

Formulation and Evaluation of Herbal Shampoo

Gaurav Vilas Sahadev¹, Janhavi Nagesh Dongare², Gaurav Vitthal Ingole³, Vishal P. Nalamvar⁴

Final Year B. Pharma Students, Department of Pharmaceutics^{1,2,3}

Associate Professor, Department of Pharmaceutics⁴

Vardhaman College of Pharmacy, Koli, Karanja (Lad), Washim, Maharashtra, India

Abstract: The study aimed to formulate a pure Shikakai shampoo and to evaluate and compare its physicochemical properties with the marketed synthetic and Shikakai shampoos. The Shikakai shampoo was formulated by adding the extracts of *Acacia concinna* in different proportions to a 10% aqueous gelatin solution. Small amount of methyl paraben was added as a preservative and pH was adjusted with citric acid. Several tests such as visual inspection, pH, wetting time, % Of solid contents, foam volume and stability, surface tension, detergency, dirt dispersion etc, were performed to determine the physico chemical properties of both prepared and marketed shampoos. The formulated Shikakai shampoo was also evaluated for conditioning performance by administering a blind test to 20 student volunteers. The formulated Shikakai shampoo was clear and appealing

Keywords: Shikakai shampoo, conditioning, Physicochemical properties, Formulation, evaluation

I. INTRODUCTION

Shampoos are most commonly used as beautifying agents, and are a viscous detergent solution that includes appropriate preservatives and active ingredients. These are probably a hair care product designed to clean the scalp skin along with its hairs. The term shampoo entered the English language through India, where the Hindi word “champoo” was used meaning to press or massage; it was used to denote cleaning through massage of the hair and skin. As far back as ancient time, people use natural extracts and resources for health care and cosmetic purposes. Now-a-days, consumers demand for natural ingredients and additives especially in cosmetic products, as a replacement of synthetic compounds, having possible negative effects on health and the environment, is tremendously increased. The development of products mainly to skin care, several cosmetic industries are focusing on hair care, with the production of safety products are paying attention to their action. For example, in recent literature the ethnicity appears as an important key factor to take into account in the clinical observation, management, and treatment of skin and hair disorders. Earlier, ordinary soap had been used for washing hair. During the early stages of shampoo, English hair stylists boiled soap in water and added herbs to give the hair shine and fragrance 2,3

DEFINITION OF

1. HERBS:- Herbs means 'grass, or (green stack) Herbs consist of entire Plant or any Part of plant such as leaves flower, fruit, fruiting bodies, seeds, Stems, wood, bark, roots, or forms or other part which is used in various Preparation valued for their therapeutic benefits 2. HERBAL SHAMPOO:- A shampoo is a preparation of a surfactant (i.e. surface active material) in a suitable form – liquid, solid or powder – which when used under the specified conditions will remove surface grease, dirt, and skin debris from the hair shaft and scalp without adversely affecting the user.

To create your herbal shampoo, you can follow these steps:

1. Gather the ingredients: amla, shikakai, reetha, gentle surfactants, and essential oils.
2. Measure and prepare the ingredients in the desired proportions.
3. In a mixing container, combine the surfactants and water, following the recommended ratios.
4. Gradually add the powdered amla, shikakai, and reetha to the mixture, stirring well.
5. If desired, add a few drops of essential oils for fragrance and additional benefits.
6. Mix everything thoroughly until well blended.
7. Transfer the shampoo into a suitable container for storage.

8. Label the container with the ingredients and date.
 9. To use, apply a small amount of the shampoo to wet hair, lather, and rinse thoroughly.
- Remember to conduct patch tests before using the shampoo on your hair, as individual sensitivities may vary.

Ideal Properties Of A Shampoo:-

1. It should effectively and completely remove dust or soil, excessive sebum or other fatty substances and loose corneal cells from the hair.
2. It should produce a good amount of foam to satisfy the psychological requirements of the user.
3. It should be easily removed on rinsing with water.
4. It should leave the hair non -dry, soft, lustrous with good manageability and minimum fly away.
5. It should impart a pleasant fragrance to the hair.
6. It should not cause any side-effects / irritation to skin or eye.
7. It should not make the hand rough and chapped 16-17

II. MATERIALS AND METHODS

[1] Sample collection:

All plant materials except flaxseed, fenugreek, reetha, aloe Vera were obtained from garden of ssspc, zundal. All other chemicals collect from the laboratory of ssspc, zundal. One commercially available shampoos namely Clinic plus Shampoo® were purchased from the local super Market.4

[2] Preparation of plant extracts:-

100 g of flaxseed were washed with water to remove dirt and foreign particulates, homogenized and boiled in hot water for 4 hr. The aqueous extract was filtered and concentrated to obtain semi solid mass. However, Aq. Extracts of fenugreek & Reetha was also prepared by cold maceration method using 70% ethyl alcohol to obtain 11.2 g of solvent free semi solid mass (yield-11.2% w/w).5

[3] Formulation of herbal shampoo:-

The plant extracts were mixed in different proportions to obtain a shampoo whose formula Herbal Extracts were added to 10% glycerine solution and were mixed by shaking for 20 min. Methyl paraben were also added with stirring. Finally the pH of the solution was adjusted by adding sufficient quantity of 1% citric acid solution. Few drops of peppermint oil were also added to Impart aroma to the prepared shampoo and the final volume was made to 100 mL with glycerine solution.6,4

SHIKAKAI SHAMPOO

Benefits of Shikakai Shampoo

- More shine
- Less hair loss
- Long lasting color
- Stronger and more fortified hairs
- Don't irritate skin or scalp

Desired Properties of Shikakai Shampoo

- Ease of application
- Removal of more debris
- Low level of irritation
- Well preserved
- Good stability
- Plant Profile of Shikakai
- Family – Fabaceae

- Synonyms – Acacia concinna Source – Pod like Fruits

Role -It is an herb especially used for controlling hair fall and dandruff. Shikakai can be used alone or in combination with reetha and amla as a shampoo to help manage hair fall and prevent dandruff due to its cleansing and antifungal properties. It provides shine to the hair as well as prevents its greying



Fig.01. Shikakai Biological Name:-Acacia concinna

EVALUATION OF Shikakai SHAMPOO

Physical appearance/visual inspection: The formulation prepared was evaluated for clarity, color, odor and foam producing ability. 3 pH: The pH of prepared shampoo was measured by using pH meter in room temperature. % Of solid Content: 4 gm of shampoo were placed in previously clean, dry and weigh the evaporating dish. the dish and shampoo weigh again then the heat of dish and liquid portion are evaporated and weigh the solid content in of shampoo
Dirt dispersion test: Two drops of shampoo were added to 10 ml distilled water taken in a large test tube. To this solution one drop of ink was added and test tube was stopper and shaken ten time. the amount of ink in the foam was indicate the none, light, moderate or heavy. Surface tension measurement: The surface tension of 10% w/v shampoo in distilled water was measure the using stalagmometer at room temperature 7,8 Wetting time: A canvas paper was cut into 1-inch diameter discs having an average weight of 0.44 g. The smooth surface of disc was placed on the surface of 1% v/v shampoo solution and the stopwatch started. The time required for the disc to begin to sink was noted down as the wetting time
Foam ability and stability test: Foaming or lathering is very important to the consumer and therefore, it is considered as an important parameter in evaluation of shampoo. Shikakai Essences and formulated shampoo produced the foam volume above 100 mL (115,113 ml respectively) while dove shampoo generated a foam volume of 92 mL The foams generated by formulated shampoo were small, compact, uniform, denser and stable similar to commercial samples. All tested shampoo had the same foam volume for 5 min showing that their foam has good stability. 9

Amla Shampoo

Benefits of amla shampoo:- .provide strength to the hair follicles
Facilitating faster growth
Prevents Hair loss
Dandruff Prevention and Antiseptic property.
Moisturizes Dry Hair.

Plant Profile of Amla .

Kingdom: Plantae
Order: Malpighiales
Family: Euphorbiaceae , Phyllanthaceae
Genus: Phyllanthus
Species: P. emblica
Botanical name: Emblica officinalis Gaertn.

Role: Amla has anti-oxidant, anti-fungal, and anti-bacterial properties that protect the scalp and hair from different microbial infections. It makes sure that hair will remain neat and odorfree. Moreover, it will rule out the problem of itchy scalp completely.



Fig.02:Amla Biological Name:-Phyllanthus Embilica

Evaluation of Amla Shampoo

The prepared formulation was evaluated for product performance which includes organoleptic characters, pH, physicochemical characterization, and for solid content. To guarantee the nature of the items, particular tests were performed for surface tension, foam volume, foam stability, and wetting time using standard protocol.

1. Visual assessment-The prepared formulation was assessed for color, clarity, odor, and froth content.
2. pH determination-The pH of the prepared herbal shampoo in distilled water (10% v/v) was evaluated by means of pH analyzer at room temperature.
3. Determination of solid content percentage The percentage of solid substance was determined by weighing about 4 g of shampoo in a dry, clean, and evaporating dish. To confirm the result, the procedure was repeated again. The liquid portion of the shampoo was evaporated in a dish by placing on hot plate. The percentage and the weight of the solid contents present in the shampoo were calculated after drying completely.
4. Surface tension measurement –The prepared shampoo in distilled water (10% w/v) was evaluated for surface tension using stalagmometer in room temperature.
5. Testing of wetting –Wetting time was calculated by noting the time required by the canvas paper to sink completely. A canvas paper weighing 0.44 g was cut into a disc of diameter measuring 1-inch. Over the shampoo (1% v/v) surface, the canvas paper disc was kept and the time taken for the paper to sink was measured using the stopwatch.
6. Foam stability test –The stability of the foam was determined using cylinder shake method. About 50 ml of formulated shampoo (1%) solution was taken in a graduated cylinder of 250 ml capacity and shaken for 10 times vigorously. Foam stability was measured by recording the foam volume of shake test after 1 min and 4 min, respectively. The total foam volume was measured after 1 min of shaking
7. Dirt dispersion test –To 10 ml of refined water two drops of cleanser were included and taken in a wide mouthed test tube. To the formulated shampoo, added one drop of Indian ink and shaken for 10 min after closing the test tube with a stopper. The volume of ink in the froth was measured and the result was graded in terms of none, slight, medium, or heavy.

Neem Shampoo

Benefits of Neem Shampoo

Dandruff and Itchy Scalp. Now, this is one of the neem's most well-known benefits. .

Promotes hair growth. Neem actively cleanses and strengthens hair follicles.

Saves from premature greying.

Plant Profile Of Neem Shampoo

Kingdom: Plantae

Division: Magnoliophyta
Order: Sapindales
Family: Meliaceae
Genus: Azadirachta
Species: A. indica



Fig.03 Neem Biological Name:- Azadirachta Indica

Reetha Shampoo18-19



Fig.4. Reetha Biological Name:- Sapindas Mukoross

Synonym:- Soap nut, Wash nut
Kingdom:- Plantae
Family:- Sapindaceae
Chemical Constituent:- Saponins, Sugar mucila protein

Organoleptic character:-
Colour:- Yellowish become black
Odour :- Pleasant
Taste:- Sweet then bitter
Uses:- Prevent dryness
Good for hair growth
Reetha reduce dandruff
Condition the hair Prevent the scalp from lice

Reetha History:

It is commonly known by many names like soapberry, soapnut, washnut, aritha, dodan, and dodani. In countries like Japan and China, Reetha has been used for centuries. In Japan, it has been used as a life-prolonging pericarp (the part of a fruit enclosing the seeds) and in China as a fruit for managing illnesses.

III. FUNCTION OF HERBAL SHAMPOO12,13

1. Lubrication
2. Conditioning

3. Hair Growth
4. Maintenance of Hair Colour
5. Medication

Benefits of Herbal Shampoo -

1. More Shine
2. Less Hair Loss
3. Long Lasting Colour
4. Stronger and More Fortified Hairs
5. All Natural, No Chemicals
6. Won't Irritate Skin or Scalp
7. Keep Healthy Natural Oils

Advantages Of Shampoo –

Cleansing properties

Improving hair hygiene.

Treating scalp conditions

Treatment for dry scalp

Treatment for hair loss

Treatment for greasing or oily hair.

Relieves itch and irritation

Repairs damaged hair.

Shampoo keeps hair silky or smooth.

Keeps your hair beautiful and blossomed. Pure and Organic Ingredient Free from Side Effects No Surfactants. eg:- SLS
No Synthetic Additives No Animal Testing Earth And Skin Friendly 13-14.

Disadvantages of Herbal Shampoo –

- 1) Difficult to hide odour and taste sometimes.
- 2) Herbal drugs having slower effect than allopathic drug hence require long term therapy.
- 3) Manufacturing process is time consuming and complicated 15.

Evaluation of herbal shampoo

To evaluate the prepared formulation, quality control test including visual assessment and physico-chemical controls such as PH, density, viscosity, surface tension, foam volume, foam stability and wetting time was performed using standard protocol. 3

1] Physical appearance/visual inspection: The formulation prepared was evaluated for the clarity, colour, odour and foam producing ability and fluidity. 3

2] Determination of PH: A 10% v/v shampoo solution was constituted in distilled water and the PH of the solution was measured by using a calibrated PH meter 10

3] Determination of solid content percentage: A clean dry evaporating disc was weighed and 4gm of shampoo was added to the evaporating disc. The evaporating disc with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the solid content present in the shampoo was calculated after drying.

4] Wetting time: Wetting time was calculated by noting the time required by the canvas paper to sink completely. A canvas paper weighing 0.42gm was cut into a disc of diameter measuring 1 inch. Over the shampoo [1%v/v] surface, the canvas paper disc was kept and the time taken for the paper to sink was measured using the stopwatch.

5] Cleansing action: The cleansing property of the herbal shampoo was evaluated by the application of the shampoo on hair that has not been washed for 7 days. The shampoo was used to wash the hair of human subject that had applied oil 4-5 hours before washing. The performance of the shampoo was assessed on its ability to remove oily dirt from scalp.

6] Foaming ability and foam stability: Cylinder shake method was used for determining foaming ability. 50ml of the 1% herbal shampoo solution was put into a 250ml graduated cylinder and the cylinder was covered with hands and shaken for 10 minutes. The total volume of the foam content after 1min shaking was recorded. Immediately after shaking the volume of the foam at 1min intervals for 10 minutes were recorded. The foam volume remains same throughout the period of about 5min 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. 1ml shampoo is dissolved with 2ml water and shaken vigorously for 10 minutes produced 0.4ml foam. 11

7] Stability study: The stability of the formulation was studied for a period of 4 weeks by keeping at temperature of 25-30°C.

8] Skin irritation test: Prepared herbal shampoo was applied on skin for 5 minutes after that was washed and tested for irritation or inflammation to the skin.

9] Conditioning attributes: The conditioning effect of the shampoo on hair was evaluated after the hair had been washed with it. Conditioning properties include all desirable benefits imparted to the hair such as increase mass to the hair, improved lusture, softness and silkiness.

10] Viscosity: Viscosity of shampoo was determined by using Ostwald's viscometer. The viscosity of herbal shampoo was measured by counting drops of herbal shampoo from the mark to bottom.
$$\text{Viscosity} = \frac{\text{Density of shampoo} \times \text{Timing of runoff of shampoo}}{\text{Density of water} \times \text{Timing of runoff of water}} \times \text{viscosity of water}$$

11] Density: First take empty weight of pycnometer, then fill it till neck with shampoo and then weigh it along with shampoo. Again, fill the pycnometer with water and weigh it.
$$\text{Density} = \frac{\text{Weight of pycnometer with shampoo} - \text{Weight of empty pycnometer}}{\text{Weight of pycnometer with water} - \text{Weight of empty pycnometer}}$$

12] Microbial examination: 1 ml of shampoo was poured to sterile petri dish under aseptic condition and then allowed to set. The plates were incubated at 37°C for 24 hours and observed for microbial growth.

IV. CONCLUSION

Herbal shampoo using reetha, amla and neem extract is prepared and evaluations were carried out for those following parameters: physical appearance/visual inspection, PH determination, determination of solid content percentage, wetting time, cleansing action, foaming ability and foam stability, stability study, skin irritation test, conditioning attributes, viscosity, density, microbial examination. The evaluation parameters data were shown in acceptance range. Further studies are appreciated for comparing this preparation with marketed one and establishing some effective results for hair cleansing action and conditioning effect as well.

REFERENCES

- [1]. Meduri TS, Munnangi LD, Potharaju S, Suravarapu ST, Swami VRD, Uppala V, Yepuri D, Vadlamudi P, Nadendla RR, Formulation and Evaluation of Fermented Rice Water Shikakai Shampoo, Journal of Drug Delivery and Therapeutics. 2021; 11(4-S):127-13
- [2]. Mainkar AR, Jolly CI. Formulation of natural shampoos. International Journal of Cosmetic Science 23(1):2001;Page.59-62

- [3]. Aghel N, Moghimipour B, Dana RA. Formulation of a herbal shampoo using total saponins of *Acanthophyllum squarrosum*. *Iran J Pharm Res* 2007;6(3):167-172
- [4]. Abeysekera W, Abayarathna U, Premakumara G, Jayasooriya M, Anti-Glycation and Glycation Reversing Potential of Fenugreek (*Trigonella Foenum-Graecum*) Seed Extract. *Biomed J Sci. and Tech Res.*, 2018; 3(2): 3138-3142
- [5]. Chavan M., et al., Formulation and Evaluation of Herbal Shampoo' *American Journal of Pharm Tech Research*, 2019; 9(5): 89-96.
- [6]. Ashwini S., Sujata P., Formulation and evaluation of herbal liquid shampoo'' *World Journal of Pharmaceutical Research*, 2020; 9(5): 901-911
- [7]. Hadkar U.B. and Ravindera R.P., *ijper* (2009) 43, 187-191
- [8]. Gaud R.S. and Gupta G.D., *Practical Physical Pharmacy*, 1st ed., (2001) C.B.S Publisher and Distributer, New Delhi, 81-105.
- [9]. Klein K., *Cosmetics and Toiletries magazine*, (2004) 119 (10), 32-35.
- [10]. Mainkar A.R., and Jolly C.I. *International Journal of Cosmetic Science* 2000; 22(5): 385 – 391
- [11]. Klein K., *Cosmetics and Toiletries magazine*: 2004; 119 (10): 32-35.
- [12]. Kothari S, Patidar K, Solanki R. Polyherbal Anti-Dandruff Shampoo: Basic Concept, Benefits, and Challenges. *Asian J. Pharm.* 2018; 12(3): S849- 58
- [13]. Gholamreza Dehghan Noudeh, Fariba Sharififar, Payam Khazaeli, Ehsan Mohajeri, Javad Jahanbakhsh. Formulation of herbal conditioner shampoo by using extract of fenugreek seeds and evaluation of its physicochemical parameters. *African Journal of Pharmacy and Pharmacology* 5(22); 2011: 2420-242
- [14]. Suyog Sunil Bhagwat Dr. N. J. Paulbudhe College of Pharmacy, FORMULATION AND EVALUATION OF HERBAL SHAMPOO 2020 IJCRT | Volume 8, Issue 9 September 2020
- [15]. Mrs.K.Sravanthi N.Kavitha, K.Sowmya, S. Naazneen , U.Vaishnavi, CH.AnilSt.Pauls college of pharmacy,Turkayamjal,Rangareddy District,Telangana,5015A Review on Formulation and Evaluation of Herbal AntiDandruff Shampoo Volume 6, Issue 3 May – June 2021
- [16]. Gaud R.S. and Gupta G.D., *Practical Physical Pharmacy*, 1st ed., C.B.S. Publisher and Distributer, New Delhi, 2001; 81-105
- [17]. Balsam, S.M., Gershon, S.D., Rieger, M.M., Sagarin, E., and Strianse, S.J.:*COSMETICS–Science and Technology*, 2nd edition, Vol-2, John Wiley India, New Delhi, 2008
- [18]. Barel, A.O., Paye, M., and Maibach, H.I.: *Handbook of Cosmetic Science and Technology*, 3rd Edition, Informa Healthcare, New York.
- [19]. Upadhyay A, Singh DK. Pharmacological effects of *Sapindus mukorossi*. *Revista do Instituto de Medicina Tropical de Sao Paulo* [Internet]. 2012 Sep [cited 2022 Mar 17]; 54(5):273-80.
- [20]. Chavan RS, Rathod VK. Evaluation of nutritional and medicinal potential of defatted *Sapindus mukorossi* seed kernel. *Preparative biochemistry & biotechnology* [Internet]. 2022 [cited 2022 Mar 21];52(1):56-61