

A Review on Aloe Vera for Hair Growth

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Abstract: *Aloe vera is one of the most popular plants in home remedies and in cosmetic products. Many people rub its gel on the scalp hoping for thicker and longer hair. This article explains, in plain language, what is inside the aloe leaf, how hair grows, and how aloe vera might support the scalp and the hair follicle. It also looks at the research done so far. In short, the gel is rich in water, sugars, vitamins, minerals and plant chemicals that can calm the skin, fight germs and protect cells from damage. Laboratory and animal studies are encouraging, and the gel looks safe for most people when used on the skin. However, strong studies on human hair growth are still missing, so aloe vera should be seen as a helpful scalp-care ingredient and not as a proven cure for baldness.*

Keywords: Aloe vera, hair growth, hair loss, scalp health, herbal medicine, natural hair care

I. INTRODUCTION

Hair is more than a matter of looks. For many people it is tied to confidence and a sense of identity, so hair thinning can feel upsetting. A healthy adult has roughly one lakh (100,000) hairs on the scalp, and losing 50 to 100 of them every day is normal (Paus and Cotsarelis, 1999). Trouble starts when more hairs fall than grow back. This can happen because of family history, hormonal change, stress, illness, poor diet, scalp infection or harsh hair treatments.

Modern medicines such as minoxidil and finasteride help some people, but they can be costly, need long-term use and may cause side effects. This is one reason why people keep turning to plants that are easy to find at home. Aloe vera is at the top of that list. It is grown in pots and gardens across India, and almost every family has heard that its gel is good for burns, skin and hair. The aim of this review is to check how much of that belief is supported by scientific writing.

II. ABOUT THE ALOE VERA PLANT

Aloe vera, often written as *Aloe barbadensis* Miller, belongs to the lily-like group of plants. It is a short, stemless plant with thick, fleshy leaves that grow in a circle from the base. The leaves have small teeth along the edges and store water, which helps the plant survive in dry and hot places (Surjushe et al., 2008). The plant has been used for many centuries in traditional medicine systems of Egypt, Greece, China and India, mostly for skin problems, wounds and digestion (Rahmani et al., 2015).

If you cut an aloe leaf across, you can see three main parts. The outer green skin, called the rind, protects the leaf. Just under the rind sits a thin layer of yellow, bitter sap known as latex. In the middle is the clear, jelly-like gel, which is the part used on skin and hair (Hamman, 2008). People often mix up the gel and the latex, but they are different. The gel is soothing, while the latex contains compounds such as aloin that act as a strong laxative and may irritate the skin.



Aloe vera plant (Aloe barbadensis Miller)



Figure 1. Drawing of a potted aloe vera plant with thick leaves growing in a rosette (original illustration).

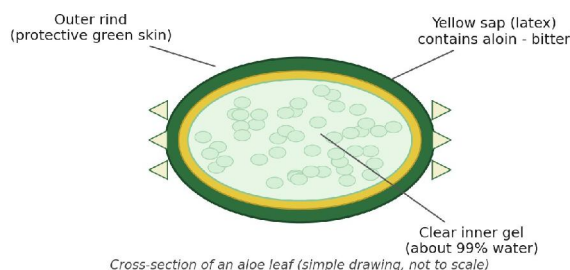


Figure 2. Cross-section of an aloe leaf showing the rind, yellow latex layer and clear gel (original illustration).

III. WHAT IS INSIDE ALOE VERA GEL?

Aloe gel is almost all water, about 99 percent, and the small remaining part holds a surprisingly long list of substances (Hamman, 2008; Sanchez et al., 2020). Table 1 lists the main groups in simple words and explains why each one could matter for the scalp and hair.

Table 1. Main groups of substances found in aloe vera gel

Group of substance	Examples	Why it may matter for hair and scalp
Sugars (polysaccharides)	Acemannan, glucomannan	Hold water, soften the skin and support healing of damaged skin.
Vitamins	A, C, E, B-group, folic acid	Act as antioxidants and take part in normal skin and cell growth.
Minerals	Zinc, copper, selenium, calcium, magnesium	Zinc and copper are needed for normal hair follicle function.
Enzymes	Amylase, lipase, others	May help break down dead skin cells on the scalp surface.
Amino acids and fatty acids	Several essential and non-essential types	Hair is made of protein, so these are basic building blocks.

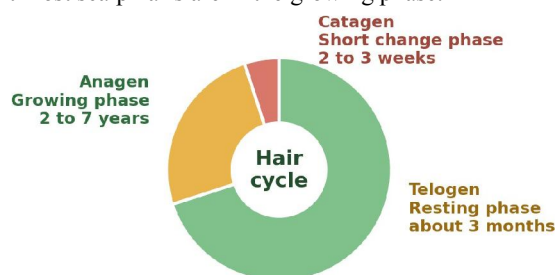


Plant chemicals	Salicylic acid, saponins, anthraquinones	Salicylic acid loosens flakes, saponins cleanse gently and some compounds fight germs.
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It is important to be honest about one point here. Finding a useful substance inside a plant does not mean that it reaches the hair root in a large enough amount to change hair growth. The skin of the scalp is a barrier, and how deeply these substances enter is not fully known.

IV. HOW HAIR GROWS

Each hair grows from a tiny pocket in the skin called the hair follicle. Follicles do not grow hair non-stop. They move through a repeating cycle with three steps (Paus and Cotsarelis, 1999). In the anagen phase the hair actively grows, and on the scalp this can last from two to seven years. In the short catagen phase, lasting a few weeks, growth slows down and the follicle shrinks. In the telogen phase, which lasts about three months, the hair rests and is finally shed to make room for a new one. At any moment most scalp hairs are in the growing phase.



The three phases of the hair cycle (slice sizes are only illustrative)

Figure 3. The three phases of the hair cycle: anagen (growth), catagen (change) and telogen (rest).

Hair loss usually means that this cycle has been disturbed. Either the growing phase becomes shorter, or too many hairs move into the resting phase at once. Poor nutrition, especially low iron, zinc or protein, can contribute to this (Rushton, 2002). An unhealthy scalp, for example one with dandruff, itching or infection, can also make hair fall worse. This is where aloe vera is most likely to help.

V. HOW ALOE VERA MAY SUPPORT HAIR

Researchers have suggested several ways in which aloe vera could be useful for hair. It is important to know that most of these are possible actions based on the plant's known properties and not proven hair-growth effects in people.

5.1 Calming the scalp

Inflammation, meaning redness, itching and irritation, around the follicle can weaken hair. Aloe vera has been described as having anti-inflammatory action in several laboratory and skin studies (Surjushe et al., 2008; Sanchez et al., 2020). By soothing an irritated scalp it may create better conditions for hair to grow.

5.2 Keeping the scalp moist

A study on human volunteers found that aloe gels improved the water content of the skin and reduced redness after repeated use (Fox et al., 2014). Although this study looked at skin on the body and not the scalp, a well-moisturised scalp is less dry and flaky, and moist hair is less likely to snap.

5.3 Fighting germs and dandruff

Aloe extracts have shown activity against some bacteria and fungi in the laboratory (Rahmani et al., 2015). In a small controlled trial, an aloe vera emulsion helped people with seborrheic dermatitis, a common cause of dandruff, when compared with a placebo (Vardy et al., 1999). Since dandruff and scalp irritation are linked with more shedding, controlling them may indirectly protect hair.



5.4 Protecting cells from damage

Aloe contains vitamins C and E and other antioxidants, which neutralise harmful molecules called free radicals (Sanchez et al., 2020). Free radicals can harm skin cells, including those around the hair root. Whether the amount of antioxidant that reaches the follicle is enough to matter is still unclear.

5.5 Cleaning and conditioning

The mild enzymes and the salicylic acid in aloe may help remove dead cells and oil build-up, so the pores stay open. The slippery sugars also coat the hair shaft, which makes hair feel smoother and easier to comb (Gavazzoni Dias, 2015). This helps to reduce breakage, though it does not make new hair grow.

VI. WHAT DO THE STUDIES ACTUALLY SHOW?

To judge the plant fairly we must look at the kind of evidence available. It can be grouped into three levels.

Laboratory studies. These test aloe compounds on cells in dishes. They show anti-inflammatory, antioxidant and antimicrobial effects and a few have reported that certain aloe components encourage cell growth. This is useful background, but cells in a dish are very different from a living scalp.

Animal studies. A small number of experiments on rats and rabbits have tested aloe gel or aloe-based formulations on shaved skin and reported faster or denser regrowth ("Microemulsion formulation of aloe vera gel and Apium graveolens ethanol extract", 2015). These results are promising, but animal skin and hair cycles differ from those of humans, and many of these studies were small.

Human studies. This is where the gap lies. We have good evidence that aloe gel is useful for skin moisture and some scalp conditions, but we do not have large, well-designed trials showing that aloe vera alone makes human hair grow back. Even general reviews of aloe vera point out that controlled trials are needed to prove its real efficacy (Surjushe et al., 2008).

Table 2. Summary of the evidence on aloe vera and hair

Type of evidence	What it suggests	How strong is it?
Cell and laboratory work	Calming, antioxidant and germ-fighting actions	Early / basic
Animal studies	Possible faster regrowth in animals	Limited, small studies
Skin moisture studies in people	Better hydration, less redness	Moderate for skin, not scalp-specific
Scalp dandruff trial in people	Improvement in seborrheic dermatitis	Small trial, needs repeating
Hair growth trials in people	Not enough good data	Missing

VII. HOW PEOPLE USE ALOE VERA ON HAIR, AND SAFETY POINTS

The most common way is to take fresh gel from a leaf, wash off the yellow sap, and massage the clear gel gently into the scalp. People leave it for some time and then rinse it off. Ready-made aloe gels, shampoos and hair tonics are also sold, and some people mix aloe with other ingredients such as coconut oil. Since the evidence for such mixtures is thin, they should be treated as personal choice and not as a proven method.

A few safety points are worth remembering:

- Do a patch test first. Apply a little gel behind the ear or on the forearm and wait a day. Aloe can cause itching, redness or rashes in some people.
- Use only the clear inner gel on the scalp and rinse away the yellow latex, which can irritate the skin.



- Do not swallow aloe latex or unregulated aloe products. Aloin acts as a strong laxative, and oral use is a separate matter from using the gel on the skin (Sanchez et al., 2020).
- Fresh gel can spoil quickly. Store it in a cool place and use it within a short time, or choose a product from a trusted maker.
- If hair loss is sudden, patchy, or lasts for weeks, meet a doctor or a skin specialist. Treating an underlying problem such as low iron or a thyroid disorder matters far more than any home remedy.

VIII. LIMITATIONS AND FUTURE RESEARCH

The main weakness in this field is the quality of studies. Many are small, use different forms of aloe (fresh gel, powder, extract, mixture with other herbs) and do not measure hair growth with reliable tools such as hair counts or photographs under controlled conditions. Aloe vera plants also differ with soil, climate and the way the gel is processed, so the amount of active substances is not the same every time. Future work should include larger, randomised trials in people, clear dose and preparation details, and tests of how deeply aloe compounds enter the scalp skin.

IX. CONCLUSION

Aloe vera is a safe, low-cost and widely available plant that offers real benefits for the skin and scalp. It moisturises, soothes, cleans gently and may help control dandruff, all of which support a healthy base for hair. Early laboratory and animal results hint that it may also help hair growth directly. However, reliable human studies are still lacking, so we cannot say that aloe vera will regrow hair or cure baldness. The sensible view is to use aloe gel as a supportive part of scalp care along with good nutrition, gentle handling of hair and medical advice when needed.

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