hoq DO. Neem (Azadirachta indica) in health care: A review. Int J Unani Integr Med. 2018;2(2):29–35.

[15]. Urmila S, Mam VS. ANTIDANDRUFF

HERBAL SHAMPOO FROM REETHA. 2024;(06):1211–20.

[16]. Vijayalakshmi A, Sangeetha S, Ranjith N. Formulation and evaluation of herbal shampoo. Asian J Pharm Clin Res. 2018;11(Special Issue 4):121–4.

[17]. Al Badi K, Khan SA. Formulation, evaluation and comparison of the herbal shampoo with the commercial shampoos. Beni-Suef Univ J Basic Appl Sci [Internet]. 2014;3(4):301–5. Available from: http://dx.doi.org/10.1016/j.bjbas.2014.11.005

[18]. Patil RS, Sandeep Patil S, Haque MA. a Review Article on Herbal Shampoo. 2023;11(12):2320–882. Available from: www.ijcrt.org

[19]. Bhavani MS, Jan SM, Rani KS, Srirekha M. Formulation, Evaluation and Comparison of the Herbal Shampoo with Commercial Shampoos. Int J Pharm Sci Rev Res. 2023;78(1).

[20]. Prasad D, Mohanta GP, Sudhakar M. A Review on Preparation and Evaluation of Nanoemulsions. Int J Pharma Res Heal Sci. 2019;7(1):2915–22.