



HAIR CARE: FROM NATURAL INGREDIENTS

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ABSTRACT

Hair is an important part of the body appeal and its look is a health indicator. Accordingly, recent advances in hair science and hair care technologies have been reported in literature claiming innovations and strategies for hair treatments and cosmetic products. The treatment of hair and scalp, primarily, involved the use of shampoo for an effective, but gentle cleansing; however, for years, the shampoo is considered not only as a cosmetic product having the purifying purpose, but it is also responsible for maintaining the health and the beauty of hair, imparting gloss and improving manageability. Shampoos are primarily been products aimed at cleansing the hair and scalp. In the present scenario, it seems improbable that herbal shampoo, although better in performance and safer than the synthetic ones, This review is largely focused on the description of natural shampoos, mainly based on the herbal ingredients. Together with other usual ingredients expected in a shampoo formulation.

KEYWORDS: Hair, cosmetic product, Herbal Shampoo, scalp, formulation.

INTRODUCTION

From ancient time beyond memory, mankind have been borrowing abundantly from nature to care for their health, skin and hair, as natural ingredients that have preventive, protective and corrective action. The warehouse of cosmetics, nature provides such versatile natural ingredients that enhance beauty of the skin and hair. Hair is one of the external barometers of internal body conditions. Shampooing is the most common form of hair treatment. The primary function of shampoo is aimed at cleansing of the hair necessitated due to accumulated sebum, dust, scalp debris etc. Various shampoo formulations are associated with hair quality, hair care habit and specific problems such as treatment of oily hairs, dandruff and for androgenic alopecia. Shampoos are liquid, creamy or gel like preparations. The consistency of the preparation depends on the inclusion of traditional soaps saturated with glycerides and natural or synthetic fatty alcohols or the thickening agents (e.g. gum, resin and PEG). Indian women use herbals such as *shikkakai* and *reetha* that are natural cleansing agents without harmful effects.

Nowadays natural sources remain attractive primarily when compared to the synthetic one, so herbal shampoos are popular with the consumer when compared to the synthetic one.^[1]

Various shampoo formulations are associated with hair quality, hair care habit and specific problems such as

treatment of oily hairs, dandruff and for androgenic alopecia. Shampoos are liquid, creamy or gel like preparations. The consistency of the preparation depends on the inclusion of traditional soaps saturated with glycerides and natural or synthetic fatty alcohols or the thickening agents (e.g. gum, resin and PEG).²⁰ Indian women use herbals such as *shikkakai* and *reetha* that are natural cleansing agents without harmful effects. Hair is one of the external barometers of internal body conditions. Shampooing is the most common form of hair treatment. The primary function of shampoo is aimed at cleansing of the hair necessitated due to accumulated sebum, dust, scalp debris etc. Various shampoo formulations are associated with hair quality, hair care habit and specific problems such as treatment of oily hairs, dandruff and for androgenic alopecia. Shampoos are liquid, creamy or gel like preparations. The consistency of the preparation depends on the inclusion of traditional soaps saturated with glycerides and natural or synthetic fatty alcohols or the thickening agents (e.g. gum, resin and PEG). Indian women use herbals such as *shikkakai* and *reetha* that are natural cleansing agents without harmful effects. A shampoo is a preparation of a surfactant in a suitable form- liquid, solid or powder- which when used under the specific conditions will remove surface grease, dirt and skin debris from the hair shaft without adversely affecting the user.

Ideal characters of shampoo

- Should effectively and completely remove the dust, excessive sebum.
- Should effectively wash hair.
- 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.

Causes and Risk Factors of Hair Loss

A number of causes might be identified. These include:

- Childbirth..
- High fever, severe infection, major surgery
- Thyroid disease.
- Inadequate protein in diet.
- Medications.
- Cancer treatment drugs.
- Birth control pills.
- Low serum iron.
- Alopecia areata.
- Androgenic alopecia.
- Infections.

Alopecia or **hair loss** is the medical description of the loss of hair from the head or body, sometimes to the extent of baldness. Unlike the common cosmetic depilation of body hair, alopecia tends to be involuntary and unwelcome, e.g., androgenic alopecia.

However, it may also be caused by a psychological compulsion to pull out one's own hair (trichotillomania) or the unforeseen consequences of voluntary hairstyling routines (mechanical "traction alopecia" from excessively tight ponytails or braids, or burns to the scalp from caustic hair relaxer solutions or hot hair irons).

In some cases, alopecia is an indication of an underlying medical concern, such as iron deficiency.^[1]

When hair loss occurs in only one section, it is known as alopecia areata. Alopecia universalis is when complete hair loss on the body occurs, similar to how hair loss associated with chemotherapy sometimes affects the entire body.^[2]

Hair care is an overall term for parts of hygiene and cosmetology involving the hair on the human head. Hair care will differ according to one's hair type and according to various processes that can be applied to hair. All hair is not the same; indeed, hair is a manifestation of human diversity.

In this article, 'Hair care' is taken to mean **care of hair on the human head**, but mention should be made of

process and services which impact hair on other parts of the body. This includes men's and women's facial, pubic, and other body hair, which may be dyed, trimmed, shaved, plucked, or otherwise removed with treatments such as waxing, sugaring, and threading. These services are offered in salons, barber shops, and day spas, and products are available commercially for home use. Laser hair removal and electrolysis are also available, though these are provided (in the US) by licensed professionals in medical offices or specialty spas.

Causes and Risk Factors of Hair Loss

A number of causes might be identified. These include:

- *Childbirth.* When a woman is pregnant, her hair continues to grow. The usual 50 to 100 hairs per day are not shed. However, after she delivers her baby, many hairs enter the resting stage of the hair cycle at once. Within two to three months after delivery, these hairs may all fall out together and be seen as large amounts of hair coming out in their brushes and combs.
- *High fever, severe infection, major surgery, significant life stressor.* From four weeks to three months after a person has a high fever, severe infection, major surgery, or significant life stressor such as death in the family, he or she may be shocked to see a lot of hair falling out. This condition usually corrects itself but may require treatment.
- *Thyroid disease.* Both an overactive and underactive thyroid can cause hair loss. The hair loss associated with thyroid disease can be reversed with proper treatment.
- *Inadequate protein in diet.* Some vegetarians, people who go on crash diets that exclude protein, and those with severely abnormal eating habits, may develop protein malnutrition. When this happens, a person's body will help to save protein by shifting growing hairs into the resting phase. Massive hair shedding can occur two to three months later. Hair can then be pulled out by the roots. This condition can be reversed by eating the proper amount of protein.
- *Medications.* Prescription drugs can cause temporary hair shedding in a small percentage of people. Examples of such drugs are blood thinners, some drugs used to treat gout and arthritis, acne, or psoriasis, and some medications for heart problems.
- *Cancer treatment drugs.* Most drugs used in chemotherapy will cause hair cells to stop dividing. Hair shafts become thin and break off as they exit the scalp. This can occur one to three weeks after beginning chemotherapy. The patient may lose all of his hair, but this will usually re-grow after treatment ends.
- *Birth control pills.* Women who lose their hair when taking birth control pills usually have an inherited tendency towards hair thinning.
- *Low serum iron.* Iron deficiency sometimes produces hair loss. Low iron can be detected by laboratory tests and corrected with iron pills.

- *Alopecia areata*. In this type of hair loss, hair usually falls out, resulting in totally smooth, round patches about the size of a coin or larger. This disease may affect children, women or men of any age.
- *Androgenic alopecia*. This is the most common type of hair loss and is often called "male- or female-pattern baldness". The hair usually thins out first in the front of the scalp and moves progressively to the back and top of the head. It tends to be progressive. This type of hair loss also runs in families.
- *Infections*. Ringworm, or tinea capitis, is a common fungal infection in children. Patches of hair may be lost and replaced with pink scaly skin.

Treatment of Hair Loss

If hair loss is caused by a temporary situation such as medication, stress or insufficient iron, however, however, the hair loss will stop when its cause ends. Hair loss due to infection may require oral antibiotics or antifungals. Alopecia areata can be treated with injections of steroids such as triamcinolone into the area. For all of the causes, early treatment works the best.

For hair loss caused by androgenic alopecia, there is no cure, although many treatments are available. Finasteride (Propecia) is a prescription hair loss treatment that is prescribed for men only. Minoxidil (Rogaine) is rubbed directly onto the scalp and works for both men and women. It usually works best for hair loss at top and back of the scalp, where there is still some remaining hair. This is available over the counter at most pharmacies.

Well chosen hairstyles can often hide hair loss effectively. Partial hairpieces or wigs are recommended if hair loss is severe.

Finally, hair transplantation has improved dramatically over the last several years. During a hair transplant, healthy hairs are harvested from an area of the scalp with normal hair growth. Individual hairs are then placed into areas of hair loss. When done well, the result is extremely natural appearing.

Ritiation, less adverse effect and better conditioning effect. In the present scenario, it seems improbable that herbal shampoo, although better in performance and safer than the synthetic ones, will be popular with the consumers.

Shampoos are hair care products used to clean the hair and scalp. These are typically available in the form of a viscous liquid, but sometimes although less common, are available in the form of powders. They are applied to the wet hair, well massaged and finally rinsed out. The ultimate goal of a shampoo is to remove the unwanted debris that is build up in the hair and or with antimicrobial properties that will prevent infection on the scalp, without stripping out much of sebum and make

hair unmanageable.

PLAN OF WORK

- Selection of the plant.
- Collection and authentication of the herbal
- Extraction of dried plant material.
- Preliminary chemical tests of extract to identification phytoconstituents.
- Procurement of experimental animals.
- Screening for hair growth promoting activity.

Drug Profile

The formulated shampoos were not only safer than the chemical conditioning agents, but also greatly reduce the hair loss during combing as well as strengthen the hair growth. The pH of the shampoos was adjusted to 5.5, to retain the acidic mantle of scalp. Synthetic preservatives have sometimes been the cause of adverse effects among consumers. We have used the physico-chemical approach to preservation and by formulating a self preserving shampoo, have avoided this risk posed by chemical preservatives. However, the aesthetic attributes, such as lather and clarity, of the laboratory shampoo are not comparable with the marketed shampoos. The foam volume is on a par. Although the retail products do not fare so well in the tests conducted by us, they enjoy market popularity, especially if they foam well. This is mainly due to the false notion among consumers that 'a shampoo that foams well, works well', and no real effort on the part of manufacturers to counter this fallacy. In the present scenario, it seems improbable that herbal shampoo, although better in performance and safer than the synthetic ones, will be popular with the consumers. A more radical approach in popularizing herbal shampoo would be to change the consumer expectations from a shampoo, with emphasis on safety and efficacy. Formulators must play an active role in educating the consumers about the potential harmful effects of synthetic detergents and other chemical additives present in shampoos. There is a strong need to change the consumer perception of a good shampoo and the onus lies with the formulators. Collected plant parts were washed with tap water and shade dried. Shade dried material was powdered and stored in air tight container for further use.



The purpose of use in the herbal shampoo and its details are mentioned below table 01.

S. No	Name of the plant	Part used	Scientific name	Purpose
1	Ritha	fruits	<i>Sapindus mukorosis</i>	Detergent
2	Liquorice	stolon	<i>Glycyrrhiza glabra</i>	Detergent
3	Bengal gram	seeds	<i>Cicer arientinum</i>	Hair growth
4	Brahmi	leaves	<i>Centella asiatica</i>	Hair tonic
5	Green gram	beans	<i>Vigna radiata</i>	Anti-dandruff
6	Banana	roots	<i>Musa acuminata</i>	Coloring agent
7	Pomegranate	seeds	<i>Punica granatum</i>	Anti-dandruff
8	Hibiscus	leaves	<i>Hibiscus rosasinensis</i>	Hair growth promoter
9	Marigold	flowers	<i>Calendula officinalis</i>	Conditioner
10	Lemon	fruits	<i>Citrus limon</i>	Preservative

MATERIAL AND METHOD

Accurately 50grams of all powdered crude drugs were taken, extracted with distilled water at below 60 OC individually. Aqueous extracts of all the crude drugs were measured and mixed in required quantities as shown in the table 02. Developed shampoo was stored in a suitable container and used for further evaluations.^[1,2,3]

Table 2: Different formulations of herbal anti-dandruff shampoo.

Ingredients	F1	F2	F3	F4
<i>Musa acuminata</i>	2ml	2ml	2ml	2ml
<i>Centella asiatica</i>	3ml	3ml	4ml	5ml
<i>Vigna radiata</i>	4ml	5ml	5ml	6ml
<i>Cicer arientinum</i>	3ml	5ml	6ml	5ml
<i>Punica granatum</i>	4ml	4ml	5ml	6ml
<i>Calendula officinalis</i>	2ml	2ml	2ml	2ml
<i>Hibiscus rosasinensis</i>	2ml	2ml	2ml	2ml
<i>Glycyrrhiza glabra</i>	3ml	5ml	5ml	5ml
<i>Sapindus mukorosis</i>	6ml	8ml	9ml	10ml

<i>Citrus limon</i>	1ml	1ml	1ml	1ml
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Evaluation of prepared shampoo Physical appearance/visual inspection

Developed formulation was evaluated for their clarity, color and odour. All evaluations were reported and discussed.

Determination of pH

Developed formulation was diluted using distilled water to prepare a sample with 10% concentration. The prepared sample was checked for pH using a digital pH meter at room temperature 30±2°C.

Determination of percentage solids contents

A clean dry china dish was weighed and added with 4 grams of shampoo. The dish with shampoo was weighed. The exact weight of the shampoo was calculated. The china dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight after drying was calculated.

Measurement of viscosity

The viscosity of the shampoo was determined by using Brookfield Viscometer LVDV Prime-I. The viscosity of shampoo was measured at room temperature i.e. $30 \pm 2^\circ\text{C}$ with varying rpm and torque.

Surface tension measurement

Dilute the shampoo using distilled water to fix 10% as concentration. Measurements were carried out using stalagmometer. Dip the flattened end of stalagmometer in to beaker containing sample of developed shampoo and suck it until the level reaches the mark. Fix that in the stand and allow the sample to run slowly from the mark. Count the number of drops formed when level of liquid reaches from A to B. Repeat the experiment with distilled water. The data was calculated using following equation,

$$R2 = \frac{(W3-W1) N1 \times R1}{(W2-W1)N2}$$

W1 is weight of empty beaker. W2 is weight of beaker with distilled water

W3 is Weight of beaker with shampoo solution. N1 is no. of drops of distilled water. N2 is no. of drops of shampoo solution. R1 is surface tension of distilled water at room temperature. And R2 is surface tension of shampoo solution

Cleaning action

5 grams of wool yarn was added in grease and it was placed in flask containing 200 ml of water with 1 gram of shampoo. Temperature of content in the flask was maintained at $30 \pm 2^\circ\text{C}$. The flask was shaken for 4 minutes at the rate of 50 shakes per minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated by using the following equation

$$DP = 100(1 - T/C)$$

In which, DP= percentage of detergency power, C= weight of sebum in the control sample and T= weight of sebum in the test sample.

Foaming ability and foam stability

Cylinder shake method with slight modification was used for determining foaming ability. 50ml of the 1% shampoo solution was put into a 250 ml graduated measuring cylinder and covered with hand. Measuring cylinder was shaken for 1 minute. The total volume of the foam contents after 1 minute shaking was recorded. The procedure was continued for 5 minutes.^[4,5]

In-vitro activity

Candida albicans were employed for testing antifungal activity using the cup-plate method. The culture was maintained on sabouraud's agar slants. 20 ml of melted sabouraud's agar medium was inoculated with 0.2 ml of 72 hour old suspension of *Candida albicans* and poured in to a Petri dish. The cups (10 mm diameter) were punched in the Petri dishes and filled with 0.05ml of a solution of the sample dissolved in DMSO (10 ml of shampoo in 100 ml of DMSO). The plates were kept for

diffusion at 40°C for one hour and incubated at 30°C for 48 hours as shown in below figure. After the completion of incubation period, the zone of inhibition in millimeter was measured.^[6,7,8]

Evaluation of herbal shampoo Physical appearance/visual inspection

The formulations prepared were evaluated in terms of their clarity, foam producing ability and fluidity.

Determination of pH

The pH of 10% shampoo solution in distilled water was determined at room temperature 25°C .

Determine percent of solids contents

A clean dry evaporating dish was weighed and added 4 grams of shampoo to the evaporating dish. The dish and shampoo was weighed. The exact weight of the shampoo was calculated only and put the evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the shampoo only (solids) after drying was calculated.

Wetting time

The canvas was cut into 1-inch diameter discs having an average weight of 0.44g. The disc was floated on the surface of shampoo solution 1%w/v and the stopwatch started. The time required for the disc to begin to sink was measured accurately and noted as wetting time.

Rheological evaluations

The viscosity of the shampoos was determined by using Brookfield Viscometer (Model DV-1 Plus, LV, USA) set at different spindle speeds from 0.3 to 10 rpm. The viscosity of the shampoos was measured by using spindle T95. The temperature and sample container's size was kept constants during the study.

Dirt dispersion

Two drops of shampoo 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 shakes it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.

Cleaning action

5 grams of wool yarn were placed in grease, after that it was placed in 200 ml. of water containing 1 gram of shampoo in a flask. Temperature of water was maintained at 35°C . The flask was shaken for 4 minutes at the rate of 50 times a minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated.

Surface tension measurement

Measurements were carried out with a 10% shampoo dilution in distilled water at room temperature. Thoroughly clean the stalagmometer using chronic acid and purified water. Because surface tension is highly affected with grease or other lubricants.

Detergency ability

The Thompson method was used to evaluate the detergency ability of the samples. Briefly, a crumple of hair were washed with a 5% sodium lauryl sulfate (SLS) solution, then dried and divided into 3g weight groups. The samples were suspended in a n-hexane solution containing 10% artificial sebum and the mixture was shaken for 15 minutes at room temperature. Then samples were removed, the solvent was evaporated at room temperature and their sebum content determined. In the next step, each sample was divided into two equal parts, one washed with 0.1 ml of the 10% test shampoo and the other considered as the negative control. After drying, the resided sebum on samples was extracted with 20 ml n-hexane and re-weighed. Finally, the percentage of detergency power was calculated.

Foaming ability and foam stability

Cylinder shake method was used for determining foaming ability. 50 ml of the 1% shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1 minute shaking were recorded. The foam volume was calculated only. Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded.

Skin sensitization test

The guinea pigs were divided into 7 groups (n=3). On the previous day of the experiment, the hairs on the backside area of guinea pigs were removed. Shampoos were applied onto nude skin of animals of groups. A 0.8% v/v aqueous solution of formalin was applied as a standard irritant on animal. The animals were applied with new patch/formalin solution up to 72 hours and finally the application sites were graded according to a visual scoring scale, always by the same investigator. The erythema scale was as follows: 0, none; 1, slight; 2, well defined; 3, moderate; and 4, scar formation (severe).

Eye irritation test

Animals (albino rats) were collected from animal house. About 1% shampoo solutions was dripped into the eyes of six albino rabbits with their eyes held open with clips at the lid. The progressive damage to the rabbit's eyes was recorded at specific intervals over an average period of 4 seconds. Reactions to the irritants can include swelling of the eyelid, inflammation of the iris, ulceration, hemorrhaging (bleeding) and blindness.

Surface characterization

Surface morphology of the hairs was examined by scanning electron microscopy (Leo 430, Leo Electron Microscopy Ltd., Cambridge, England). The hair samples were mounted directly on the SEM sample stub, using double side stitching tape and coated with gold film (thickness 200nm) under reduced pressure (0.001 mm of Hg). The photomicrographs of suitable magnification were obtained for surface characterization.

Stability studies

The thermal stability of formulations was studied by placing in glass tubes and they were placed in a humidity chamber at 45°C and 75% relative humidity. Their appearance and physical stability were inspected for a period of 3 months at interval of one month.

Evaluation of herbal powder shampoo Solubility

Solubility is defined as the ability of the substance to soluble in a solvent. One gram of the powder is weighed accurately and transferred into a beaker containing 100 ml of water. This was shaken well and warmed to increase the solubility. Then cooled and filter it, the residue obtained is weighed and noted.

Loss on drying

Loss on drying is the loss of mass expressed in percent m/m. Two gram of the powder was weighed accurately and transferred into a dry Petri dish. The Petri dish is placed in a dessicator for 2 days over calcium chloride crystals. Then the powder was taken and weighed accurately to find out the weight loss during drying.

Swelling index

The swelling index is the volume in milliliters occupied by one gram of a drug, including any adhering mucilage, after it has swollen in an aqueous liquid for 4 hour. Accurately weighed 1 g of the powder and transferred it into glass stopper measuring cylinder containing 25 ml of water. Then it is shaken thoroughly at every 10 minutes for 1 hour. After that it was kept for 3 hours at room temperature. The volume was measured in ml.

Angle of repose

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow.

Methods**i. Funnel method.**

ii. Open – ended cylinder method. I Funnel method: Required quality of dried powder is taken in a funnel placed at a height of 6 cm from a horizontal base. The powder was allowed to flow to form a heap over the paper on the horizontal plane. The height and radius of the powder was noted and recorded.

II Open - ended cylinder method:

Required amount of dried powder is placed in a cylindrical tube open at both ends is placed on a horizontal surface. Then the funnel should be raised to form a heap. The height and radius of the heap is noted and recorded.

Bulk density

Bulk Density is the ratio between the given mass of a powder and its bulk volume. Required amount of the powder is dried and filled in a 50 ml measuring cylinder up to 50 ml mark. Then the cylinder is dropped onto a hard wood surface from a height of 1 inch at 2second intervals. The volume of the powder is measured. Then

the powder is weighed. This is repeated to get average values.

Foaming index

One gram of the powder was weighed accurately and transferred into 250 ml conical flask containing 100 ml of boiling water. Then it is warmed gently for 30 minutes, cooled and filtered and make up the volume to 100 ml in standard volumetric flask. This extract is taken in 10 test tubes in a series of successive portion of 1, 2, 3....10 ml and remaining volume is made up with water to 10 ml. Then the test tubes were shaken in longwise motion for 15 seconds at speed of 2 frequencies / second. Then the tubes are allowed to stand for 15 minutes. The height of the foam was measured.^[3-11]

RESULT AND DISCUSSION

Shampooing is the most common form of hair treatment. Shampoos are primarily been products aimed at cleansing the hair and scalp. In the present scenario, it seems improbable that herbal shampoo, although better in performance and safer than the synthetic ones, will be popular with the consumers. A more radical approach in popularizing herbal shampoo would be to change the consumer expectations from a shampoo, with emphasis on safety and efficacy. We have evaluated and compared the herbal shampoo, which was formulated in previous study, with two marketed shampoos. The findings of this investigation reveal that synthetic preservatives have sometimes been the cause of adverse effects among consumers. We have used the physico-chemical approach to preservation and by formulating a self preserving shampoo, have avoided this risk posed by chemical preservatives. However, the aesthetic attributes, such as lather and clarity, of the laboratory shampoo are not comparable with the marketed shampoos. The foam volume was on a par. Although the retail products were not fare so well in the tests conducted by us, they enjoy market popularity, especially if they foam well. This is mainly due to the false notion among consumers that 'a shampoo that foams well, works well', and no real effort on the part of manufacturers to counter this fallacy. Evaluation of shampoos comprises the quality control tests including visual assessment and physiochemical controls such as pH, density and viscosity. Sodium lauryl sulfate based detergents are the most common but the concentration will vary considerably from brand to brand and even within a manufacturer's product range. Cheap shampoos may contain a high detergent concentration while expensive shampoos may contain very little of a cheap detergent.^[1] Shampoos for oily hair can have exactly the same detergent at the same concentration as shampoos for dry hair. The difference is more likely to be a reduced amount of oil or conditioning agent in the

shampoo for oily hair or the difference may even just be the packaging. Decoction of Aloe barbadensis, Phyllanthus emblica, Trigonella foenum – graecum, Azadirachta indica, Eclipta Alba, Sapindus Mucrosai, Acacia concinna, Rosemarinus officinalis was prepared in one part of water, Figure 1. Triethanolamine lauryl sulphate was mixed with other part of water. Mixing of both the solutions was done with constant stirring. Water and perfume was added. Shown in Table No. 1. To evaluate the prepared formulations, quality control tests including visual assessment and physicochemical controls such as pH, density and viscosity were performed. Also, to assure the quality of products, specific tests for shampoo formulations including the determination of dry residue and moisture content, total surfactant activity, salt content, surface tension, thermal and mechanical stability and detergency tests were carried out. The results were compared with marketed formulations.^[2]

Cleansing action was tested on wool yarn in grease. The efficiency of developed formulations to remove the grease applied on the wool yarn was assessed and reported. Formulation, which was incorporated with multiple surfactants, had percentage cleaning action of 33.22. The percentage cleaning action obtained for the marketed sample in this investigation was 32.17, which was marginally lesser than the herbal formulation. The possible reason behind the improved percentage cleaning action of developed formulation may be because of incorporation of two surface active agents, shikakai and liquorice in optimized concentration. Bengalgram was used in this formulation for improving viscosity. It has water-thickening potency. Hence, only a small quantity was needed to increase the viscosity of the product (0.5-1%). The higher foaming property of formulation may be due to the combination of shikakai and liquorice. Normally it is considered that forming ability of natural shampoo is not comparable with its synthetic counterpart. But the study proves that combination of natural surfactants such as shikakai and liquorice in optimized concentration can generate sufficient foam for the shampoo. This data may prove the ability of natural surfactants shikakai and liquorice in optimized concentration as the best replacement for the harsh synthetic detergents which shown in table-2 which are commonly used in majority of synthetic and their commercial herbal shampoo. The antifungal activity of developed formulations showed positive results against the tested fungal pathogen *Candida albicans*, table 04. Formulated Anti-dandruff shampoo has shown maximum inhibition, i.e. 20 mm. Marketed formulation possesses lower antifungal activity as compared with our formulation.

Table 4: *In vitro* activity of formulations.

S. No.	Organism	Formulations	Zone of inhibition
1.	<i>Candida albicans</i>	Herbal formulation	20mm
2.	<i>Candida albicans</i>	Marketed formulation	19mm

Formulated shampoo (F4) is more stable than the F1, F2, F3 formulations and is similar to marketed shampoo (Dove). The maximum antifungal activity of formulation may be because of the presence of green gram and Pomegranate which have established anti-dandruff activity. But this study may prove that ability of Green gram and Pomegranate as antidandruff agents might have improved in the presence of good surfactant i.e. optimized combination of shikakai and liquorice. When zone of inhibition was measured, formulation was having highest zone of inhibition of 20 mm, which was higher than the commercially established marketed shampoo containing synthetic ingredients. The results from in-vitro anti-dandruff study confirm the ability of

antidandruff shampoo developed from natural ingredients is the best replacement for synthetic counterpart, if formulated with best ingredients in optimized combination. Stability of formulation was checked for selected parameters after the interval of one month. There was marginal increase in pH reported for the developed formulation with increase in temperature, i.e. at 45±20C after one month. When % cleansing action was assessed for developed formulation after one month, it was evident that % cleansing action was dropped at negligible level. Overall stability of shampoo developed from natural ingredients was good at a temperature ranging between 4 to 420C.^[9,10,11]

Table 5: Stability studies.

Evaluation parameters	Before 1 month	After 1 month
Colour	Light brown	No Change
Odour	Pleasant	No Change
Transparency	Thick	No Change
pH	6.6 ± 0.5	6.2 ± 0.5
% Solid content	25.75± 2%	25.75± 2%
Foam volume	98 ± 5ml	968± 5ml
Surface tension	30.68±0.5 dyne/cm	30.68±0.5 dyne/cm
Wetting time	140 sec	140 sec

SUMMARY AND CONCLUSION

Globalisation is the need of today and the world market will open for all by 2005. The world is also moving towards herbal medicines for health care, health foods and for cosmetic purposes including hair preparations. India is rich heritage for cultivation and production of herbal medicines due to its diversified climatic conditions. The present paper emphasizes on composition, types, methods of evaluation, also a brief review on herbal shampoo formulations.

Medicinal plants used in the formulation of herbal shampoo were found as rich source of novel drugs. These plants were Henna, Reetha, Tulsi, Neem, Amla, Shikakai, China rose, Lemon, Aloe, Peppermint had been reported for hair growth and conditioning. The various quality control parameters were checked. All parameter gives favourable result. The result obtained on present study shows that the active ingredients of these drugs when incorporated in shampoo gives more stable products with good aesthetic appeal. The pH of the shampoo 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 current trend to promote shampoos of lower pH is one of the minimizing damage to the hair. Such results are estimated out of a formulation to establish strong results for the usage and good results of the product. Though the product is in dry form inspite has wonderful wetting capacity and being dry is very good for the storage.

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