Available Online through
www.ijpbs.com (or) www.ijpbsonline.com

IJPBS |Volume 3| Issue 2 |APR-JUN |2013|151-159

Research Article
Pharmaceutical Sciences

PREPARATION AND EVALUATION OF POLYHERBAL SHAMPOO POWDER

Sutar Manisha*, Deshmukh Swati , Chavan Manisha, Singh Sonia

Alard College of Pharmacy, Pune, Near Rajiv Gandhi Info Tech park, Hinjewadi, Pune 57

*Corresponding Author Email: manishasutar01@gmail.com

ABSTRACT

Shampoos are kind of formulation that are used for hair and body washing or therapeutic purposes. Shampoos are expected to be much more than mere cleansing agents. The findings of this investigation reveal that synthetic preservatives have sometimes been the cause of adverse effects among consumers, so it's the challenge to prepare a complete herbal shampoo in powder form. This study aims to formulate a self preserving shampoo powder containing natural ingredients with emphasis of safety and efficacy, will avoid the risk posed by chemical ingredients. The formulated shampoo powders contains Amla fruit, Hibiscus Leaf, Neem leaf, Shikakai fruit, Aloe leaf ,Henna Leaf , Ritha fruit . All shampoo powders were evaluated for organoleptic, powder characteristics, Physicochemical evaluation, dirt dispersion, foaming capacity, wetting time etc. 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. After complete study it is concluded that all the three powder shampoos shown good qualities of shampoo. The PHS2 was found to be aesthetic for the use among the three. Whereas the formulation is in the powdered form so having low risk during storage as compare to liquid shampoo.

KEY WORDS

Shampoo, herbal, powder and evaluation.

1. 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 reasons 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 hairs[1].

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 shampoo and nutritional shampoo containing vitamin, amino acids proteins hydrolysate[2].

Herbs are used since from the since the beginning of civilization to maintain health and treat disease. Various literatures provides lots of information on the folklore practices in different parts of country and traditional aspect of therapeutically important natural products and also their use in skin care and hair care. There is immense opportunity to use the photochemical

ingredients in the hair care; even they are responsible to provide the nutrition to the body[3]. Herbs have long been associated with hair care and are often ingredients of conditioners, shampoos and rinses. The selection of active ingredients for hair care powder is often based on the ability of the ingredient to prevent damage to the skin as well as to improve the quality of the skin by way of cleansing, nourishing and protecting the skin, in the paper, we report the development and evaluation of polyherbal hair care powder[4].

2. MATERIAL AND METHODS

2.1 Procurement of material

The different parts of the plants were selected for the study having hair care property, the plants are Amla fruit (*Embelica officinalis*), Hibiscus Leaf (*Hibisucus rosea*), Neem leaf (*Azadirachta indica)* Shikakai fruit(*Acacia concinna*), Aloe leaf (*Aloe barbadensis*), Henna Leaf (*Lawsonia inermis*), Brahmi root (*Centella asiatica*), Rithafruit (*Sapindus mukorossi*)[5,6].

The powder of Amla fruit, Hibiscus Leaf, Neem leaf, Shikakai fruit, Aloe leaf, Henna Leaf, Ritha fruit were collected from the local market. The raw materials collected were given with their respective biological source and uses in **Table No 1**.

Table No:1 Herbs used in the preparation of polyherbal shampoo powder

Sr.No	Constituents	Biological source/Family	Uses
1	Amla fruit	Dried ripe fruits of ***Embelica officinalis*** (Euphorbiaceae)	Darkening of hairs and Hair growth promoter
2	Hibiscus Leaf	Dired leaves of ***Hibisucus rosea*** *(*Malvaceae)	Prevents hiar loss and hair growth promoter.
3	Neem leaf	Dried leaves of ***Azadirachta indica*** (Miliaceae)	prevent the dryness of hairs and flaking of hairs
4	Shikakai fruit	Dried pods of ***Acacia concinna*** (Mimosaceae)	Foam base and anti-dandruff
5	Aloe vera leaf	*Dried leaves of* ***Aloe barbadensis miller*** (Asphodelaceae)	Conditioner and moisturizing effect
6	Henna Leaf	Dried leaves of ***Lawsonia inermis*** (Lythraceae)	Growth of hair, Conditioner
7	Brahmi root	Dried roots of ***Centlla asiatica*** *(Apiaceae)*	Support to growth of Hairs
8	Ritha fruit	Dried fruits of ***Sapindus mukorossi*** (Sapindaceae)	Detergent and antidandruff

2.2 Preparation of the herbal shampoo powder

All the required powders for shampoo preparation were weighed individually, passed through sieve no.120 mesh and mixed in ascending order by weight with continuous trituration[7]. Total three batches of each preparation were prepared labeled and kept in closed container for further studies. The preparation formula for the PHS1, PHS2 and PHS 3 were given in **Table No 2**.

Table No: 2 Formula for the Polyherbal shampoo powder

Sr.No	Constituents	PHS1	PSH2	PHS3
1	Amla fruit	30	25	28
2	Hibiscus Leaf	15	20	17
3	Neem leaf	10	10	10
4	Shikakai fruit	10	12	08
5	Aloe leaf	2	2	2
6	Henna Leaf	2	2	2
7	Brahmi root	5	5	5
8	Ritha fruit	4	6	8

2.3 Evaluation of shampoo powder

Organoleptic evaluation/visual appearance

Organoleptic evaluation for 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 were selected [8,9].

General powder characteristics [10,11, 12]

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 particle size, angle of repose, bulk density and tapped density. All the three shampoo powders were taken at three different level i.e. from top, middle and lower level for the evaluation.

Particle size is a parameter, which could 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 affects the flow properties of a powder. It was determined by fix glass funnel method, a distance of 2 cm is maintained between the graph paper and the bottom of a powder. Flowing was continued till the top of the heap touches the bottom tip of funnel.

Bulk density is an important property for the packaging and uniformity in the bulk of product. Bulk density depends on particle size, particle size distribution and cohesiveness of particle. For measuring bulk density a weighted amount of powder was introduced in 100ml graduated cylinder. The cylinder is fixed on bulk density apparatus and bulk density was calculated. It is expressed in grams per cubic centimeter (g/cm3).

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).

Physicochemical evaluations [13, 14, 15]

A. Extractive values

Determination of Alcohol Soluble Extractive

5 g of the each air dried polyherbal shampoo powder was weighed and macerated with 100 ml of Alcohol of the specified strength in a closed

flask for twenty-four hours, shaked 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^{0}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.

B. Ash Value

Determination of Total Ash

5 g of the each air dried polyherbal shampoo powder was weighed and taken in a tare silica crucible and incinerated in muffle furnace at the temperature not exceeding 450^{0}C until free from carbon, cooled. Percentage of total ash was calculated.

Determination of Acid Insoluble Ash

Total ash obtained was boiled for 5 minutes with 25 ml of dilute hydrochloric acid and filtered the insoluble matter in a Gooch crucible, or on an ash less filter paper, washed with hot water and ignited to constant weight. The percentage of acid-insoluble ash was calculated for each sample.

C. Moisture content determination

10 g of each polyherbal shampoo powder was weighed in a tare evaporating dish and kept in hot air oven at 105^{0}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.

D. Determination of 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.

Cleaning action[16]

5 grams of wool yarn were placed in grease, after that it was placed in 200 ml. of water containing 1 gram of each polyherbal shampoo powder in a flask. Temperature of water was maintained at 35^{0}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 by using the following equation:

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

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

Foaming capacity[17]

Although foam generation has little to do with the cleansing ability of shampoos, it is of paramount importance to the consumer and is therefore an important criterion in evaluating shampoos. Cylinder shake method was used for determining foaming ability. 50ml 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 was recorded for all the three shampoo powders.

Dirt dispersion[18]

Two drops of 1% each shampoo powders 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 shaken for 10 times. The amount of ink in the foam of was estimated as None, Light, Moderate, or Heavy

Detergency ability [19] 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 an 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 of all the three shampoo powder was calculated using the following equation:

DP= 100(1-T/C)

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

Wetting time [20, 21]

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.

Nature of hair after washes [22]

Nature of hair after wash can be done by collecting the responses of volunteers.

Stability Study [23, 24]

Stability and acceptability of organoleptic properties (odor and color) of formulations during the storage period indicated that they are chemically and physically stable.

RESULT AND DISCUSSION

Organoleptic evaluation/visual appearance

The result of visual inspection for all the polyherbal shampoo powders were observed and evaluated for color, odour, taste and in terms of their appearance, flow property and texture. They are somewhat shows distinct change in color. The results were reported in **Table No 3**.

General powder characteristics

General powder characteristics includes evaluation of those parameters which are going to affect the external properties (like flow properties, appearance, packaging criteria etc.). The particle size, angle of repose, bulk density and tapped density results were determined .All the polyherbal shampoo powder shows the result in the specific limits for the respective evaluation parameter and were found nearly same as reported in **Table No 3**.

Table No: 3 Evaluation of polyherbal shampoo powder

Sr.No	Evaluation parameter		PHS 1	PHS 2	PHS 3
1.	Organoleptic evalation	Color	Brownish	Brownish	Brownish
		Odour	Slight	Slight	Slight
		Taste	Characteristic	Characteristic	Characteristic
		Texture	Fine and smooth	Fine and smooth	Fine and smooth
2	Gerneal powder chracters	Particle Size	20- 25 um	20- 25 um	20- 25 um
		Angle of repose	24±1.02	22±1.07	24±1.18
		Bulk density	0.35 g/cm^3	0.28 g/cm^3	0.21 g/cm^3
		Tapped density	0.37 g/cm^3	0.33 g/cm^3	0.34 g/cm^3
3	Physicochemical evaluation	Extractive values			
		Alcohol soluble	15.45 % w/w	17.60% w/w	16.54% w/w
		Water soluble	12.15% w/w	12.78% w/w	13.08% w/w
		Ash Value			
		Total Ash	4.23% w/w	4.17% w/w	4.57% w/w
		Acid Insoluble Ash	1.08 % w/w	1.38% w/w	1.20% w/w
		Moisture content	3.02%	3.61%	3.38%
		pH	5.47± 0.24	5.79± 1.17	5.52± 1.02
	Cleaning action		28.51± 0.03	33.14± 0.12	30.11± 1.07
4	Foaming capacity		Good foaming	Good foaming	Mild foaming
5	Dirt Dispersion		Moderate	Light	Moderate
6	Detergency ability		65.12± 0.02	69.69±1.16	62.81±1.02
7	Wetting time		172±0.04	154±0.19	164±1.08
8	Nature of hair after wash		Soft manageable	Soft manageable	Soft manageable

Physicochemical evaluations

A. Extractive values

Alcohol soluble extractive value for PHS1 , PHS 2 & PHS 3 were 15.45 % w/w,17.60% w/w and 16.54% w/w. Water soluble extractive value for PHS1 , PHS 2 & PHS 3 were 12.15%, w/w12.78% w/w and 13.08% w/w respectively as reported in **Table No 3**.

B. Ash Value determination

Total Ash value for PHS1, PHS 2 & PHS 3 were 4.23% w/w, 4.17% w/w and 4.57% w/w respectively .Acid insoluble Ash value for PHS1, PHS 2 & PHS 3 were 1.08 % w/w,1.38% w/w and 1.20% w/w respectively as reported in **Table No 3**.

C. Moisture Content

Moisture content determined for PHS1, PHS 2 & PHS 3 were 3.02%, 3.61% &3.38% respectively as reported in **Table No 3**.

D. Determination of pH

The pH of shampoos has been shown to be important for improving and enhancing the qualities of hair, minimizing irritation to the eyes and stabilizing the ecological balance of the scalp. pH is one of the ways to minimize damage to the hair. Mild acidity prevents swelling and promotes tightening of the scales, there by inducing shine. All the three shampoo powders were acid balanced and were ranged 5.5 to 6.5, which is near to the skin pH . The PHS 2 showed

the slight acidic pH which matches with pH may not cause any damage to hairs. The Results were reported in **Table No 3**.

Cleaning action

Cleaning action was tested on wool yarn in grease. Although cleaning or soil/sebum removal is the primary aim of a shampoo, experimental detergency evaluation has been difficult to standardize. As seen from the results, there is a significant difference in the amount of grease removed by all the three shampoos. The cleaning action of PHS1, PHS 2 & PHS 3 was found to be 28.51± 0.03, 33.14± 0.12 &30.11± 1.07 as reported in **Table No 3**.

PHS 2 shows the good ability to remove the grease as compare to remaining two.

Foaming capacity

All the three shampoo powders having comparable foaming characteristics in distilled water. The total foam volume polyherbal shampoo powders after 1 minute shaking were recorded.The foam volume for of PHS1, PHS 2 & PHS 3 were observed as 131, 148 & 121.The same sample were kept for stability studies for 3 months and shown the same results as observed previously. All the observations are reported in **Table No 3 and Table No 5**. The PHS 2 shows the more stability of the foam as compare to the remaining two. From all the observations noted here are does not seem to be any direct correlation between detergency and foaming, which only confirms the fact that a shampoo that foams well need not clean well.

Dirt dispersion

Shampoo that cause the ink to concentrate in the foam is considered poor quality, the dirt should stay in water. Dirt that stays in the foam will be difficult to rinse away and will redeposited on the hair. The amount of ink in the foam of PHS1 , PHS 2 & PHS 3 was evaluated as Moderate , light & Moderate respectively . rate All the three shampoo powders showed no more dirt, but the PHS 2 indicates that no dirt would stay The PHS 2 showed less dirt as compare to other and observations were reported in **Table No 3**.

Detergency ability

Although cleaning or soil/sebum removal is the primary aim of a shampoo. As seen from the results, there is a significant difference in the amount of sebum removed by the different shampoos. One of the important factors affecting the separation of soil from substrate is moistening of the substrate surface and the ability to penetration detergent component in the soil. This reaction continues by reducing the surface tension. This means that the detergent dissolves and removes soils much more when the surface tension is lower and the moisturizer is higher. The moisturizing time is usually depended on the concentration of detergent and other ingredients. The detergency ability of the PHS 1, PHS 2 & PHS 3 were observed as 65.12± 0.02 , 69.69±1.16 & 62.81±1.02 respectively.So from the result we can conclude that PHS 2 showed good wetting time for moisturizing. Therefore, based on the results of strength and moisturizing time and foam productivity, PHS 2 could easily penetrate hairs and able to remove the soils. The results were reported in **Table No 3**.

Wetting time

Wetting time of a substance is a function of its concentration. The wetting time of the PHS 1, PHS 2 & PHS 3 were observed as 172±0.04, 154±0.19 & 164±1.08 minutes respectively as reported in **Table No 3**. The PHS 2 showed the less wetting time with respect to the PHS 1and PHS 3.

Nature of hairs after wash

Nature of hair after wash was carried out the with the help of application to the hairs of volunteers. The volunteers observed the hairs as soft and manageable. Their responses were reported in the **Table No 3.**

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. The stability of herbal formulation is listed in **Table No 4**.

Table No 4 : Stability studies of polyherbal Shampoo powders

Parameters	PHS 1	PHS 2	PHS 3
Physical Appearance	Brownish	Brownish	Brownish
pH	5.46± 0.22	5.80± 1.16	5.20± 1.07
Foaming capacity	131	148	121
Detergency ability	65.11± 0.07	69.60±1.06	62.45±1.09

Table No: 5 Foam stability of polyherbal shampoos

Time(min)	PHS 1	PHS 2	PHS 3
	Foam volume (ml)		
1	131	148	121
2	128	140	117
3	122	137	113
4	116	134	112

CONCLUSION

Globalization is the need of today and the world market will open for all by 2005. The world market 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. Indian traditional literature and ethanopharmacological studies present a number of plants/ formulations with proven efficacy for hair care preparations. Present investigations was carried out to formulate the herbal shampoo powder preparations based upon traditional knowledge and to develop few parameters for quality and purity of herbal powder shampoo. Although these studies are preliminary but presented evaluation parameter will be useful for the standardization of herbal shampoo powder.

The formulated shampoos were evaluated for the organoleptic , general powder characteristics and physiochemical study, they are also evaluated for their different properties cleaning action, foaming capacity , dirt dispersion, wetting time and nature of hair after wash.

From the given study it is concluded that all the three shampoo powders are good and having all properties that are expected, even though on the basis of wetting time, foam stability, Dirt dispersion, and cleaning action PHS 2 is more acceptable. Whereas the prepared shampoo powders are in dry powder form having no more change in stability after the long storage.

REFERENCES

1. Mithal B.M., Saha R.N., A Handbook of Cosmetic. Vallabh Prakashan; 1st ed. Delhi: Vallabh Prakashan Publishers; 110-112,(2002).
2. Sharma P.P, Cosmetics Formulation, Manufacturing and Quality Control, 3rd ed. Delhi: Vandan Publications;-644-647, (1998).
3. Kapoor V P, Natural product Radiance, Herbal cosmetics for Skin care and hair care, 4(4): 306-314,(2005)
4. Paithankar V. V., Formulation and evaluation of herbal cosmetic preparation using safed musli, 2(4): 2261-2264,(2010).
5. MD Afzal Azam., A. Rahamatullah S.R., Dube R.., Formulation and evaluation of polyherbal hair care powders , Ancient Science of Life, xvi (i): 15-20(1996).
6. Kokate C. K.,. Purohit A. P,. Gokhale S. B, Phamracognosy, 41st Ed, Nirali Prakashan,16.12-16.14,(2008).
7. Mehta R.M., Dispensing Pharmacy, 1st ed. Delhi: Vallabh Prakashan Publishers., 108, (2000).
8. Gennaro A.R., Remington: The Science and Practice of Pharmacy, 20th Ed Mary land: Lippincott Williams and Wilkins, 437, (2000).
9. Evans W.C. , Treas., Evans., Phamracognosy, 16th Ed New York: Harcourt Brace and Company Ltd., 128, (1997).
10. Subrahmanyam CVS, Text Book of Physical Pharamcy., Vallabh Prakashan, 2nd Ed .,221-224,(2000).
11. Martin Alfred.,Physical Pharmacy,4th Ed London: Lea & febigen Philadelphia ., 431-432,(1993).
12. More H. N, Hazare A.A ., Practical Physical Pharamcy,1st ed.,114-119,(2007).
13. Lachman L., Lieberman H.A., Kanig J.L., The Theory and Practice of Industrial Pharmacy, 3rd Bombay: Varghese Publishing House., 67, (1991).
14. Indian Pharmacopoeia, Government of India, Ministry of Health and Family Welfare, Published by, The Indian Pharmacopoieal Commission, Ghaziabad, 1(134): 191(2007).
15. Ayurvedic Pharmacopoiea of India ,Government of India ,Part I, Vol.VI., 242—245,(2008).
16. Sharma R.M, Shaha K,Patel J., Evaluation of prepared formulations and to compare formulated shampoo with marketed Shampoo, International Journal of Pharmacy and Pharmaceutical Sciences,3(4):402-405,(2011).
17. Deshmukh S ,Kaushal B., Ghode S ., Formulation and evaluation of herbal shampoo and comparative studies with herbal marketed shampoo, International Journal of Pharma and Biosciences],3(3), 638 -645,(2012).
18. Klein K., Evaluation of Shampoo foam,Cosmetics and Toiletries Magazine,119 (10): 32-35,(2004).
19. Aghel*a* N, Moghimipour E, Azadeh R.Dana., Formulation of a Herbal Shampoo using Total Saponins of *Acanthophyllum squarrosum* , Iranian Journal of Pharmaceutical Research, 6 (3): 167-172 ,(2007).
20. Barel A.O., Paye M.,Maibach H.I., Handbook of Cosmetic Science and Technology. 423, 583-588, 773-775, (2001).
21. Ali H.S., Rasool B.K., Formulation and Evaluation of herbal shampoo from *Zizipus Spina* Leaves Extract., International Journal of Research in Ayurveda and Pharmacy,2(6),1902-1806(2011).
22. Dubey S., Nema N., Nayak S., Preparation and Evaluation of Herbal Shampoo Powder, Ancient Science of Life, XXVI (1) ,(2004).
23. Kumar A ., Mali R.R., Evaluation of Prepared shampoo formulations and to compare formulated shampoo with marketed shampoo, 3(1), 121-126,(2010).
24. Noudeh G.D., Sharififar F., Khazaeli1 Payam.et.al., 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),2420-2427, (2011).

***Corresponding Author:**
Mrs. Sutar Manisha
Mobile No: 0757099911
Mail.ID- manishasutar01@gmail.com