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Review on Polyherbal Hydrogel Hair Serum for Hair Care

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Abstract: *Hair problems such as dandruff, hair loss, scalp infections, are common problems in people of all age groups. Herbal formulations are becoming popular due to their safety, efficacy and less side effects than synthetic products. Also, the growing consumer awareness regarding the harmful effects of synthetic hair care products, is a major factor driving the demand for plant based alternatives in hair care. These concer often include fears of scalp irritation, hair damage and potential long-term health risks linked to ingredients like sulfates, parabens and artificial fragrances commonly found in conventional hair products.This shift in consumer preference underscores the need for safer, more biocompatible options that require advantage of nature to promote hair health. The serum was prepared using extracts of Rosmarinus officinalis, Murraya koenigii and Vitis vinifera. These herbal ingredients are traditionally used to boost hair growth, reduce dandruff and strengthen hair follicles. The study concludes that the herbal hair serum can be a safe and effective alternative to the synthetic hair care products. [1]*

Keywords: Hydrogel based hair care, Anti-hair fall serum, Antioxidant, Non greasy, Hair growth serum

I. INTRODUCTION

Hair is a filamentous structure of keratin protein, growing from hair follicles in the skin. It is a vital part of protecting the scalp from environmental damage, regulating body temperature and enhancing appearance. Healthy hair is strong, smooth, shiny and elastic. [3]

ANATOMY OF HAIR:

The composition of hair is 95% keratin. Keratin is a protein, with a helical structure. It is also found in the skin and its parts like body hair and nails. Human hair has two parts:

1. The hair root
2. The hair shaft

1. Structure of hair root

The hair root forms the foundation of hair growth and contains several essential structure that supports its function. The hair follicle is a tube like depression in the skin that enclose the root and anchors the hair into the scalp. At the base of this follicle lies the hair bulb a rounded structure where actively dividing cells generate the hair strand through a process called keratinization. Below the bulb the dermal papilla cone-shaped structure containing capillary and nerve endings that supply a nutrient and signal necessary foie the hair growth

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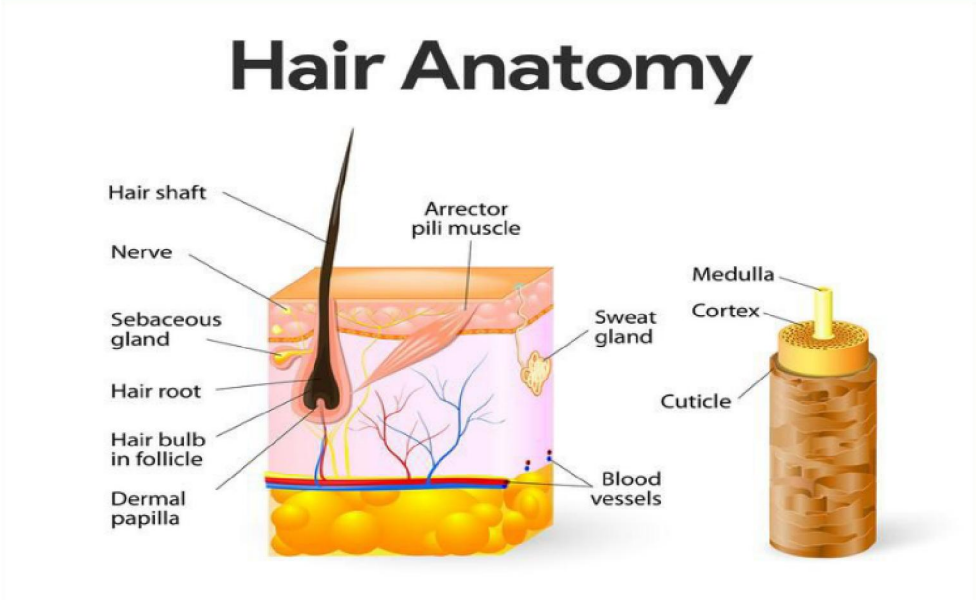


Fig.1: Anatomy of Hair

2. Structure of hair shaft

The hair shaft is composed of three layers, each layer giving hair its physical characteristics. The cuticle is the layer and consists of transparent overlapping scale-like cells that protect the inner layer. The cuticle is important, for shine and smoothness. Beneath the cuticle is the cortex, which makes up 90 percent of the hair shaft mass and gives the hair shaft its strength, elasticity and natural color. At the center of the hair shaft is the medulla. The medulla is usually found in coarse or thick hair. [5,6]

The structure of hair is divided into three distinct layers:

- The medulla
- The cuticle
- Cortex
- Medulla

The Medulla is located at the center of a hair shaft. It is a sponge‑like core that may or may not be present depending on the hair type. The exact role of the Medulla is not fully known, many believe the Medulla helps make hair thicker and keeps it warm. Coarser or thicker hair usually has a Medulla while finer hair often lacks a Medulla.

Cuticle

The cuticle is the hair's protective shield. I have seen it made of overlapping cells that look like tiny scales. When hair is healthy these scales lie flat giving hair a shiny look and keeping moisture inside. When the cuticle is damaged by heat, chemicals or friction the scales lift. This makes hair feel rough look dull and makes it easier for hair to break.

Cortex

Beneath the cuticle is the cortex, the thickest and most important part of the hair fiber. This layer consists of tightly packed keratin proteins and pigment. It is responsible for the strength, stretch ability and natural color of the hair. The cortex is responsible for the hair's elasticity and mechanical resilience, which means that most hair damage like breakage and weakening happens when this layer is compromised [5].

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GROWTH CYCLE OF HAIR:

1. Anagen (growth stage): Anagen is the growing stage. In this stage hair grows actively. Can last many years. I find it fascinating how Anagen keeps the hair strong.
2. Catagen (stage): Catagen is the transitional stage. During Catagen the hair follicle contracts and the rate of hair growth slows down. I notice that Catagen marks the end of a growth period.

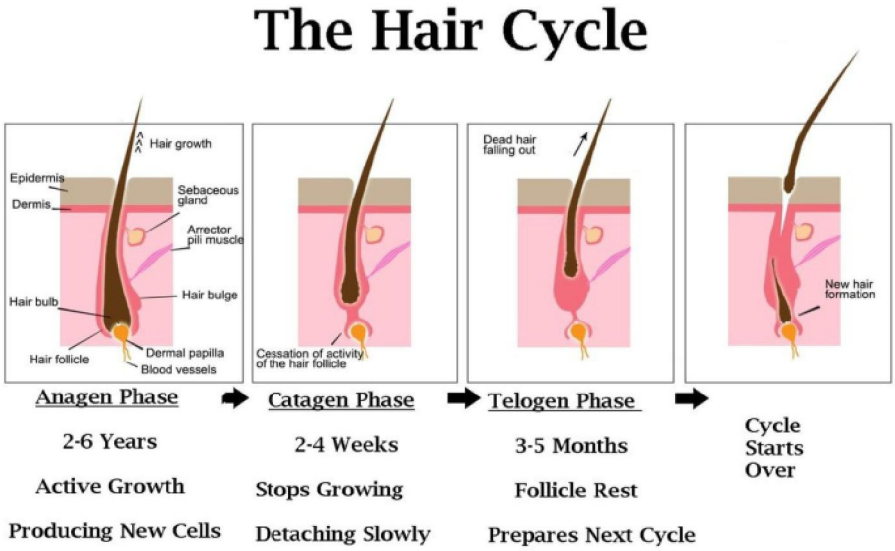


Fig.2: Growth cycle of hair

3. Telogen (resting stage): I notice that during Telogen, hair growth stops and new hair starts to grow pushing out the hair.
4. Exogen stage (stage): In the Exogen stage I see that the hair strand fully detaches from the scalp and falls away.[2]

HAIR PROBLEMS

Hair loss

All thought historically discussed as a problem among people with hair loss or thinning hair is also common, among humans. For men it is becoming male pattern balding. Female hair loss is typically caused by stress, medication, changing hormones and even menopause. Additionally many hair studying products (chemicals/ heat) can contribute to hair loss.

Split ends

Over brushing hair excessive perming much heat and lack of good conditioner cause split ends.

Oily / greasy hairs

Oily hair is caused when the scalp produce an excessive amount of the natural oil called sebum.

Sebum is produced by sebaceous glands, which may sometimes “work overtime”, leading to excessive amount of oil.

Heat damaged hair

Use your curly iron of flat iron too much and your hair will become damage.

Grey hair

To many, gray hair is a badge of honor. But other would prefer to get rid of it because grey hair become brittle and unruly than other strands.

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CAUSES OF HAIR PROBLEMS:

Heredity

Androgenetic alopecia is primarily caused by hereditary factors.

An imbalance in hormones

The cycle of hair growth can be disrupted by conditions like PCOS, hypothyroidism, and hyperthyroidism.

Drugs

Hair thinning is a known side effect of beta blockers, anticoagulants, and chemotherapy drugs.

Stress and trauma

Extreme and continuous stress, as well as any physical or emotional trauma, can cause hair loss.

Hair styling and styling products with rough handles

Tangled hair, excessively tight braided hairstyles, damp combing, and excessive pulling all put physical strain on hair, which can cause it to weaken and fall out. [8]

HAIR SERUM:

Hair serum is a light, liquid hair care product that is generally made of silicones, oils, and other beneficial adjuncts. It covers the hair shafts with a protective barrier, thus enhancing the club and improving overall hair condition.

What is hydrogel?

Hydrogels are water swollen polymeric materials that have a defined three-dimensional shape.

Hydrogel, by definition, refers to a substance that is swollen in water but in the case of a coater, it is meant to imply that the Hydrogel is a cross-linked network of hydrophilic polymers.

Hydrogel-Based Hair Serum:

Hydrogel- Based Hair Serum Hydrogel-based hair serum can be considered as a hair-care composition consisting of a hydrophilic polymeric network, which acts as a structural matrix to include cosmetic ingredients.Hydrogel materials have a three-dimensional, cross-linked polymeric structure with excellent water absorption ability, and they have found applications in cosmetics related to skin and hair. Multiple natural and synthetic polymers, such as chitosan, collagen, hyaluronic acid, alginate, and cellulose derivatives, have been studied in terms of their use in hydrogel based cosmetic systems. Some polymers like chitosan and keratin based materials have specific properties that are applicable for hair conditioning, film-forming and hair care. [22,23,24,25,26]

PLANT PROFILE:

1. Rosemary (Rosmarinus officinalis):

Rosemary (Rosmarinus officinalis Linn).an evergreen branched bushy shrub, reaching about one meter in height with upright stems, whitish-blue flower and dark green leaves which are small with edges turned over backward. Other species of genus Rosmarinus include R. tomentosus, R. laxiflorus and R. lavandulaceus.

Family. Labiatae.

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Fig 3: Rosemary leaves

Chemical constituents : rosmarinic acid, 12-methyl carnosic acid, caffeic acid and camphor, chlorogenic acid, rosmanol, carnosol, various diterpenes, ursolic acid, glycolic acid.

Uses

1. Hair Growth
2. Promotes a healthy scalp
3. Promotes Hair Strength
4. Enhance Natural anti-oxidant
5. Add shine and luster[8,10,11]

2. Curry Leaves (Murraya koenigii):

You may be familiar with curry leaves as a fragrant culinary herb that has a citrus flavor. But they have many other uses, including for hair care. Curdy powder is a combination of some spices. It is not curry leaves. The curry leaf plant is also called Murraya koenigii or kadi patta.

Family: Rutaceae



Fig 4: curry leaves

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Chemical constituents Carbazole alkaloids (Mahanimbine, girinimbine, Koenimbine), flavonoids (Quercetin), Vitamins & minerals (Vit.C, Vit.E, Vit.A), β-carotene, Tannins.

Use:

1. Prevent graying of hair
2. Boost Hair Growth
3. Strengthens the hair roots
4. Scalp nourishment
5. Conditioning hair [13,14,16]

3.Grape seed (Vitis vinifera):



Fig 5: Grape seed

Grape seed extracts. show great potential in hair care its and grape seed oil because of high concentrations of proanthocyanidins essential fatty acids, and antioxidant compounds

Family: Vitaceae.

Chemical constituents: oligomeric proanthocyanidins consisting largely of catechins, epicatechin. monomers and epicatechin gallate, alongside linoleic acid and vitamin E in the lipid fraction.

Uses:

1.Antioxidant power
2.Antiinflammatory effect
3. Vascular support
4.Antimicrobial action
5.Structural conditioning [17,18,19,21]

II. CONCLUSION

A promising herbal formulation for hair care is the Polyherbal hydrogel hair serum, which contains grape seeds, curry leaves, and rosemary. These plant-based components have potential health benefits, such as antioxidant activity, scalp-conditioning effects, and assistance in keeping hair healthy. Curry leaves are rich in bioactive compounds that may help nourish the scalp, grape seeds contain polyphenols with antioxidant qualities, and rosemary has long been used in hair

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care due to its potential to promote hair growth. With its non-greasy feel, ease of application, and enhanced cosmetic acceptability, the hydrogel base provides an appropriate vehicle for delivering
these herbal ingredients. The combination could be a viable substitute for traditional hair serums.
To assess its physicochemical characteristics, stability, safety, and clinical effectiveness in encouraging hair growth and lowering hair loss, more research is necessary. Subject to suitable formulation optimization and scientific validation, this polyherbal hydrogel hair serum presents potential for the creation of a natural hair-care product.

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