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FORMULATION AND EVALUATION OF HERBAL EFFERVESCENT DRY SHAMPOO

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ABSTRACT

Shampoos are one of the cosmetic products used in daily life. Synthetic preservatives and detergents have sometimes been the cause of adverse effects among consumer. A more radical approach in reducing the synthetic ingredients is by incorporating natural extracts whose functionality is comparable with their synthetic ingredients. A shampoo is a cleaning aid for the hair and is counted among the foremost beauty products. Today's shampoo formulations are beyond the stage of pure cleaning of the hair. Additional benefits are expected, e.g. conditioning, smoothing of the hair surface, good health of hair, hair free of dandruff, dirt, grease and lice and, above all, it is safety benefits are expected. The herbal shampoo was formulated using natural ingredient; Sapindus mukorossi (reetha) have the efficacy in hair care preparations. Formulation was done by incorporating this natural ingredient with sodium bicarbonate, citric acid and tartaric acid in different ratios to facilitate its effect in shampoo. The combination of several such ingredient of herbal origin has made it possible to secure highly effective dry powder shampoo. The formulation was evaluated for different parameters to arrive at the ideal formulation, which will be benefit for the cosmetic use.

KEYWORDS: Dry shampoo, Effervescence, Reetha.

INTRODUCTION

Hairs are the integral part of human beauty. People are using herbs for cleaning, beautifying and managing hair since the ancient era. Only in this century, a real technology in the cleaning of hairand scalp been developed. First came the mass distribution of cake soap and sanitary facilities to make bodily cleanliness and personal hygiene practice. Next came the specialization of branded shampoo products[1] for the hair and scalp, offered in multiplicity of types and forms. Now, washing the hair and scalp with shampoo has become a nearly universal practice. Shampoos are probably the most widely used hair products today, based on synthetic ingredients as well as herbal ingredients. Shampoos are of various types, like powder shampoo, clear liquid shampoo, liquid shampoo, lotion shampoo, solid gel shampoo, medicated shampoo, liquid herbal shampoo etc. Shampoos are probably the most widely used cosmetic products for cleansing hairs and scalp in our daily life. The shampoo is acid balanced which is near to the skin pH. The pH of shampoo is important for enhancing the qualities of hair, stabilizing ecological balance of scalp and minimizing irritation to the eyes. The ideal pH range for shampoo which is between 5 and 7.8.

MATERIALS AND METHODS

PLANT PROFILE

Reetha[2,10] or Soapnuts is also called as Arishtak in Ayurveda and “Soap nut tree” in India. It is wellknown for its traditional medicinal uses and is commonly used as a hair cleanser.

Fig No. 1: Reetha Plant and its Fruits.

Scientific Classification

Kingdom : plantae

Family : sapindaceae

Popular names : soap nut, soap berry, washnut.

Phytochemical constituents: The chemical components in reetha include saponins, genin, oleanolic acid, sopindic acid, sapindoside A & B which exhibits a host of health.

USES[9]

- It is used in preparation of shampoo.
- It is used as a foaming agent in the shampoo.
- It can be used as a cleanser for hair.
- It is also used for removing lice from hair.

EXCIPIENT PROFILE[12]

SODIUM BICARBONATE

Sodium bicarbonate, commonly known as baking soda or bicarbonate of soda, is a chemical compound with the formula $NaHCO_3$. It is a salt composed of a sodium cation and a bicarbonateanion. Sodium bicarbonate is a white solid that is crystalline but often appears as a fine powder.

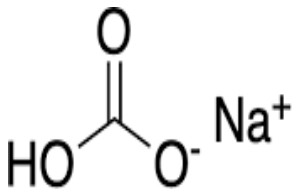
Formula : $NaHCO_3$

IUPAC NAME : Sodium hydrogen carbonate

Solubility : Soluble in Water

Molar mass : 84.007 g/mol

Density : 2.2 g/cm³



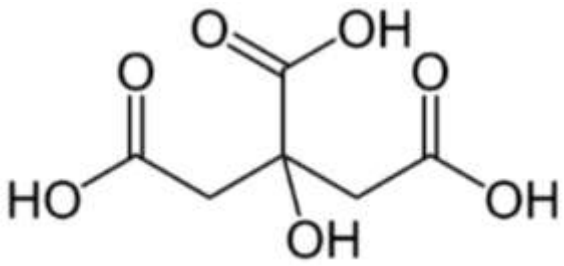
CITRIC ACID

Citric acid is an organic compound with the chemical formula $HOC(CH_2CO_2H)_2$. It is a colorless weak organic acid. It occurs naturally in citrus fruits. In biochemistry, it is an intermediate in the citric acid cycle, which occurs in the metabolism of all aerobic organisms.

Formula: $C_6H_8O_7$

Molar mass: 192.124 g/mol

Soluble in: Water, Acetone, Dimethyl sulfoxide, Ethyl acetate.



TARTARIC ACID

Tartaric acid is a white, crystalline organic acid that occurs naturally in many fruits, most notably in grapes but also in tamarinds, bananas, avocados, and citrus. Its salt, potassiumbitartrate, commonly known as cream of tartar, develops naturally in the process of fermentation.

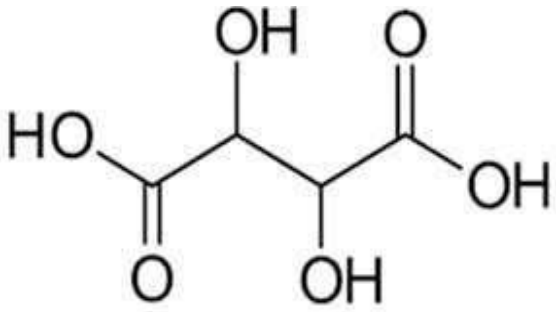
Formula: $C_4H_6O_6$

Molar mass: 150.087 g/mol

Density: 1.79 g/cm³

Acidity (pKa): L(+) 25 °C: pKa1= 2.89, pKa2= 4.40; meso 25 °C: pKa1= 3.22, pKa2= 4.85

Appearance: White powder.



FORMULATION

Development of different batches of herbal effervescent dry tablet shampoo.[3]

1. Authentication of Reetha plant.
2. Formulation of the batch A1–A5.
3. Formulation of the batch B1-B5.

Table No: -1 Formulation Chart for the development.

SL NO	FORMULATION IDENTITY	RATIO OF FORMULATION (In grams)			
		Sodium Bicarbonate	Citric acid	Tartaric acid	Reetha
1	A1	1	0.5	--	0.5
2	A2	1	1	--	0.5
3	A3	1	1.5	--	0.5
4	A4	1	2	--	0.5
5	A5	1	2.5	--	0.5
6	B1	1	--	0.5	0.5
7	B2	1	--	1	0.5
8	B3	1	--	1.5	0.5
9	B4	1	--	2	0.5
10	B5	1	--	2.5	0.5

METHODOLOGY[4,11]

The ingredients as per the formulation chart were weighed accurately and dried. The dried powder was mixed with the help of double cone blender. The weighed quantities were compressed with the help of compression machine with the compression force of 10kg to get the direct compressed form. Locally fabricated mould is used for the preparation of effervescent tablet having diameterof 2.4 cm.

The mixed ingredients were accurately weighed and transferred to a clean dry container. Throughout the manufacturing process presence of moisture was strictly avoided. As per the batch size and batch identity, the weighed ingredients mixed with perfume powder and compressed with the help of a hydraulic machine to get the compressed tablet. The obtained compressed tablets were evaluated for different parameters to arrive at the ideal formulation. Various evaluation parameters[5,6,7,8,14] were performed for their preformulation character and post compaction parameters. The evaluations were carried out for their powder characteristics, physical nature, weight variation, hardness, friability, foaming ability, pH of the formulation.[15] From the data, selection can be done for ideal formulation.

RESULTS AND DISCUSSION

Physical Parameters: The formulations were evaluated for their physical nature, uniformity in color, odor, thickness of the compressed units. From the parameters, all the formulations showed uniformity in color distribution, have a pleasant odor and have a disc shape solid unit. All the formulation does not showed any cracks or imperfection. Thus the manufacturing process was very accurate for the development of compressed tablet dry shampoo.

Powder Characteristics: The preformulation studies were conducted for the determination of powder characteristics such as bulk density, tapped density, Hausner ration and compressibility index. The results of bulk density of the powder in the range of 0.378g/ cm^3 and 0.567g/cm^3 .Tapped density proved for the range of 0.457g/cm^3 and 0.691g/cm^3. The Hausner's ratio was found to be between 1.02 and 1.21 and the compressibility index was found to be between 15.245 and 17.94 which revealed that the powder is ideal for its compression and for its good flow property.

pH of the formulation: pH of all formulations were studied using digital pH meter and all the formulation met the pH range of 4.1 and 5.4. It is compatible with the pH of hair and proved the ideal characteristic of shampoos.

Weight variation test: Individual weight of the formulated dosage forms were evaluated for its weight with the help of precision digital balance andthe weight of individual batch found between 4.46 and 4.641. All the tablets passed the weight variation test.

Friability: The test was performed by using Roche friabilator and was found the friability of the formulations in the range of 0.10 and 0.96. This parameter proved the developed tablet has the ability to withstand abrasion in packaging, handling and transport.

Hardness evaluation: Studied using Pfizer hardness tester and all the formulation have adequate hardness. This is very important in disintegration to achieve the fastest dissolution of the product.

Foaming ability: Randomly selected formulation was evaluated for the foaming ability by cylinder shake method.

From all the evaluation parameters, the formulation development proved for the exact manufacturing method for the compressed herbal dry formulation. As per the results, the formulation B2 (Effervescent dry shampoo tablet with sodium bi carbonate: tartaric acid: Reetha in the ratio of (1:1:0.5) met all the evaluation parameter and selected as the ideal formulation. Results are tabulated in the table.

SL.NO	PARAMETERS	OBSERVATIONS
1.	POWDER CHARACTERISTICS a. Bulk density b. Tapped density c. Hausner's ratio d. Compressibility index	 0.567g/cm^3 0.691g/cm^3 1.21 17.94
2.	POST COMPACTION STUDIES a. Color b. Shape c. odour	 No mottling observed Disc shape Pleasant odour
3.	WEIGHT VARIATION	4.46 to 4.61
4.	pH	4.1 to 5.1
5.	FRIABILITY	0.10 to 1.26

CONCLUSION

Reetha has been reported for hair growth and conditioning and well established for its cleansing, foam producing activity. The various quality control parameters were evaluated to arrive at the ideal formulation. All parameter complies with the standard evaluation results. The result obtained for the ingredient "reetha" when incorporated in shampoo gives more stable product 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 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 inspite 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 action were done to select the ideal formulation, Nature of hair, was found to be within the standard range. It is concluded that the formulation of herbal effervescent dry shampoo is as good as comparative to synthetic shampoos to achieve the aim of this study. The ideal formulation B2 (Effervescent dry shampoo tablet with sodium bi carbonate: tartaric acid: Reetha in the ratio of (1:1:0.5) met all the evaluation parameter and selected as the ideal formulation. It shows conditioning effect with shining hairs. The formulation is in dry state, the transportation and storage can be utilized by the travellers.

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