



Formulation and Evaluation of Antidandruff Shampoo

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ABSTRACT

Shampooing is the most common form of hair treatment to remove dirt, grease and debris from the hair, scalp and other parts of body without damaging the natural gloss of hair and to keep the hair fragrant, lustrous, soft and manageable. The shampoo is prepared by using two Antidandruff agents such as Sulphur and Benzoic acid. The other ingredients used are sodium lauryl sulphate as surfactant, urea as solubilizing agent, sodium EDTA as chelating agent, guar gum as foam stabilizer and thickening agent, tween 80, distilled water is used as vehicle. It was evaluated for various tests and the ranges were in acceptable limits. The pH range was 6.3 to 6.8, physical appearance was pale yellow, The percentage (%) of solid contents ranges from 22.3 to 26.7, viscosity was in the range of 1209 to 1729, surface tension was 31.16 to 34.19 and foam value 143 to 171. The anti-microbial activity was done by using staphylococcus aureus, The zone of inhibition by 1% solution using Sulphur : Benzoic acid in the ratio of 1: 1.25 have shown 3.1mm of inhibitory action. The present research emphasizes about the preparation & evaluation of synthetic antidandruff cosmetic shampoo.

KEYWORDS: Antidandruff, Benzoic acid, Sulphur, Sodium lauryl sulphate.

1. INTRODUCTION

Through earlier it was thought that a good shampoo not only cleans, rinses out dirt from the hair and imparts gloss to it, but also leaves hair manageable and non dry. But at present, the composition and purpose of shampoos varies so much that no definition can cover them all. This can be observed from the varieties of shampoo products available in the market.

A shampoo may be defined as a preparation of a surfactant (i.e. surface active material) in a suitable form-liquid, solid, or powder which when used under the conditions specified will remove surface grease, dirt and skin debris from the hair, shaft and scalp without affecting adversely the hair, scalp or the health of the user. The word shampoo in English usage dates back to 1762, with the meaning "to massage". The word derived from Anglo-Indian shampoo, in turn from Hindi *champoo* imerative of *champna* to smear, knead the muscles, massage. Today, a plethora of shampoos are available for men and women.

A good shampoo should almost immediately form abundant foam irrespective of the type of water used or the nature of soil or fat to be removed from hair. Though foam formation is not released to the

cleansing effect, but people psychologically always prefer a high foam product.

Some good shampoos are found to have side effects like drying effect on the hair. This leaves the hair too dry to handle or comb. So proper conditioning of the hair is also an important consideration, Some shampoos cause irritation to the eye and a lasting corneal cloud. These should be avoided. The functions of shampoo are expected to be various. A good and acceptable shampoo should have the following characteristics^[1].

1.1. Composition of shampoos^[2,3,4,5,6]

The following are the ingredients used for preparation of shampoos. They include Primary surfactants e.g. sodium lauryl sulphate, triethanol lauryl sulphate. Secondary surfactants e.g. dialkyl sulphosuccinates, monoalkyl sulphosuccinates. Germicides and Antidandruff agents e.g. Salicylic acid, Benzoic acid. Conditioning agents e.g. fatty substances like lanolin, oils. Pearlscent agents e.g. 4-methyl-7-diethylamino coumarin. Sequestrants e.g. Sodium salt of EDTA. Thickening agents e.g. Alginates. Preservatives e.g. formaldehyde, methyl paraben, propyl paraben. Solubilizing agents e.g. Aliphatic alcohols, Urea etc.

2. MATERIALS AND METHODS

The antidandruff agents used in present study are Sulphur and Benzoic acid. The other ingredients include Sodium lauryl sulphate

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(surfactant), Urea (solubilizing agent), Citric acid (sequestering agent), Sodium EDTA (chelating agent), Guar gum (stabilizer & thickening agent), Tween 80, Ethanol IP, Distilled water (vehicle). All ingredients were purchased from SD fine chemicals, boisar.

2.1. Preparation of antidandruff shampoo

The antidandruff shampoo was formulated using simple mixing process. Formulations were made by using two antidandruff agents such as sulphur and benzoic acid. The other ingredients used are sodium lauryl sulphate as surfactant, urea as solubilizing agent, citric acid as sequestering agent, sodium EDTA as chelating agent, guar gum as foam stabilizing agent and thickening agent, tween 80 & distilled water as vehicle.

Table 1. Composition of Antidandruff shampoo

S.No	Ingredients in grams	F1	F2	F3	F4	F5	F6	F7	F8
1	Sulphur	0.25	0.5	0.75	1	1.25	1.5	1.75	2
2	Benzoic acid	2	1.75	1.5	1.25	1	0.75	0.5	0.25
3	Sodium lauryl sulphate	20	20	20	20	20	20	20	20
4	Urea	1	1	1	1	1	1	1	1
5	Citric acid	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
6	Sodium EDTA	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
7	Guar gum	2	2	2	2	2	2	2	2
8	Tween 80	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
9	Distilled water upto (in ml)	100	100	100	100	100	100	100	100

2.2. Evaluation of prepared antidandruff shampoo

2.2.1. Physical appearance/Visual inspection: The formulations prepared were evaluated in terms of their clarity, foam producing ability and fluidity^[7].

2.2.2. Determination of pH: The pH of 10% shampoo solution in distilled water was determined at room temperature 25°C^[8].

2.2.3. Determine percent of solid 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 solids) and evaporating dish with shampoo was placed on hot plate until the liquid portion was evaporated. The weight of the shampoo (only solids) after drying was calculated.

Table 2. Evaluation of Formulation for Physical Appearance, pH and Solids

S.No	Formulation	Physical Appearance	pH	Solids (%)
1	F1	Pale yellow	6.5	24.2
2	F2	Pale yellow	6.4	22.3
3	F3	Pale yellow	6.4	26.7
4	F4	Pale yellow	6.6	26.7
5	F5	Pale yellow	6.3	25.6
6	F6	Pale yellow	6.8	26.1
7	F7	Pale yellow	6.5	25.3
8	F8	Pale yellow	6.5	25.9

2.2.4. Rheological evaluation: The viscosity of the shampoos was determined by using Brookfield viscometer by setting different speeds from 0.3 to 10 rpm^[8]. The viscosity of the shampoos was measured by T95. The temperature and sample container's size was kept constant during the study.

2.2.5. Surface tension measurement: Measurements were carried out with a 10% shampoo dilution in distilled water at room temperature. Thoroughly clean the stalagnometer using chromic acid and purified water. Because surface tension is highly affected with grease or other lubricants^[9,10]. The data is calculated by using the equation given below:

$$R_2 = (W_3 - W_1) n_1 / (W_2 - W_1) n_2 \times R_1$$

Where, W_1 is weight of empty beaker. W_2 is weight of beaker with distilled water. W_3 is weight of beaker with shampoo solution. n_1 is number of drops of distilled water. n_2 is number of drops of shampoo solution. R_1 is surface tension of distilled water at room temperature. R_2 is surface tension of shampoo solution.

2.2.6. Foaming ability and Foam stability: Cylinder shake method was used for determining foaming ability. 50ml of 1% shampoo solution was put into a 250ml graduated cylinder and is shaken for 10 times. The total volumes of foam contents after 1minute shaking were recorded. The foam value was calculated immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded^[11].

Table 3: Evaluation for viscosity, surface tension & foam value of formulation

S.No	Formulation	Viscosity	Surface tension (dynes/cm)	Foam volume(ml)
1	F1	1512	34.12	162
2	F2	1618	31.16	156
3	F3	1209	34.19	154
4	F4	1645	33.17	171
5	F5	1234	32.11	153
6	F6	1346	32.17	147
7	F7	1729	33.16	143
8	F8	1284	31.78	157

2.2.7. Anti Microbial activity against Staphylococcus aureus: The prepared antidandruff shampoo formulations F1 to F8 were subjected to antimicrobial activity by cup plate method using the agar medium. 1% antidandruff shampoo was used to study this antimicrobial activity. The petriplates were then sealed using para film and incubated at 37°C for 24hrs. The zone of inhibition was observed successfully for formulation F4 than other formulations .

Table 4: Evaluation of formulations for Zone of Inhibition

S.No	Formulation	Concentration (gms)		Zone of Inhibition(mm)
		Sulphur	Benzoic acid	Staphylococcus aureus
1	F1	0.25	2	2.7
2	F2	0.5	1.75	2.75
3	F3	0.75	1.5	2.55
4	F4	1	1.25	3.1
5	F5	1.25	1	2.6
6	F6	1.5	0.75	2.7
7	F7	1.75	0.5	2.5
8	F8	2	0.25	2.7



Fig.1. Zone of Inhibition

3. RESULTS AND DISCUSSION

The aim of the present work is to prepare Antidandruff shampoo by using two antidandruff agents such as Benzoic acid and Sulphur by various combinations.

The prepared Antidandruff shampoo was evaluated for physical appearance/visual inspection, determination of pH, determine % of solid contents, rheological evaluation, surface tension measurement, foam ability and antimicrobial activity.

Physical appearance/visual inspection: The formulations prepared were appeared in pale yellow colour.

Determination of pH: The pH of 10% shampoo solution in distilled water was determined at room temperature 25°C and the range of pH was found to be 6.3 to 6.7.

Determine percent of solid contents: The weight of the shampoo (only solids) after drying was calculated for all the formulations and the range was found to be 22.3% to 26.7%.

Rheological evaluation: The viscosity of the shampoo was determined by using Brookfield Viscometer by setting different spindle speeds from 0.3 to 10rpm and the range of cps obtained was 1234 to 1729.

Surface tension measurement: Measurements were carried out with a 10% shampoo dilution in distilled water at room temperature and the range was found to be 31.16 to 34.19.

Foaming ability: Cylinder shake method was used for determining

foaming ability. 50ml of 1% shampoo solution was put into a 250ml graduated cylinder and covered the cylinder with hand and shaken for 10 times and the range of values obtained was found to be 143-171.

Antimicrobial activity against *Staphylococcus aureus*: The prepared antidandruff shampoo formulations F1 to F8 were subjected to antimicrobial activity by using cup-plate method using agar medium. 1% antidandruff shampoo was used to study this antimicrobial activity. The zone of inhibition was observed successfully for formulation F4 than other formulations.

4. CONCLUSION

In the present work, efforts have been made to prepare and evaluate Antidandruff shampoo by using two antidandruff agents such as Benzoic acid and Sulphur by various combinations. Zone of inhibition for F4 obtained was best compared to other formulations against *Staphylococcus aureus* after incubating for 24 hrs. It may have fair antidandruff activity efficiency. Hence the formulation F4 has met the objectives of the present study which may hold promise for further studies.

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