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## A Review on Shampoo based on Natural Ingredients

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**Abstract** Shampoos are products that clean the hair shaft and scalp by removing oil and dust from the surface of the hair. The ability of a shampoo to clean or serve as a detergent is one of its key functions. However, the capacity of a shampoo to produce foam is a significant factor in determining how well it will be received by consumers. The detergent that is utilised in shampoos most usually is known as sodium lauryl sulphate. Sodium lauryl sulphate is a synthetic chemical that is produced in large quantities and is regulated as a pesticide. It is utilised in consumer items. In addition to causing eye irritation, allergic responses, and hair loss, sodium lauryl sulphate is thought to be harmful to the gastrointestinal tract or the liver. It may also be extremely drying and rough on the hair. Hence, main goal of this study was to eliminate sodium lauryl sulfate in shampoo preparation and substitute it with harmless natural constituents that will also provide softness, smoothness, and brightness to the hair with an emphasis on safety and efficacy.

**Keywords:** Shampoo, Natural Ingredients, Hair

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### Introduction

An essential component of the human body is the hair. The length of hair on a person's head has been always correlated in history with both attractiveness and social status [1].

1 In contrast to important organs like the heart, liver, or kidneys, where cellular regeneration can only take place to a limited extent, hair grows at an astounding pace of 0.35 millimetres per day. This makes it possible to remove old, damaged hair and have it quickly restored with new regrowth. As long as the hair follicle continues to operate normally, hair is the only structure of the body that can totally regenerate itself without leaving any scars [2].

Shampoo is a type of hair care product that is intended to provide sufficient cleansing power along with adequate foam, to remove soil from the hair and scalp without significantly reducing the hair's natural oiliness. This is done to ensure that the hair is left in a condition that is soft, manageable, and glossy in its natural state after being washed with shampoo [3].

### Ideal Characteristics of Shampoo [3]

- It is imperative that there be an adequate amount of foam present in order to fulfil the psychological needs of the consumers.
- Rinsing out the shampoo should be quick and simple, and it should leave the hair in a condition that is silky smooth and shiny.
- During usage, the shampoo should leave the hair with a fragrance that is pleasing to the senses.
- It is important to make sure that the shampoo does not irritate the skin of the scalp.



- It is not expected to have any adverse effects or irritate the skin or eyes in any way.
- It should possess good biodegradability.
- A basic environment damages the hair by dissolving the disulphide bonds in hair keratin, hence the hair care product should be slightly acidic.

Most people use shampoos for their cosmetic value. It is a product for the care of hair that is used on a regular basis to clean the scalp as well as the hair. Shampoos are a viscous solution of detergents that contain adequate additives, preservatives, and active ingredients. They are most commonly used as beautifying agents. The product is typically applied to damp hair, worked into the strands with a massaging motion, and then washed out using water. When you use shampoo, you want to make sure that you get rid of any debris that has accumulated on your hair without removing too much of the sebum. There are many synthetic shampoos available on the market right now, both medicated and non-medicated. Despite this, herbal shampoo has become increasingly popular because of its natural origin, since it is safer, improves customer demand, and does not have any adverse effects [4-6].

### Characteristic Features of Hairs [7]

- **Elasticity**

It is possible for hair to withstand pressures that attempt to alter its shape, its volume, or its length. Long keratin fibres found in the cortex of the hair are responsible for the elasticity of the hair. Both natural sunshine and artificial UV radiation may break down chemicals in the hair, which in turn causes the hair to become more brittle and lose its elasticity.

- **Static electricity**

Static electricity is generated on the hair strands when dry hair is rubbed. This is particularly obvious when the weather is hot and dry. The end effect is hair that is uncontrolled and flies out from the head, giving the impression that it is difficult to control.

- **Moisture content**

In conditions of high heat and humidity, there is an increase in moisture, a decrease in static electricity, and collapse. When conditions are dry, there is less moisture, which results in more static electricity and a greater volume. The cortex of the hair swells when it is wet, and the cuticle scales on the borders have a tendency to lift.

- **Porosity**

The cuticle that covers the cortex remains whole and is impervious to water. An increase in temperature or the use of an alkaline lotion will split the scales of the cuticle to the point where the chemicals will be able to flow through.

- **Texture**

The beautiful texture or feel of hair on head of a person contributes significantly to one's overall appeal. The texture of hair is influenced by a variety of factors. The first measurement is an average of the diameter of each individual's hair. Second, the texture of various people's hair is inherently distinct. Third, the degree of weathering that hair suffer has an effect on its texture.

- **pH**

The pH level of your hair should be between 4.5 and 5.5 for optimal health. When the pH is below 4.5, the hair begins to constrict, and beyond 5.5, it begins to open [7].

### Hair Diseases [7]

- **Alopecia areata**

It is generally agreed that alopecia areata is an autoimmune condition. In alopecia areata, the WBC's target the cells in the hair follicles that are quickly dividing and developing. The injured hair follicles become much smaller, which significantly reduces the rate at which new hair is produced. Alopecia is termed '*Indralupta*' or '*Khalitya*' in Ayurveda.



- **Dandruff**

Dandruff can be caused by having oily skin, using too much shampoo, unhealthy eating habits, or stressful life. Malassezia, a yeast-like fungus that feeds on fat, is suspected to be the real offender in this case. This causes a significant increase in the amount of skin cells that have died. The dead cells become white and form a condition known as 'Rucci' in the hair. In Ayurvedic practise, this is referred to as '*Darunak*'.

- **Premature graying of hair**

The inability of the melanocytes that are found in the hair matrix to produce pigment is the physiological reason for greying hair. The greying process can take place even in the absence of any other changes in the hair's structure or development. In Ayurvedic practise, this is referred to as '*Palit Rog*'. '*Heat*' and '*Pitta*' are created in the body as a result of negative emotions such as anger and sadness as well as due to physical exertion. After they have reached the skull, this "*Heat*" and "*Pitta*" cause the hair to turn grey or white at an earlier age.

- **Head lice**

Lice are parasitic insects that are most usually found in hairs located in the area behind the ears and close to the neckline. The condition is known as *Pediculus Humanus Capitis* in the medical community. It causes a sensation, itching, and red blisters on the scalp, among other symptoms. In Ayurvedic terminology, this is referred to as '*Arunshika*'. As a result of 'Kuff,' 'Pitta,' and Worms, the hairs become brittle and multiheaded, and they also develop some sebaceous patches.

- **Folliculitis**

The inflammation of the hair follicles is known as folliculitis. This condition can manifest itself anywhere on the skin or the scalp. Folliculitis has the appearance resembling acne pimples or lesions that are crusty and do not cure.

- **Hirsutism (excess of hair)**

It is believed that excessively high amounts of male hormones (androgens) are the root cause of hirsutism. Acne, a change in the pitch of one's voice, and an increase in overall muscle mass are also signs. Women who suffer from hirsutism have hair that is dense and black covering their faces, chests, stomachs, and backs [7].

### **Ingredients Generally used for Shampoo Formulations [8]**

Beside water as well as detergents, other most vital constituents in shampoo preparations are thickeners, foam boosters, modifiers, conditioning agents, preservatives, and special additives

- **Water**

Water that has been deionised is the fundamental component of all shampoos and often accounts for between 70 and 80 percent of the whole composition.

- **Detergents**

The major detergents make up the second most abundant component of shampoos. These substances, which are often referred to as surfactants, are the components in shampoos that are responsible for their cleansing effects. Because of their ability to interact with surfaces, surfactants are classified as surface active substances. The chemical composition of a surfactant gives it the ability to envelop and trap oily substances that are present on surfaces. While one part of the molecule is compatible with oil and can dissolve in it, the other part of the molecule can only dissolve in water. When a shampoo is applied to hair or textiles, the water-soluble component aligns with the water layer, while the oil-soluble component aligns with the oily substances. A micelle is the name given to the structure that is created when many molecules of surfactant align themselves in this manner. The fact that this micelle has oil that is held in the center yet can be removed with water is what gives the shampoo its ability to clean well.

Fatty acids are the precursors of the chemicals that are known as surfactants. Fatty acids are organic compounds that can be derived from a wide variety of sources, including plants and animals. Coconut oil, palm kernel oil, and soy bean oil are the three oils most commonly utilised to derive the surfactants that are frequently included into shampoos. Ammonium lauryl sulphate, sodium lauryl sulphate, and sodium lauryl ether sulphate are some examples of major detergents that are frequently found in shampoos.



- **Foam boosters**

Shampoos contain a variety of surfactants, including cleaning surfactants as well as other forms of surfactants, which are used to increase the foaming properties of the formulation. These substances, which are known as alkanolamides, contribute to an increase in both the quantity of foam and the size of the bubbles. They are likewise formed from fatty acids, just like primary detergents, and they have the ability to dissolve in both water and oil, just like primary detergents. Typical materials are lauramide DEA or cocamide DEA.

- **Thickeners**

The alkanolamides that cause shampoos to foam also have the effect of making the formulations of shampoos more viscous. However, in addition to these ingredients, we also utilise other ingredients in order to get the desired rise in viscosity. Shampoos, for instance, have methylcellulose, which is produced from cellulose found in plants, added to them so they become thicker. In addition, sodium chloride, more commonly known as salt, can be utilised to thicken shampoo.

- **Conditioning agents**

In order to soften the occasionally abrasive effect that surfactants can have on hair and clothes, certain ingredients are sometimes used in shampoos. Polymers, silicones, and quaternary agents are all examples of common types of conditioning agents. Each of these compounds will deposit on the surface of the hair, where they will reduce static charge while also improving the texture, softness, and combability of the hair. The term "2-in-1 shampoo" refers to products that clean and condition the hair in a single process, and it was coined to describe shampoos that particularly promote conditioning as one of its benefits. Dimethicone, which is a kind of silicone, quaternium 80, which is a quaternary agent, and guar hydroxypropyltrimonium chloride which is a kind of polymer are all examples of conditioning agents.

- **Preservatives**

Because shampoos are composed of water and organic components, it is possible for them to be contaminated with bacteria and other types of microorganisms. Preservatives are used to stop the growth of microorganisms. DMDM hydantoin and methylparaben are two of the most frequent preservatives that are utilised in the production of shampoos.

- **Modifiers**

In order to alter certain properties, several other components are sometimes used in shampoo formulations. The formulation is made opaque by the use of opacifiers, which also provide it a pearly appearance. To counteract the dulling effects of hard water, materials that are known as sequestering agents are often added. The pH of a shampoo is adjusted by adding acids or bases like citric acid or sodium hydroxide, respectively, so that the detergents can perform at their highest level of effectiveness.

- **Special additives**

The appearance of the shampoo, as well as its aroma, is among the most important aspects that play a role in the final buying decision. In order to alter these qualities, the makers add fragrance oils and FD&C dyes that have been officially sanctioned and verified by the government. There are a variety of other unique additives that are capable of having a similar impact. Natural ingredients, such as plant extracts and oils, as well as proteins and vitamins, give shampoos their distinctive features and contribute to their marketability. In order to combat the issue of dandruff, some additives like zinc pyrithione have been used. Additional components include dyes, which impart colour to the hair.

### **Toxic Chemicals used in Shampoo Formulation [9]**

Over fifty percent of all skin illnesses that might affect people or pets are really caused by chemicals that are found in common household items. In point of fact, more than 95% of all shampoos, bath gels, conditioners, laundry detergents, and cosmetics include one or more of these compounds. This includes products for both human and animal skin care. More than 10,000 different substances are utilised in the production of personal care products. Some of these chemicals have been related to a variety of health concerns, including cancer, birth abnormalities,



damage to development and reproduction, and other issues that are on the rise. The following is a list of some of the more prevalent substances that have been linked to various health issues.

- **Sodium Lauryl Sulfate (SLS)**

Because of its low cost, this abrasive and caustic detergent is frequently utilised. In addition to its applications as an engine degreaser and a cleaner for garage floors, you may find it in products such as shampoo, soap, face cleansers, and so on. SLS has a degenerative impact on the cell membranes and can denature proteins found in hair, skin, and other tissues. This can cause damage to the hair and skin, resulting in aged skin and damaged hair. SLS has the potential to corrode the hair follicles and hinder hair development, both of which can contribute to hair loss. The usage of SLS may increase the risk of developing cataracts (through skin absorption, even without direct eye contact). The eyes may take longer to recover because of the effects of SLS, which can denature the proteins in the eyes. SLS may be absorbed into your blood and concentrate in your organs if it comes into touch with your skin. These organs include your heart, liver, and brain. Because SLS is a mutagen, it has the ability to alter the information contained in the genetic material of your cells and organs, which makes this situation potentially hazardous.

- **Triethanolamine (TEA)**

Used frequently as a component of a product's base and for modifying the pH. TEA produces allergic symptoms, including difficulties with the eyes, dryness of the hair and skin, and can be harmful if it is taken into the body over an extended period of time.

- **Parabens (Propyl, Methyl, Butyl, or Ethyl)**

In spite of the fact that it is common knowledge that these low-cost preservatives are extremely hazardous to human health, manufacturers continue to use them in cosmetics and hair care items. They have been responsible for a lot of allergy responses as well as skin issues.

- **Imidazolidinyl and Diazolidinyl Urea**

After parabens, these are the preservatives that are utilized in the majority of products. According to the American Academy of Dermatology, they are a known cause of contact dermatitis and also give out formaldehyde, which is a carcinogen.

- **Synthetic Colours**

The vibrant colors of a skin lotion or shampoo are achieved with the use of synthetic colours. Along with hair dyes, these should be avoided at all costs (with the exception of some henna products). They are known to provoke allergic reactions, as well as skin and nerve disorders.

- **Fragrance**

When the word "fragrance" is used on a product's label, it refers to an artificial scent that was created in a laboratory using one of more than 200 different man-made compounds. These "fragrance" compounds, which have the potential to bioaccumulate in your organs, have been linked to a wide variety of adverse health effects, including but not limited to headaches, lung issues, skin irritation, disorientation, cognitive impairment, rashes, and more. They smell quite similar to real herbs but are actually very cheap and dangerous imitations.

- **Propylene Glycol**

This is an inexpensive, synthetic petrochemical that is used as a basis in emulsifying creams and lotions to make the skin appear smoother; but, in the long run, it speeds up the ageing process of the skin. Because it is an irritant to the skin, the Material Safety Data Sheet advises you to avoid coming into contact with it. It is possible for the protein in the skin to get denatured, which can result in poor skin quality and sagging. It is possible for it to be absorbed via the skin, which might result in allergic responses as well as harm to the liver and kidneys.

- **Cocamide DEA/Lauramide DEA**






It's possible that the foaming chemicals Cocamide DEA and Lauramide DEA used in shampoos and bath products, as well as the emulsifying agents used in cosmetics, might be contaminated with pollutants that are connected to









cancer or another severe health condition. After being absorbed, they have the potential to transform into cancer-causing substances known as nitrosamines on the skin or in the body.

In light of the adverse consequences that are associated with the use of synthetic substances, using plant components in their place demands cautious consideration.

**Table 1:** Herbal ingredients for shampoo formulations [10]

S. No.	Plants	Plant parts	Use	Image
1.	<i>Acacia concinna</i> (Shikakai)	Pods	Hair cleanser as well as dandruff controller.	
2.	<i>Arnica Montana</i> (Arnica)	Flowers	Utilized in hair oils as tonic in addition to stimulating the hair follicles.	
4.	<i>Brassica spp.</i> (Mustard)	Seed	Utilized as hair oil in addition to beneficial for nourishment of hair.	
5.	<i>Cocos nucifera</i> (Nariyal)	Kernel	Hair oil and raw material for preparing hair oil & tonic	
6.	<i>Eclipta alba</i> (Bhringraja)	Whole plant	Used for hair nourishment and dyeing.	







7.	<i>Ocimum sanctum</i> (Holy basil)	Leaves	Utilized in shampoos as anti-microbial agent	
8.	<i>Lawsonia inermis</i> (Henna)	Leaves	Used for hair dyeing and nourishment.	
9.	<i>Nardostachys jatamansi</i> (Jatamansi)	Rhizomes	Utilized as hair tonic as well as in growth of hair.	
10.	<i>Phyllanthus emblica</i> (Amla)	Fruit	Utilized as hair tonic as well as in growth of hair.	
11.	<i>Sapindus mukorossi</i> (Ritha)	Fruit coat	Utilized in herbal shampoos as hair cleanser, also used alone as natural shampoo	
12.	<i>Saussurea lappa</i> (Kuth)	Root	Root extract is used for hair dyeing.	



13.	<i>Sesamum indicum</i> (Til)	Seed	Major source of hair oil and used as base for preparing specific hair oils.	
14.	<i>Terminalia chebulla</i> (Harad)	Seed	Used in hair care formulations.	
15.	<i>Thymus serpyllum</i> (Banajwain)	Whole plant	Useful for preparing hair tonics.	
16.	<i>Terminalia bellirica</i> (Behera)	Seed	Extract from Seed is utilized in formulations for hair dyeing.	
17.	<i>Trigonella foenum-graecum</i> (Fenugreek)	Seed	Seed extract is used as hair cleanser.	
18.	<i>Calendula officinalis</i> (Marigold)	Flower	For its soothing effects, flower extract is utilized in haircare creams.	





19.	<i>Citrus Limon</i> (Lemon)	Peel	Prevent hair loss. Maintains the pH & imparts fragrance to preparation	
20.	<i>Salvia officinalis</i> (Sage)	Whole plant	Used as hair conditioners.	
21	<i>Azadirachta indica</i> (Neem)	Leaves	Utilized in shampoo as anti-microbial agent.	
22	<i>Nigella sativa</i> (Kalonji)	Seed	It known to reverse hair damage and help in hair regrowth	

Today, all throughout the world, there is a shift occurring toward the use of herbal remedies and the adoption of a way of life that is more in tune with nature. When it comes to maintaining a healthy lifestyle, many people choose for natural foods, herbal medications, and natural healing techniques. The vegetable product that is grown through biological or organic farming without the use of synthetic fertilisers and pesticides is seeing a significant surge in popularity. There has been a significant rise in the number of people using herbal cosmetics as part of their personal care routine, and there is a significant growth in the demand for herbal cosmetics. In the past one and a half centuries, all of this was caused by the excessive use of products based on synthetic materials, synthetic chemicals, chemical dyes, and the products that were derived from them. The production and use of these things cause human health hazards with several side effects that ultimately lead to a wide variety of diseases. In addition to this, it had a significant negative impact on the ecosystem and disrupted our eco-system. The allopathic system on its own is proven to be inadequate, and there is a necessity to augment it with herbal medications. When it comes to looking after the health of individuals, the most effective method is to make use of both contemporary and traditional medical practises. Consumers are becoming much more conscious of the importance of health and improving the quality of their life, which has led to an increase in the use of natural dye, natural cosmetics, herbal medications, and nutraceuticals. The new markets are being driven by fundamental shifts in consumer demand for products based on herbal ingredients, as well as rising consumer concern about products based on synthetic ingredients [10].



The health of an individual, their nutrition, their habits, the routine of their employment, the climate, and the upkeep of their hair and skin are the primary factors that determine their attractiveness. During the summer, prolonged exposure to high temperatures causes dehydration of the skin and an increase in the amount of melanin produced. It can result in sunburns, freckles, wrinkles, blemishes, pigmentation, and even discomfort across the body. The harsh winter weather can cause damage to the skin in the form of cuts, fissures, maceration, and infection. These symptoms are commonly encountered. Skin diseases are quite frequent among people of all ages and can be caused by the infection of a wide variety of microorganisms, chemical agents, and biological poisons that are present in the air. Skin diseases can also be caused by physical causes, malnutrition, and environmental pollution. A similar issue arises with one's hair, since the premature greying of hair and loss of hair both grow commonplace with increasing age. In accordance with the principles of both cosmetic preparation and traditional medical practises, such as Ayurveda, Siddha, Unani, and Tibetan medicine, there are enormous opportunities to use phytochemicals as ingredients in cosmetics for the purpose of providing care for the skin and the hair. These opportunities can be found in a variety of forms.

### **Benefits of Using Natural Shampoos [11]**

- By stimulating the hair follicles in their natural way, natural shampoo encourages the growth of new hair.
- Natural oils, minerals, and herbal extracts are infused into the hair follicles to help maintain moisture and enhance the hair's overall condition.
- Because it is made entirely of natural components, it does not provoke allergic reactions and is thus appropriate for use on all skin types, including sensitive and skin that is prone to allergic reactions.
- The smell of natural shampoos is more natural and mild.
- Natural shampoos are better for the environment than conventional shampoos since they are made from natural, biodegradable ingredients rather than harmful chemicals.

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