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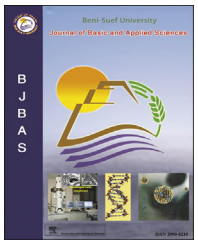

Full Length Article

Formulation, evaluation and comparison of the herbal shampoo with the commercial shampoos☆

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ABSTRACT

The study aimed to formulate a pure herbal shampoo and to evaluate and compare its physicochemical properties with the marketed synthetic and herbal shampoos. The herbal shampoo was formulated by adding the extracts of *Acacia concinna*, *Sapindus mukorossi*, *Phyllanthus emblica*, *Ziziphus spina-christi* and *Citrus aurantifolia* in different proportions to a 10% aqueous gelatin solution. Small amount of methyl paraben was added as a preservative and pH was adjusted with citric acid. Several tests such as visual inspection, pH, wetting time, % of solid contents, foam volume and stability, surface tension, detergency, dirt dispersion etc, were performed to determine the physicochemical properties of both prepared and marketed shampoos. The formulated herbal shampoo was also evaluated for conditioning performance by administering a blind test to 20 student volunteers. The formulated herbal shampoo was clear and appealing. It showed good cleansing and detergency, low surface tension, small bubble size and good foam stability after 5 min. The prepared shampoo and commercial shampoos showed comparable results for % solid contents also. The score of the conditioning performance of the tress washed with herbal shampoo was found to be 3.0 out of 4, while the score of the marketed synthetic and herbal shampoo was 3.4 and 3.3 respectively. The results indicated the formulated shampoo is having excellent conditioning performance, at par with commercially available shampoo. However, further research and development is required to improve it's quality and safety.

1. Introduction

Shampoos are probably the most widely used cosmetic products for cleansing hairs and scalp in our daily life (Ishi, 1997). A shampoo is basically a solution of a detergent containing suitable additives for other benefits such as hair-conditioning enhancement, lubrication, medication etc. Now-a-days many synthetic, herbal, medicated and non medicated shampoos are available in the market but popularity of herbal shampoo among consumers is on rise because of their belief that these products being of natural origin are

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safe and free from side effects (Manikar and Jolly, 2001). Synthetic surfactants are added to shampoo primarily for the foaming and cleansing action but their regular use leads to dryness of hairs, hair loss, irritation to scalp and eyes (Potluri et al., 2013). Herbal formulations are considered as alternative to synthetic shampoo but formulating cosmetics using completely natural raw material is a difficult task (Shinde et al., 2013). There are large numbers of medicinal plants which are reported to have beneficial effects on hair and are commonly used in formulation of shampoo (Firthouse, 2009). These plant products may be used in their powdered form, crude form, purified extracts, or derivative form (Pooja et al., 2011). It is extremely difficult to prepare a herbal shampoo using a single natural material that would be milder and safer than the synthetic ones, and at the same time would compete favorably with its foaming, detergency and solid content. We, therefore, considered to formulate a pure herbal shampoo using traditionally and commonly used plant materials for hair washing in India and gulf region especially in Oman.

The pericarp of *Spindus mukorossi*, commonly known as Soapnut or reetha, fruits of *Phyllanthus emblica* commonly known as Amla, and dried pods of *Acacia concinna* (Sheekakai) have traditionally been used in Indian folklore system for centuries for washing hair (Kapoor, 2005). Reetha and Sheekakai produce rich lather when shaken with water due to their high content of saponins. They are also known to produce beneficial effects on skin and other organ systems (Khushboo et al., 2010). Amla fruit is rich in vitamin C and is employed in hair preparations as antidandruff agent, hair growth promoter and to strengthen hairs (Srivasuki, 2012). The *Ziziphus spina-christi* tree, known as Sidr in Arabic, is indigenous to the Middle East including Oman, and its leaves are traditionally used by women to wash, darken and lengthen hairs (Ali and Kadhim, 2011). It is reported to contain four saponin glycosides that help in removing excess sebum without causing adverse reactions (Mahran et al., 1996). Saponins also exhibit antibacterial and antifungal activities that make them important ingredients of cosmetic applications (Chen et al., 2010).

This study was designed to formulate a herbal shampoo and to evaluate and compare its physicochemical properties with the marketed synthetic and herbal shampoo in search of a safe and effective cosmetic product.

2. Materials and methods

2.1. Sample collection

All plant materials except *Ziziphus spina-christi* were obtained from Okhla market, New Delhi, India and were identified and authenticated by a botanist of Jamia Hamdard University. *Ziziphus* leaves were collected from the garden in Sohar, Oman and were authenticated by the Pharmacognosy professor, at Oman Medical College. Two commercially available shampoos namely Dove Shampoo® (Unilever, Middle East) and Herbal Essences shampoo® (Procter and Gamble company, US) were purchased from the local super market.

2.2. Preparation of plant extracts

100 g of *Ziziphus spina-christi* leaves were washed under running water to remove foreign substances, homogenized and boiled in hot water for 4 h. The aqueous extract was filtered and concentrated to obtain semi solid mass (yield: 11% w/w). Aqueous extracts of Sheekakai and Amla were also prepared by the similar method (yield: 8.3% w/w and 8% w/w respectively). However, Reetha pericarps were extracted by cold maceration method using 70% ethyl alcohol to obtain 11.2 g of solvent free semi solid mass (yield-11.2% w/w).

2.3. Formulation of herbal shampoo

The plant extracts were mixed in different proportions to obtain a shampoo whose formula is shown in Table 1. Herbal extracts were added to 10% gelatin solution and were mixed by shaking for 20 min. Lemon juice (1 mL) and Methyl paraben were also added with stirring. Finally the pH of the solution was adjusted by adding sufficient quantity of 1% citric acid solution. Few drops of rose essential oil were also added to impart aroma to the prepared shampoo and the final volume was made to 100 mL with gelatin solution.

2.4. Evaluation of formulated and commercial shampoo

To evaluate the quality of commercial and prepared formulations, several quality control tests including visual assessment, physicochemical controls conditioning performance tests were performed (Ashok and Rakesh, 2010).

2.4.1. Physical appearance/visual inspection

The formulation prepared was evaluated for the clarity, color, odor and foam producing ability (Aghel et al., 2007).

2.4.2. Determination of pH

The pH of 10% v/v shampoo solution in distilled water was measured by using pH meter (Mi 151, Martini instruments) at room temperature (Tarun et al., 2014).

2.4.3. Determination of % of solid contents

4 grams of shampoo were placed in a previously clean, dry and weighed evaporating dish. The dish and shampoo was weighed again to confirm the exact weight of the shampoo. The liquid portion of the shampoo was evaporated by placing the evaporating dish on the hot plate. The weight and thus %

Table 1 – Composition of formulated herbal shampoo.

Material	Quantity
Reetha extract	2.5 g
Amla extract	2.5 g
Sheekakai extract	2.5 g
Sidr extract	2 g
Lemon juice	1 mL
Methyl paraben	1 mL of 0.05% solution
Gelatin solution	q.s
Citric acid	q.s
Essential oil	0.1 mL