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Formulation and evaluation of herbal shampoo

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Abstract
The aim of the article is to formulate a pure herbal shampoo and to evaluate its physicochemical properties. The shampoo is enriched with herbal extracts without any synthetic additives.
The herbal extracts used in formulation are *Sapindus mukorossi* (reetha), *Glycyrrhiza glabra* (liquorice), *Azadirachta indica* (neem), *Nardostachys jatamansi* (jatamansi), *Ocimum tenuiflorum* (tulsi), *Lavendula angustifolia* (lavender oil), *Musa acuminate* (banana root). Small amount of marigold was added as a preservative and citric acid as pH adjuster.
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Herbal shampoo was prepared by simple mixing process. The herbal shampoo was tested for physicochemical properties. Some of methods are visual inspection, pH determination, solubility check, cleansing action, determination of percentage solid content etc.
The formulated shampoo was clean and qualitative. It showed good cleansing and detergency, low surface tension, good foam stability and antidandruff property. The pH of herbal shampoo was found to be around 6.2 which is good for scalp.
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Keywords: Dandruff, anti-fungal, various herbs, evaluation

Introduction
Shampoo in easy phrases in a hair care product designed to cleaning the scalp along with the hairs. The time period shampoo in English is derived from Hindustani phrase called "CHAMPOO". Shampoo is a hair care product that is used for the elimination of the oils, dust's, pore and skin debris, dandruff, environmental pollution and other contaminant particles that regularly increase in hair.
The aim of use of shampoo is to take away the undesirable increase in between the hair without stripping out. Cleaning the hair has always been difficult task especially for women. A women has 4-8 square meters of hairs. This will likely be more for the common Indian girls because of tradition of maintaining lengthy hair.
Traditional soaps that are used in advance for each skin and the scalp are not advocated anymore for cleaning as they don't have excellent lathering ability and leave behind "soap Scum" when mixed with hard water which is hard to rinse off .
Modern shampoo as it is known today was first introduced in the 1930s. The first synthetic shampoo using synthetic surfactant instead of soap. Used initially for laundry and for cleaning carpets and later evolved as hair shampoo.
Shampoos are used generally to cleaning the scalp of dust and other environmental pollutions, sebum, sweat, scales, and greasy residues including previously applied hair care products such as oils, lotions and sprays. It is easily to formulate a shampoo which will take away all of the sebum and dust from the hair scalp, however it is going to be frizzy, dry, and unattractive. It additionally offers condition and beauty of the hair.

Shampoo contains
- Detergents
- Conditioners
- Thickeners
- Opacifiers
- Fragrances
- Preservatives

AIM
Formulation of herbal anti-dandruff shampoo using herbal extracts and its physicochemical parameters.

Objectives
The present work is oriented at the synthesis of herbal anti-dandruff hair formulation and the estimation of its various aspect.
- Collection of Herbal Crude Drugs.
- Extraction of Herbal Crude Drugs.
- Preparation of Herbal Antidandruff shampoo.
- Evaluation of Herbal Antidandruff shampoo

Materials and Methods
Chemicals
1. Reetha
2. Lavender oil
3. Tulsi
4. Aloevera gel
5. Hibiscus
6. Fenugreek
7. Banana roots
8. Lemon
9. Henna
10. Mentha
11. Jatamansi
12. Neem
13. Xanthum gum
14. Black cumin
15. 15.Amla

Apparatus
1. Beaker
2. Triple stands
3. Glass rods
4. Soxhlets apparatus
5. Funnel
6. Bunsen burner
7. China dish
8. Grinding machine
9. Sieve machine
10. Filter paper
11. Glass ware
12. Water bath
13. Spatula
14. Measuring cylinder
15. 15.Weight machine

Result
Evaluation of anti-dandruff herbal shampoo
Physical Appearance/Visual Inspection
The Result of inspection of series of formulation are listed below

Evaluation, Formulation for Physical Appearance

Table 1: Evaluation for physical appearance

Sl. No	Formulation	Visual Inspection
01	Sample 1	Brick Red, Pleasant Smell
02	Sample 2	Brick Red, Pleasant Smell
03	Sample 3	Brick Red, Pleasant Smell

Determination of pH (Potential of Hydrogen)
The pH of herbal shampoo has been shown to be important and enhancing the qualities of hair, minimizing irritation to the eyes and stabilizing the ecological balance of the scalp. The current trend to promote herbal shampoo followers. PH is one of the ways to minimize damage to the hair. Mild acidity prevents swelling and promote tightening of the scales, there by inducing shine. As seen from below table all the shampoos were acid balanced and were ranged 6.1 to 6.4, which is near to the skin.

Table 2: Determination of pH

Sl. No.	Formulation	pH
01	Sample 1	6.4
02	Sample 2	6.2
03	Sample 3	6.1

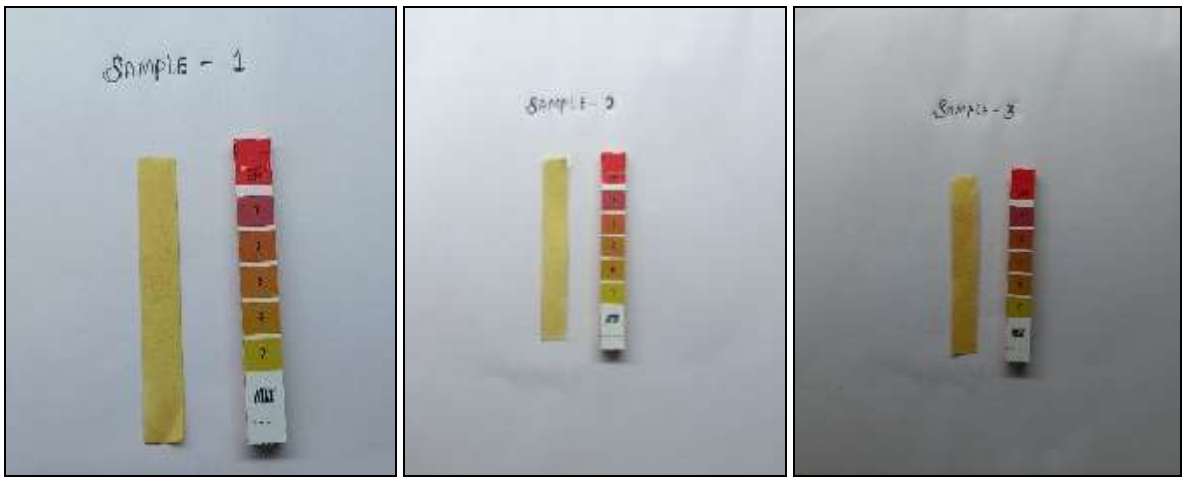


Fig 1: Samples of Potential Hydrogen

Solubility Check: Shampoo is soluble in water. So the shampoo is easy for applying in hair.

Fig 2: Sample of Shampoo

Cleansing Action: Cleaning action was tested on wool yarn in grease. Although cleaning or solid/sebum removal is the primary aim of shampoo, experimental detergency evaluation has been difficult to standardize, as there is no real agreement on a standard soil, a reproducible soiling process or the amount of soil a shampoo should ideally removal. As seen from the result, there is a significant difference in the amount of sebum removed by the different shampoos. The result of detergency ability, when compared with the marketed formulation and it was found between 18-33%. The result are presented in table.

Cleansing Action of Herbal Shampoo

DP = (1-T/C)

Where
DP = percentage of detergency power
C = weight of sebum in the control sample (meera herbal shampoo)
T = weight of sebum in the test sample

Table 3: Formulation and Cleansing

Sl. No	Formulation	Cleansing (%)
01	Sample 1	31.16
02	Sample 2	32.49
03	Sample 3	32.74

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 shikkai in optimized concentration can generate sufficient foam for the shampoo.

Fig 3: Sample of foam shampoo

This data may prove the ability of natural surfactants shikkai in optimized concentration as the best replacement for the harsh synthetic detergents which shown in table which are commonly used in majority of synthetic and their commercial herbal shampoo. The antifungal activity of developed formulation showed positive results against the tested fungal pathogen Marketed formulation possesses lower antifungal activity as compared with our formulation. Formulated shampoo (test sample) is more stable than the (control sample) 1, 2, 3 formulations and is similar to marketed shampoo (meera).

Determination percentage solid content
A Clean dry china dish was weighed and 4 grams of shampoo was added to it. The weight of dish and shampoo was noted. The exact weight of shampoo was calculated. Place the china dish with herbal shampoo on hot plate until the liquid portion was evaporated. The weight of shampoo (solids) after drying was calculated.

$$\text{Percentage of solid} = \frac{\text{Net weight of dry sample} \quad \text{x } 100}{\text{Net weight of test sample}}$$

Table 4: Formulation and Solid content

Sl. No	Formulation	Solid content
01	Sample 1	21.11
02	Sample 2	22.58
03	Sample 3	26.57

Fig 4: Determination percentage solid content of shampoo

Viscosity Evaluation

The viscosity was in the range 1.10 -1.30 poise which gives great fluidity, which makes formulation easy to apply on and easy to spread on hair. Formulated shampoos did not show any skin irritation on application as the shampoo is fully prepared by natural herbs and was found between 1.10-1.40 Pa s. Viscosity of shampoo is calculated by

$$\eta = \frac{\eta_1 \times \rho_2 t_2}{\rho_1 \times t_1}$$

η_1 = Absolute viscosity of water
t_1 = Time of flow of water
ρ_1 = Density of water
η_2 = Absolute viscosity of liquid
t_2 = Time of flow of liquid
ρ_2 = Density of liquid

Viscosity of Herbal Shampoo

Table 5: Formulation and Viscosity Pas

SL No	Formulation	Viscosity Pas
01	Sample 1	1.12
02	Sample 2	1.21
03	Sample 3	1.17

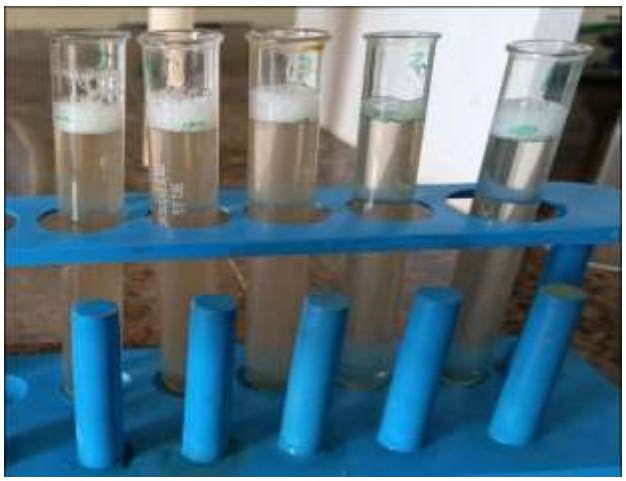
Foam Determination

Foam production has little to do with cleansing activity of shampoos, it is key importance to the consumer and is therefore an important criteria in evaluating shampoo. The shampoo showed good foaming properties

Foam index = 1000/A

Where A= volume of decoction having exact 1cm of height

Sl. No	Number of test containing ml of solution	Height of foam in cm
1	1ml	0.5
2	2ml	0.7
3	3ml	1.2
4	4ml	1.5
5	5ml	2



Dirt Detergency

It was performed as the evaluation procedure. The dirt detergency activity of shampoo was found to be as moderate.

Surface Tension Measurement

A proper shampoo should be able to decrease the surface tension of pure water to about 40dynes/cm.it is one of the main mechanism of detergency. The reduction in surface tension of water from 72.8 dynes/cm to 34 dynes/cm by the herbal shampoos is an indication of their good detergent action.

Sl. No.	Formulation	Surface Tension
1	F1	33.14
2	F2	31.22
3	F3	34.09

Stability study

Stability and acceptability of organoleptic properties of formulations during the storage period indicated that they are chemically and physically stable. The shampoo was observed for physicochemical changes for 3 days. No change was observed. The shampoo was very stable.

Nature of hair after washing

The hair was found to be soft and silky.

Discussion

Herbal shampoo formulation is mainly composed of herbal extracts which were found as rich source of useful chemical constituents. Parts of plants such as Reetha, had been reported hair growth, anti-dandruff, cleansing and conditioning actions. All the required quantity was collected and the necessary evaluation parameters shown positive and acceptable results. The results depicted in study shows that when these herbal extracts are incorporated in shampoo it gives effective product with good appearance and patient compliance. The pH of shampoo is good which helps in improving the hair texture and maintains the pH of scalp. The evaluation parameters like visual inspection, pH determination, solubility check, viscosity determination, surface tension measurement etc. are carried out and the results were good

Conclusion

An herbal shampoo anti-dandruff shampoo preparation was formulated based upon theoretical knowledge and Aim of the study was to formulate an effective and stable product.it was found to be harmless and effective formula. The shampoo is enriched with beneficial constituents like polyphenol, flavonoids, saponins, vitamins which contribute antibacterial, antioxidant activity, anti-hair fall which enhances the cleaning ability of shampoo and promote growth of healthy hair The awareness and the need of herbal anti-dandruff shampoo is on demand at present due to lesser side effects, low cost and more effective than synthetic shampoos.

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