

# FORMULATION AND EVALUATION OF HERBAL GEL SHAMPOO

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**Abstract:** The main purpose behind this investigation was to develop a stable and functionally effective shampoo. The present study was carried out with the aim of preparing the herbal shampoo that provides smooth and straight effect to hairs, safer than the chemical conditioning agents. Herbal shampoo was formulated with the aqueous extract of medicinal plants that are commonly used for cleansing and smoothing hair traditionally. To provide the effective conditioning effects, the present study involves the use of moringa, aloe Vera, and hibiscus extracts instead of synthetic cationic conditioners. The factors like UV radiations, use of harsh chemical products have direct and indirect impact on the hair. The present work focuses on the potential of herbal extracts from cosmetic purposes. Hence we conclude that the formulation of moringa herbal shampoo is effective in providing smoothing and shiny effect and better conditioning effect. Results shows that all ingredients use to formulate the shampoo were found to be safe and physiochemical evaluation shows ideal results. Stability studies showed a stable homogenous appearance during 3-4 weeks at 3-8°C 40-degree Celsius ambient temp however F1 formula A gives best and optimum stability and active results. Aloes have been vital components of ethnomedicine. Studies on phytochemical constituents and medicinal properties of the aloes showed that they are good sources of bioactive. Sensory observation and physiochemical tests also revealed that the formulations have required qualities. Further studies are recommended to elucidate the complete phytochemical profile of the plant and develop a more refined protocol of shampoo making.

**Keywords:** Stability, Detergent, Viscosity, Drug content, Evaluation

**INTRODUCTION:** Shampoos are most probably used as cosmetics. Shampoos are most likely utilized as beautifying agents and are a viscous solution of detergents containing suitable additives preservatives and active ingredients. Hair is a mid way between nature and culture. Hair care attitudes are different from one society to another regardless of economic differences, and from one person to another within societies. Today's busy life schedule has created the negligence of an individual to protect their hair from various problems. People don't have time for different treatment for getting good results. The objective of this study was to develop a method for hair growing and strengthening without affecting or damaging hair. For this herbal drugs were used for the formulation of shampoo. Herbal Cosmetics, here in after referred as Products, and are formulated, using various permissible cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide defined cosmetic benefits only, shall be called as Herbal Cosmetics. Herbal drugs or their formulations are viable alternative to synthetic drugs. During the past few decades, there has been a dramatic increase in the use of natural products in cosmetics. Now-a-days, many herbal shampoos are available in the market which contains herbal ingredients such as plant extracts and essential oils. There are large number of plants which are reported to have beneficial effects on hair and are commonly used in shampoos. Shampoo is a polyherbal formulation that consists of extracts of Moringa Oleifera (drumstick), Rosasinesis (Hibiscus) and Aloe vera gel. These herbs have been selected on the basis of a traditional system and scientific justification with modern uses. Many synthetic shampoos are present in the current market both medicated and non medicated; however, herbal shampoo popularized due to natural origin which is safer, increases consumer demand and free from side effects. Moringaoleifera, belongs to family Moringaceae. It is indigenous to south asia, mainly in Himalayas foothills, India. Moringaoleifera is a nature's gift to mankind as it is the most nutrient-rich and multipurpose plant discovered.

## MATERIALS AND METHODS

### MATERIALS:

#### PLANT PROFILE: ALOE VERA

Aloe vera plant with flower detail inset.

#### Scientific classification

Kingdom: Plantae

Order: Asparagales

Family: Asphodelaceae

Genus: Aloe

Species: *Aloe vera*

Binomial name: *Aloe vera* (L.) Burm.f.

Chemical analysis reveals that Aloe vera contains various carbohydrate polymers, notably glucomannans, along with a range of other organic and inorganic components. Although many physiological properties of Aloe vera have been described, it still remains

uncertain as to which of the component(s) is responsible for these physiological properties. Further research needs to be done to unveil the myth surrounding the biological activities and the functional properties of A. Vera. A lot of interest has been recently shown in the Aloe vera gel, as new studies have shown the gel has distinct physiological properties. Appropriate processing techniques should be employed during the stabilization of the gel in order to affect and extend its field of utilization.

The semi-tropical plant, Aloe vera, has a long and illustrious history dating from biblical times. It has been mentioned throughout recorded history and given a high ranking as an all-purpose herbal plant. These days it is easy to go to a local pharmacy store and find a product that contains Aloe vera. It can be found in a range of health care and cosmetic products such as hand lotions, shampoos, cosmetics, beverages and dietary supplements. Aloe vera gel is used for its emollient and wound healing activities. The untreated gel is also a therapeutic agent and is available in the market in various concentrated, diluted and otherwise modified products. A number of reviews have been written covering the uses of the gel. But in the recent years there has been considerable effort towards definition of active constituents so that they can be accurately used in formulations. This review aims to emphasize on the research work being carried out on the constituents and varied biological activities of the constituents of aloe vera with special emphasis on the research work on the Aloe vera leaf gel.

## BOTANICAL INFORMATION OF ALOE VERA

**Medicinal species:** Aloe vera, *A. barbadensis* (Curacao or Barbados aloe), *A. vulgaris*, *A. arborescens*, *A. ferox* (Cape aloe), *A. perryi* (Socotrine or Zanzibar aloe). There are over 300 species of aloe, most of which are native to South Africa, Madagascar and Arabia. The different species have somewhat different concentrations of active ingredients. Common names: Aloe, Aloe capensis, Aloe spicata, Aloe vera, Barbados aloe, Cape aloe, chirukattali (India), Curacao aloe, Ghai kunwar (India), Ghikumar 2Introduction (India), Indian aloes, kumari (Sanskrit), laloi (Haiti), lohoi (Vietnam), luhui Chinese), nohwa (Korean), rokai (Japanese), sabilla (Cuba), Socotrine aloe, subr (Arabic), Zanzibar aloe. The name aloe is derived from the Arabic word *alloe* meaning a shining bitter substance.

### Taxonomy and etymology



Spotted forms of *Aloe vera* are sometimes known as *Aloe vera* var. *chinensis*.

The species has a number of synonyms: *A. barbadensis* Mill., *Aloe indica* Royle, *Aloe perfoliata* L. var. *vera* and *A. vulgaris* Lam., and common names including Chinese Aloe, Indian Aloe, true Aloe, Barbados Aloe, burn Aloe, first aid plant. The species name *vera* means "true" or "genuine." Some literature identifies the white spotted form of *Aloe vera* as *Aloe vera* var.

The species is widely naturalised elsewhere, occurring in temperate and tropical regions of Australia, Barbados, Belize, Nigeria, Paraguay and the It has been suggested that, like many Aloes, the species is originally from Southern Africa and that populations that occur elsewhere are the result of human cultivation.

## CHEMICAL CONSTITUENTS OF ALOE VERA

Aloe vera has marvelous medicinal properties. Scientists have discovered over 150 nutritional ingredients in Aloe vera as an ingredient. They all work together in a synergistic way to create healing and health giving benefits. The ten main areas of chemical constituents of Aloe vera include: amino acids, anthraquinones, enzymes, minerals, vitamins, lignins, monosaccharide, polysaccharides, salicylic acid, saponins, and sterols.

The amino acids in Aloe vera are the building blocks of protein and influence our brain function. Humans require 22 amino acids and the body will make all of them except for eight essential amino acids which our body gets from the food/drinks that we take in. Every one of the essential amino acids are available in Aloe vera and they include isoleucine, leucine, lysine, methionine, phenylalanine, threonine, valine, and tryptophan.

## METHODS:

**1. Collection and Preparation of Plant Specimens:** Healthy and mature leaves of Aloe vera were collected. The leaves were washed with tap water to remove dirt and soil. The outer green skin (i.e., the leaf) and the inner gelatinous mass (i.e., the gel) were separated by peeling the skin off with a scalpel. The gel mass was dried in shade at room temperature for 18 days. The dried gel mass was then pulverized into powder in an electrical grinder and stored in a sealed container until used for the phytochemical study.

**2. Gross Phytochemistry of Gel Extracts:** The Aloe vera gel powder was extracted by 100% methanol using the continuous hot percolation method in a Soxhlet apparatus for 18 hours. The extract was concentrated in a rotary evaporator to yield a brown liquid. The extract was kept at 4°C in a deep freezer. Then, samples of the extracts were subjected to preliminary phytochemical screening using standard tests for alkaloids (Wagner test), anthraquinones (Borntrager's test), flavonoids (lead acetate test), saponins (froth test), tannins (ferric chloride test), and terpenoids (Salkowski test).

**3. Formulation of Aloe vera Gel Shampoos:** Aloe vera shampoos were prepared from gel mass by mixing it with six ingredients, namely, coconut oil, jojoba oil, lemon juice, olive oil, pure glycerin oil, and vitamin E (Table 1). Five shampoo formulations were

prepared by mixing the ingredients at varying concentrations (amounts) (Table 2) and homogenizing the contents by a mechanical stirrer [28, 29]. The volumes of all the formulations were fixed at 20 mL by adding sterile distilled water.

**Table 1:** Ingredients of component used in formulating *Aloe vera* gel shampoos

Formulation of *Aloe vera* shampoos.

Ingredients	UoM*	Formulations				
		F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>5</sub>
<i>Aloe vera</i> gel	mL	4	6	8	10	10
Coconut oil	Drops	1	1	1	1	2
Olive oil	Drops	1	2	1	2	1
Jobba oil	Drops	1	1	1	1	1
Glycerin oil	Drops	1	1	1	1	1
Vitamin E	Drops	1	1	1	1	1
Lemon juice	Drops	1	1	1	1	1
Proportion of gel	(%), v/v	20	30	40	50	50

\*UoM (unit of measurement).

### 3. Evaluation of the Characteristics of the Shampoos

The five shampoo formulations were physically evaluated by inspecting and measuring their color, clarity, odor, consistency, spreadability, and pH at 25°C. Likewise, the qualities of the formulations were evaluated by analyzing their solid contents, surface tension, dirt dispersion, rheology (viscosity) (Model DV-1 Plus, LV, USA), foaming stability, wetting time, and conditioning performance.

## RESULT AND DISCUSSION:

**1. Gross Phytochemistry of *Aloe vera* Gel:** *Aloe vera*, like all aloes, can be the source of many phytochemical constituents applicable in preparing cosmetic, pharmaceutical, and many other products. Preliminary phytochemical screening of methanol gel extracts using standard tests showed the presence of anthraquinones, flavonoids, saponins, and tannins and the absence of alkaloids and terpenoids (Table 3). Brhane et al. [30] used multiple extraction solvents and reported the presence of alkaloids, flavonoids, tannins, saponins, polyphenols, and terpenoids with in vitro antioxidant properties. Leaf latex of the plant is also reported to be the source of two anthrones with anti-inflammatory activities [31]. Besides, proximate analysis exhibited that the moisture and ash content, crude fat, total protein, and carbohydrate of the plant's gel were  $92.19 \pm 0.03\%$ ,  $3.51 \pm 0.01\%$ ,  $0.24 \pm 0.04\%$ ,  $1.64 \pm 0.09\%$ , and  $2.61 \pm 0.07\%$ , respectively.

**Table 3:** Proximate composition of *Aloe vera* leaf gel.

Composition	Tests	Inspection	Results*
Alkaloids	Wagner test	Brownish-red precipitate	–
Anthraquinones	Borntrager's test	Pink, red	+
Flavonoids	Lead acetate test	Yellow precipitate	+
Saponins	Froth test	Foam	+
Tannins	Ferric chloride test	Dark-green	+
Terpenoids	Salkowski test	Reddish-brown	–

\*“+” sign indicates the presence and “–” sign indicates absence of the chemical constituents.

## EVALUATION OF ALOE VERA GEL SHAMPOOS

### 1. Sensory Assessment

Good shampoos have attractive appearance to the sensory observer like the case with all cosmetic products. They demonstrated no significant difference from the commercial shampoo in terms of odor, transparency, and foaming characteristics except color (Table 4). Since no coloring agent was added, the formulations were white. Varying the proportion of Aloe vera gel did not lead to change in color, turbidity, and characteristic odor.

**Table 4:** Physical inspection of Aloe vera leaf gel shampoos.

Formulations	Color	Clarity	Odor	Consistency	Spreadability	pH	Temp. (°C)
F <sub>1</sub> (4 mL)	White	Turbid	Characteristic	Thin	Good	6.4	25
F <sub>2</sub> (6 mL)	White	Turbid	Characteristic	Thin	Best	6.4	25
F <sub>3</sub> (8 mL)	White	Turbid	Characteristic	Slightly thick	Best	6.5	25
F <sub>4</sub> (10 mL)	White	Turbid	Characteristic	Slightly thick	Best	6.6	25
F <sub>5</sub> (10 mL)	White	Turbid	Characteristic	Slightly thick	Best	6.8	25
Commercial	Green	Turbid	Characteristic	Slightly thick	Best	6.7	25

### 2. Quality Characteristics

**a. Solid Content.** The qualities of the formulated shampoos were evaluated using some physicochemical parameters, namely, solid content, foam stability, dirt dispersion, surface tension, wetting time, and conditioning performance.

**Table 5:** Evaluations of Aloe vera shampoo formulations.

Formulation	Solid content (%)	Foam stability	Dirt dispersion	Surface tension	Wetting time test	Conditioning performance	Temp. (°C)
F <sub>1</sub> (4 mL)	23	Good	Not detected	38	142	Good	25
F <sub>2</sub> (6 mL)	24	Good	Not detected	37	150	Good	25
F <sub>3</sub> (8 mL)	26	Very good	Not detected	36	152	Good	25
F <sub>4</sub> (10 mL)	28	Very good	Not detected	34	153	Good	25
F <sub>5</sub> (10 mL)	25	Very good	Not detected	33	157	Good	25
Commercial	26	Very good	Not detected	32	185	Good	25

**b. Foam Ability and Stability.** Volume and stability of foams are also principal parameters in assessing the quality and consumer acceptance of shampoos.

**c. Dirt Dispersion:** Dirt dispersion is another key parameter in evaluating the cleansing action of shampoos, whereas high-quality shampoos concentrate the dirt in the water, poor-quality ones concentrate the dirt in their foams.

**d. Surface Tension:** The present study resulted in shampoo formulations with measures of surface tension ranging from 33 (for formulation with 10 mL gel) to 38 dynes/cm (for formulation with 4 mL gel)

**e. Wetting Ability:** Wetting abilities of shampoos depend on the concentration of their surfactants. Higher concentrations of surfactants lead to better wetting ability. Canvas disc method is a quick, efficient, and reliable test in evaluating the wetting abilities of shampoos as a function of wetting time

**f. Conditioning Performance:** The conditioning performances of shampoos depend on their chemistries. Shampoos are enriched with conditioning polymers that deposit, adhere, or adsorb onto the proteins of hairs.

g. **Viscosity:** Viscosity of a shampoo is the reflection of the amount of its solid content. Viscosity plays a key role in defining many attributes of shampoos such as their spreadability upon application and consistency in their package.

**Table 6:** Viscosities of Aloe vera gel shampoos.

Formulations	Viscosity (poise)	Speed (rpm)	%FSR	Shear stress	Stress rate	Temp (°C)
F <sub>1</sub> (4 mL)	22.19	60	69.17	18,672.23	899.99	25
F <sub>2</sub> (6 mL)	24.09	60	68.70	186,112.11	899.99	25
F <sub>3</sub> (8 mL)	24.11	60	67.19	165,112.17	899.99	25
F <sub>4</sub> (10 mL)	26.17	60	66.17	168.88	899.99	25
F <sub>5</sub> (10 mL)	26.86	60	69.12	169.82	899.99	25

## SUMMARY AND CONCLUSION:

The main purpose behind this investigation was to develop a stable and functionally effective shampoo. The present study was carried out with the aim of preparing the herbal shampoo that provides smooth and straight effect to hairs, safer than the chemical conditioning agents. Herbal shampoo was formulated with the aqueous extract of medicinal plants that are commonly used for cleansing and smoothening hair traditionally. To provide the effective conditioning effects, the present study involves the use of moringa, aloe vera, and hibiscus extracts instead of synthetic cationic conditioners. The factors like UV radiations, use of harsh chemical products have direct and indirect impact on the hair. The present work focuses on the potential of herbal extracts from cosmetic purposes. Hence we conclude that the formulation of moringa herbal shampoo is effective in providing smoothening and shiny effect and better conditioning effect. Results shows that all ingredients use to formulate the shampoo were found to be safe and physiochemical evaluation shows ideal results. Stability studies showed a stable homogenous appearance during 3-4 weeks at 3-8°C 40 degree Celsius ambient temp however F<sub>1</sub> formula A gives best and optimum stability and active results.

Aloes have been vital components of ethnomedicine. Studies on phytochemical constituents and medicinal properties of the aloes showed that they are good sources of bioactive compounds [43–48]. Few studies explored the phytochemical properties of Aloe. Further studies are recommended to elucidate the complete phytochemical profile of the plant and develop a more refined protocol of shampoo making.

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