



Formulation And Evaluation Of Dry Herbal Powder Shampoo

1Mane Swati Mahadev, 2Mr.S.B.Deshmukh, 3Dr.Santosh.Jain.Sir

1B.Pharm final year

1Aditya Institute of Pharmaceuticals,Beed.

1.ABSTRACT

Shampoos are used not only for cleansing purpose but also for imparting gloss to hair and to maintain their manageability and oiliness for hair. Shampoos are of various types, like powder shampoo, clear liquid shampoo liquid shampoo, lotion shampoo, solid gel shampoo, medicated shampoo, liquid herbal shampoo etc. As far as herbal shampoos are concerned in stability criteria. Depending upon the nature of the ingredients they may be simple or plain shampoo, antiseptic or antidandruff. In the present work the herbal shampoo powder has been developed, by using traditional drugs for hair care. The preparation were formulated using , Shikakai Heena, Reetha Tulsi, Neem, evaluated for organoleptic properties, powder characteristics, foam test and physical evaluation. The physicochemical evaluation of the formulated shampoo showed ideal results. However, to improve its quality, product performance, and safety, further development and study was required . Two preparations of herbal shampoo powder were formulated using some common traditional drugs used by folk and traditional people of Bundelkhand region (M.P) India, for hair care. The preparations were formulated using bahera, amla, neem tulsi, shikakai henna & brahmi evaluated for organoleptic, powder charecterestics, foam test and physical evaluation. As the selected drugs being used since long time as single drug or in combination, present investigations will further help to establish a standard formulation and evaluation parameters, which will certainly help in the standardization for quality and purity of such type of herbal powder shampoos . Herbal Shampoo is used to cleansing of the hair also conditioning,smoothing of the hair surface,good health of hair,hair free of dandruff dirt grace and live above all,it's safety benefits are expected . The advantage of herbal cosmetic is their non – toxic nature, reduce the allergic reaction.time tested usefulness of many ingredients. Thus in present work,we found good properties for the herbal shampoo further optimization study benefits of herbal shampoo on human use as cosmetic product .

KEY WORDS: Herbal Shampoo, Evaluation, Standardization.

2.INTRODUCTION

Hairs are the integral part of human beauty. People are using herbs for cleaning, beautifying and managing hair since the ancient era. As the time has passed synthetic agents have taken a large share but today people are getting aware of their harmful effects on hairs, skin and eyes. These regions attracted to community towards the herbal products, which are less expensive and have negligible side effects. Hair cleansers or shampoos are used not only for cleansing purpose but also for imparting gloss to hair and to maintain their manageability and oiliness for hairs¹. Shampoos are of various types, like powder shampoo, clear liquid shampoo liquid shampoo, lotion shampoo, solid gel shampoo, medicated shampoo, liquid herbal shampoo etc. As far as herbal shampoos are concerned in stability criteria. Depending upon the nature of the ingredients they may be simple or plain shampoo, antiseptic antidandruff shampoo nutritional shampoo containing vitamin ,aminoacids proteins hydrolysate.

Hair is one of the vital parts of the body derived from ectoderm 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. They are also known as epidermal derivatives as they originate from the epidermis during embryological development. Hair is an important part of the overall appeal of the human body .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).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 cause irritation to skin and eye.

❖ Composition of shampoo

- Surfactant
- Antidandruff agents
- Conditioning agents
- Pearlescent agents
- Sequestrants
- Thickening agents
- Colours, perfumes and preservatives.

❖ Types of Shampoo

Shampoos are of the following types:

- Powder Shampoo
- Liquid Shampoo
- Lotion Shampoo
- Cream Shampoo
- Jelly shampoo
- Aerosol shampoo
- Specialized Shampoo
- Conditioning Shampoo
- Anti-dandruff Shampoo
- Baby Shampoo
- Two Layer Shampoo

In today fast life peoples dont have time to look on there physique also. The problems of hair : Hair falling, White hair, Dandruff, and Split end hair etc. The reasons of hair problem are tension, scalp infection, hormones disturbances, lower vitamin, food, minerals, and large chemical shampoo use. To overcome all this problem was the main intension of our project. So we prepared polyherbal antidandruff powder, which is an multipurpose powder for hair treatment. Cleanliness of hair and scalp are among the most important personal life consideration today.

3. PREPARATION OF INGREDIENTS

3.1 SHIKAKAI



Fig.1.shikakai

It's amazing how so many of our traditional Indian beauty regimes are making a come-back in this day and age. Take a look at **shikakai** or *Acacia concinna*, a climbing shrub that is native to Asia. Shikakai is commonly found in India and has been traditionally used as a hair cleanser in several parts of our country. Remember the brown paste that our grandmas washed their hair with? Well it has numerous fabulous hair care benefits!

You would be surprised to know how many hair ailments this natural hair cleanser can cure.

Synonym- *Acacia Concinna*

Biological Source- Dried pods of *acacia concinna*

Family- *Mimosaceae*

Uses- Foam base and Anti-dandruff

Chemical Constituents-Lupeol, spinasterol, acacic acid, lactone, and the natural sugars glucose, arabinose and rhamnose.

3.1.1 Benefits of Shikakai

- More shine
- Less hair loss
- Long lasting colour
- Stronger and more fortified hairs
- Don't irritate skin or scalp
- Prevent dryness
- Control hair fall
- Promotes faster hair growth

3.1.2 Desired Properties of Shikakai Shampoo

- Ease of application
- Removal of more debris
- Low level of irritation
- Well preserved
- Good stability
- Potential effect on constipation
-

3.2 REETHA



Fig.2 Reetha

Reetha or Soapnuts is also called as Arishtak in Ayurveda and "Soap nut tree" in India. It is well known for its traditional medicinal uses and is commonly used as a hair cleanser. Reetha is extensively used to make natural hair care products as it makes hair shiny, healthy and lustrous. It can be used on a daily basis to provide nourishment to the hair scalp and promote hair regrowth. Reetha powder can be mixed with warm water to form a paste which can be used to massage the scalp to help manage dandruff and also remove lice from the scalp due to its insecticidal property. The powder of Amla and Reetha can be applied to the hair to help control greying of hair and also stimulate better hair growth.

What are the synonyms of Reetha?

Sapindus mukorossi, Haithaguti, Ritha, Aritha, Dodan, Kanmar, Rithe, Thali, Phenila, Urista, Kunkudu, Krishvarn, Arthsaadhan, Rakhtbeej, Peetfan, Phenil, Garbpatan, Guchfaal, Areetha, Ita, Kunkute kayi, Ponnankottai, Rithegach, Rittha, Dodan, Soapnut tree, Chinese soapberry, Finduk-e-hindi, Haithguti, Funake farasi, Arishta

Synonym-Biological source-Dried fruits of Sapindusmukorossi

- a) Family-Sapindaceae
- b) Uses- Detergent and antidandruff.
- c) Chemical constituents-Present in Reetha are saponins,sugars and mucilage.
- d) The The seed kernels of Reetha are a rich source of proteins and show a balanced amino acid composition as per the World Health Organization.

In addition to proteins ,sugars and fibres are also present.

3.2.1 Properties of Reetha

Reetha may have the following beneficial properties.

- It may have de-tanning properties
- It may have antifungal activity
- It may have antibacterial activity
- It may act as an expectorant (may help remove sputum from air passages).
- It may have anti-protozoal activity (may kill head lice)
- It may have an anti-inflammatory effect
- It may have wound healing action
- It may help relieve joint pain.
-
- It cleans the oily secretions in the skin and can be used as a cleanser for hair and a hair tonic as it forms a natural lather
- It is also used for removing lice from hair

3.2.2Disadvantages of Reetha

- Reetha has strong bleaching properties, which can cause irritation and redness in hypersensitive skin.
- If any itching in the skin and hair occurs, usage of Reetha products should be stopped immediately.
- Reetha contains insecticidal properties and may irritate the eyes and cause swollen eyelids.

3.3TULASI



Fig.3 Tulai

Tulsi also known as basil is considered to be a holy herb in India. In Sanskrit, Tulsi means “the incomparable one”. From centuries, Tulsi has been the most healthiest, sacred and wonderful medicinal ayurvedic herb. It is a part of the Ayurvedic medicines for its incredible healing properties and treats human body in a holistic manner right from the Skin, Hair and Health. It is an important healing plant in alternative medicines, especially those practiced in Southeast Asia and India. So, before we share the beauty and health benefits of basil, let’s first check out some of the facts about the same.

Basil plants can have different sizes as well as varieties. Rama tulsi, Krishna tulsi and Vana tulsi are the most common types of tulsi that are found in India. Along with that, there is Mediterranean basil, Thai sweet basil, cinnamon basil, lemon basil etc. With total 35 types of basil species all over the world, this holy herb is used in more than 300 treatment cases, emphasizing on its medicinal importance

Family- Labiateal

Synonym- *Ocimum tenuiflorum*

Biological source-Dried leaves of *ocimum santu*

Uses- Antibacterial

Chemical constituents-eugenol, rosmarinic acid, apigenin, myretenal, luteolin, β -sitosterol, and carnosic acid

Benefits of Tulsi

- Thofa herbal shampoo contains Tulsi which helps rejuvenate and strengthen hair follicles, and fight against hair fall.
- Tulsi is also a great anti-dandruff ingredient .
- Tulsi helps maintain moisture in your scalp and reduces dryness.
- Hair by stimulating blood circulation and promoting hair growth amongst others.
- Packed with vitamins, minerals, electrolytes and phytonutrients, Tulsi is the hero ingredient for healthy hair and skin.
- It not only thoroughly removes dirt and impurities but also the excess oil. Take a handful of tulsi leaves, crush them and add some water to make a paste.
- Tulsi has been the most healthiest, sacred and wonderful medicinal ayurvedic herb.
- It is an important healing plant in alternative medicines, especially those practiced in Southeast Asia and India.
- Rama tulsi, Krishna tulsi and Vana tulsi are the most common types of tulsi that are found in India.
- Along with that, there is Mediterranean basil, Thai sweet basil, cinnamon basil, lemon basil.
- Healthy hair grows in scalp healthy. Dandruff and various types of other scalp infections often causes excessive dry and itchy scalp as well as severe hair fall.
- Prevents premature Graying of hair.

3.4 Amla

Add amla to your hair Mask

Treat your hair to a spa-like treatment right at home with an amla-based hair mask. Not only will it cleanse your hair and scalp but will also have long term benefits such as stronger roots and reduced hair fall. This hair mask, made using amla in combination with yoghurt and banana, is extremely moisturising. To prepare the amla hair mask, mix 1 teaspoon of amla with 3 teaspoons of yoghurt and half a mashed banana.



Fig. 4. Neem powder

Synonym- Indian gooseberry, emblic myrobalans,

Family- Euphorbiaceae

Biological Source- Dried ripe fruits of Embelica Officinalis

Chemical constituent- Ellagic Acid ,emblicanine A, emblacani, Gallic acid, Phyllatine.

Uses- Hair growth promoter

Benefits of Amla

- Amla protect the hair from external damage.
- Amla can reduces hair loss
- Amla can help balance a flaky scalp
- Amla can boost hair growth

Properties of Amla

- Amla ha Antibacterial and Anti- inflammatory properties.
- Solubility
- Colour
- Melting point
- Temperature

3.5Neem

One of the many benefits of neem leaves includes strengthening hair follicles and simultaneously reducing hair fall. The result is luscious, strong and healthy hair. Regular application of a neem hair mask or oil can give you long and voluminous hair without any extra effort..



Fig.5.Neem

Family- Euphorbiaceae

Biological Source- Dried ripe fruits of *Embelica officinalis*

Chemical constituent- The active ingredients are Azadirachtin, salannin, Meliantriol

Uses- Hair growth promoter.

Been it is a antifungal properties that may within the help treatment of dandruff.

Can relieve the itchiness, inflammation, and irritation associated with dandruff.

3.6 Heena

Henna also helps reduce premature graying of hair, because it's loaded with tannins, a plant compound found in teas that contributes to their rich coloring. Henna contains vitamin E, which helps to soften hair. The natural leaves of the plant are rich in proteins and antioxidants that support hair health.



Fig.5.Heena

Family-Lythraceae

Biological source-Dried leaves of *Lawsonia inermis*

Chemical constituent-The leaves contain soluble matter lawsone.

Uses- Conditioner

3.7Harada

Harad is an herb which is commonly known as Harade in India. It has multiple Ayurvedic health benefits. Harad is an amazing herb that can be helpful in controlling hair loss and promoting hair growth. This is due to the presence of vitamin C, iron, manganese, selenium, and copper that provides optimal nourishment to the scalp.



Fig.7.Harada

Harad has Ruksha (dry), Deepan (appetizer), Medhya (intelligence improving), and Rasayana (rejuvenating) properties. *Hericium erinaceus* is a culinary-medicinal mushroom used traditionally in Eastern Asia to improve memory.

Synonym- Haritaki, Hirda, Harida, Abhaya

Family- Combretaceae

Biological source-Dried ripe fruits of Terminalia balerica

Chemical constituents-*Hericium erinaceus* is a culinary-medicinal mushroom used traditionally in Eastern Asia to improve memory

Uses- Hair growth promoter

❖ Benefits of Harada

- Harad is an amazing herb that can be helpful in controlling hair loss and promoting hair growth.
- Harada due to the presence of vitamin C, iron, manganese, selenium, and copper that provides optimal nourishment to the scalp.
- Haritaki along with Amla and Beheda are the three most important Rasayanas (elixirs) in Ayurvedic wisdom.

Hair experts swear by this medicinal plant for its exceptional abilities to Hair growth and prevent various hair and scalp issue.

3.8 Bhringraj Powder

Himalayan Organics Bhringraj Shampoo works great when it comes to improving hair growth. Reduces greying: Bhringraj contains haritaki, which helps in bringing you your hair colour back and stopping premature greying of hair. Bhringraj is also known as Kesharaj which means "Ruler of the hair". It is rich in proteins, vitamins and antioxidants which help protect the body against certain infections. Bhringraj oil is effective in promoting hair growth as well as reducing the greying of hair.



Fig.8.Bhringraj

Synonym- Keshranjana, Keshraja, Markava, Bhunga

Family- Asteraceae

Biological source- It is obtained from entire herb *Eclipta- alba*

Chemical Constituents- The principal constituents of *Eclipta alba* are Coumes
Tan derivatives like wedoloacetone, demethylwedoloacetone.

Uses- Increasing haemoglobin level reducing

4..Preparationof dry shampoo powder

4.1Drying :-

All the powder are in dry form and grinded.

4.2 Size reduction:-

The crude ingredients were collected and these ingredients were size reduced using driven mixer individually.

4.3Sieving :-

Then this fine powder was passed through sieve no.:80 , to get the sufficient quantity of fine powder.

4.4 Weighing :-

All the required herbal powders for shampoo preparation were individually.

4.5 Mixing:-

All these fine ingredients were mixed throughly by mixer to form a homogeneous fine powder.

4.6Packing and Labeling:-

Then it was packed and labeled suitably.

5.EVALUATION OF HERBAL SHAMPOO POWDER

5.1 Organoleptic evaluation :-

Organoleptic evaluation on the parameters like colour, odour taste and texture was carried out. Colour and texture was evaluated by vision and touch sensation respectively. For taste and odour evaluation a team of five taste and odour sensitive persons was formed and random sampling was performed.

5.2General powder characteristis:

General powder characteristics includes evaluation of those parameters which are going to affect the external properties (like flow properties, appearance, packaging criteria etc.) of the preparation, Characteristics evaluated under this section are powder form, particle size angle of repose and bulk density. Sample for all these evaluation were taken at three different level i.e. from top, middle and lower level.

Particle size

Particle size is a parameter, which affect various properties like spreadability, grittiness etc., particle size was determined by sieving method by using I.P. Standard sieves by mechanical shaking for 10 min.

Angle of repose

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

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 the angle of repose (θ) can be calculated by using the formula.

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. For the above two methods, the angle of repose (θ) can be calculated by using the formula.

$$\theta = \tan^{-1}(h / r)$$

Where,

θ – Angle of repose, h – Height of the heap, r – Radius of the base

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 2 second intervals. The volume of the powder is measured. Then the powder is weighed.

This is repeated to get average values. The Bulk Density is calculated by using the below given formula.

Mass of the herbal powder shampoo

Bulk Density= -----

Volume of the herbal powder shampoo

Tapped density

The tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample. After observing the initial powder volume or mass, the measuring cylinder or vessel is mechanically tapped for 1 min and volume or mass readings are taken until little further volume or mass change was observed. It was expressed in grams per cubic centimeter (g/cm³).

Formula of Herbal dry shampoo powder

| .Ingredients | Quantity (100 gm) |
|--------------------|-------------------|
| 1)Shikakai | 15gm |
| 2) Reetha | 10gm |
| 3)Tulasi | 10gm |
| 4)Amla | 15gm |
| 5)Neem | 5gm |
| 6)Harda | 10gm |
| 7)Heena | 15gm |
| 8) Bhringraj | 5gm |
| 9)Black tea | 5gm |
| 10)Hibiscus flower | 10gm |

5.3 Physicochemical evaluation

pH

The pH of 10% shampoo solution in distilled water was determined at room temperature 25°C. The pH was measured by using digital pH meter.

Washability Formulations were applied on the skin and then ease and extent of washing with water were checked manually.

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.

Skin irritation test: The skin irritation tests revealed that the herbal shampoo powder shows no harmful effect on skin. This is due to the absence of synthetic surfactants. Most of the synthetic surfactants produce inflammation of the eyelid and corneal irritation. But in this formulation of herbal shampoo powder, the uses of all ingredients are obtained naturally. So it does not produce any harmful effect on skin.

5. **Ash value:** Total ash content Ash value is calculated to determine the inorganic contents which is characteristic for a herb. About 2gm of powder drug was taken in silicon dish previously ignited and weighed. Temperature was increased by gradually increasing the heat not exceeding to red colour. After complete burning, ash is cooled and weighed.

Extractive values

Determination of alcohol soluble extractive 5 g of the each air dried herbal shampoo powder was weighed and macerated with 100 ml of Alcohol of the specified strength in a closed flask for twenty-four hours, shaken frequently during six hours and allowed to stand for eighteen hours. Filtered, by taking precautions against loss of solvent, 25 ml of the filtrate was evaporated to dryness in a tare flat bottomed shallow dish, and dry at 105 °C, to constant weight and weighed. The percentage of alcohol-soluble extractive with reference to the air-dried drug was calculated.

Determination of water soluble extractive

Proceeded as directed for the determination of alcohol-soluble extractive, using chloroform water instead of ethanol. The percentage of water-soluble extractive was calculated for each sample.

Moisture content determination

10 g of each herbal shampoo powder was weighed in a tare evaporating dish and kept in hot air oven at 105°C. Repeated the drying until the constant weight loss was observed after the interval of 30 minutes. The moisture content was calculated for each sample.

Wetting time

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

Stability Study

Stability and acceptability of Organoleptic properties (odor and color) of formulations during the storage period indicated that they are chemically and physically stable Nature of hair after washes Nature of hair after wash can be done by collecting the responses of volunteers.

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.

Foaming index = $1000/a$

6.Result:-

Evaluation of Herbal shampoo

1)Organoleptic evaluation

Table.2 Organoleptic evaluation

| Organoleptic evaluation | Result |
|-------------------------|-----------------|
| Colour | Yellowish green |
| Odour | Slight pleasant |
| 3)Test | Characterstics |
| 4)Texture | Fine smooth |

3) General Powder Characteristics

Table 3. General powder characteristics

| Powder characteristics | Result |
|------------------------|------------------|
| 1) Particle size | 25-30 micrometer |
| 2) Angle of repose | 34°9' |
| 3) Bulk density | 0.354 |

7. Conclusion:-

Medicinal plants used in the formulation of herbal shampoo were found as rich source of novel drugs. These plants are Onion Powder, Rose Petal, Lemon Grass, Flaxseed or Linseed, Hirda, Bahera, Black tea, Brahmi, Triphala, Bhringraj, Ginger Root, Ashwagadha, Shikakai, Tulsi, Neem, Hibiscus Flower, and Retha has been reported for hair growth and conditioning. The various quality control parameters were checked. All parameter gives favorable 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 irritations the eyes and stabilizing the ecological balance of the scalp. The current trend to promote shampoos of lower pH is one of the minimizing damages 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 in spite has wonderful wetting capacity and being dry is very good for the storage. The evaluation parameters like Organoleptic evaluation, General powder Characters, Physicochemical Evaluation, Cleaning action, foaming, wetting agent, Nature of hair after wash was carried out and was found to be within the standard range.

8.Reference:-

- 1.Mithal B.M.& Saha R.N. "A Handbook of Cosmetic" Vallabh Prakashan, New Delhi, First edition, 110-112, (2002).
- 2.. Sharma P.P, "Cosmetics Formulation, Manufacturing and Quality Control", Vandan publications, New Belhi, 3, (1998).
3. Wallis T.E. "Text book of pharmacognosy" CBS Publishers & Distributors. 5th editions, 82=89.
4. Kokate C.K., Purohit A.P. and Gokhale S.B. "Pharmacognosy", Nirali Prakashan, Pune, Sixteenth edition, 242-253,(2001)
5. Mehta R.M, "Dispensing Pharmacy:;, Vallabh Delhi, 1st edition, 108, (2000).
6. Gennaro A.R, "Remington: The Science and Practice of Pharmacy", Lipincott Williams and Wilkins, Maryland, Twentieth edition. 437, (2000).
- Evans W.C., "Treas and Evans Pharmacognosy", Harcourt Brace and Company Ltd., S9ixteenth edition, New York, 128, (1997).
8. TylerE., Brady R. and Robbers E. "Pharmacognosy", K.M. Varghese company, Bombay, 1984.
9. Martin Alfred "Physical pharmacy" 4th edition Lea & febigen Philadelphia London 431-432, (1993).
10. Subrahmanyam CVS "Text book of physical pharmaceutics" Vallabh prakashan Second edition, 221-224, (2000).
11. Lachman L, Lieberman H.A. and Kanig J.L. "The Theory and Practice of Industrial Pharmacy", Varghese publishing house, Bombay, third edition, 67, (1991).
12. Kokate C.K., 'Practical phramacognosy", Vallabh Prakashan, New Delhi, Forth edition, 123, (1994).
13. "The Pharmacopea of India ", New Delhi, 947, (1996).
14. Ali Heyam Saad, Rasool bazigha Kadhim. Formulation and development of herbal shampoo from Ziziphus spina leaves extract. International Journal of Research in Ayurveda & Pharmacy 2(6); 2011: 1802-1806.
15. Sachin Dubey, Neelesh Nema, Nayak S. Preparation and evaluation of herbal shampoo powder. Ancient Science of Life 26(1); 2004: 38-44.
16. Sutar Manisha, Deshmukh Swati, Chavan Manisha, Singh Sonia. Preparation and evaluation of polyherbal shampoo powder. International Journal of Pharmacy and Biological sciences 392); 2013: 151-159.
17. 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
- 18.Mohamed Halith S, Abirami A, Jaya prakash S, Chitra Karthikeyini, Kulathuran K, Mohamed Firthouse PU. Effect of Ocimum sanctum and Azadiracta indica on the formulation of antidandruff herbal shampoo powder.

Scholars Research Library 1(2); 2009: 68-76.

18. Swati Deshmukh, Bindurani Kaushal, Shweta Ghode. Formulations and evaluation of herbal shampoo and comparative studies with herbal marketed shampoo. International Journal of Pharma and Bio Sciences 3(3); 2012: 638-645.

19. Naresh Gorantla, Sai Prasad K, Thimma Reddy VT, Ragadeepika J, Hajarabi T, Hindustan Abdul Ahad. Formulation and evaluation of herbal shampoo containing chamomile, rose and orange peel. Pharma Research Library: International Journal of Medicine and Pharmaceutical Research 1(2); 2013: 192-197.

20. Ashok Kumar, Rakesh Roshan Mali. Evaluation of prepared shampoo formulations and to compare formulated shampoo with marketed shampoos. International Journal of Pharmaceutical sciences Review and Research 3(1); 2010: 120-127.

21. Kokate C.K., Purohit A.P. and Gokhale S.B. "Pharmacognosy", Nirali Prakashan, Pune, Sixteenth edition, 242-253,(2001)

22. Mehta R.M, "Dispensing Pharmacy:, Vallabh Delhi, 1st edition, 108, (2000).

