



Keratin-Infused Shampoos: Substance or Just Marketing?

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Awards:

Grand Prize Award in the 2021 New Brunswick North-West Regional Science Fair,
Participated in the Canada-Wide Science Fair

Keratin is a protein that forms the nails and hair of the human body. Many people use keratin-infused shampoos, and users claim that there has been a significant improvement in the appearance of their hair. Keratin-infused shampoos have been the default recommendation for silkier and smoother hair for a long time, but certain aspects of the manufacturers' claims do not make sense. For example, both hair and the scalp (the top layer of skin on the head) are not alive and hence, are unable to actively absorb any keratin. This leads to the main question of this article. How do keratin-infused shampoos work, and do they provide any of the long-term hair benefits that companies strongly imply in their advertising?

Hair follicles which reside in the dermis (the second layer of the skin) are responsible for hair growth. Since scalp and hair cannot absorb keratin, it cannot directly improve hair growth and nourishment, nor can it give beneficial long-term effects. However, if a supply of keratin nourishes the hair from its roots, the hair follicle will be able to absorb the keratin and use it, making the hair stronger and healthier more permanently than the short-term effects that keratin-infused shampoos have on hair. This article will inform the public of the truth of the misleading claims shampoo companies make to allow consumers to make educated decisions. My article will also help hold companies more accountable for their advertising.

Methods and Materials:

During the research for this paper, many credible websites and scientific literature were consulted such as peer-reviewed journal articles which helped study how keratin-infused shampoos affect hair health. For the more technical aspects of this paper, PubMed was used as it is a source of reputable scientific peer-reviewed publications regarding the health sciences, including trichology, the subject area of this article. To study the layer of the skin in which hair follicles reside and the kind of molecules the skin can absorb, health websites like Healthline and Cleveland Clinic were used. These websites provide scientific information in a manner that the public can easily access and understand. For similar reasons, Healthline was used to see which amino acids keratin is made up of and the digestion process of keratin supplements. Furthermore, a physician was consulted regarding how the keratin from shampoos makes hair look glossy and shiny and whether those effects are temporary or long-term.

Results:

Keratin-infused shampoos work by forming a temporary layer of keratin on the surface of hair (Ramprakash Galwa, personal communication, April 5, 2022). This layer temporarily makes them shinier and glossier by smoothening the potentially rough outer surface of the cells that overlap to make hair strands, which also increases hairs' tensile strength (Cutters His and Hers Hairdressing, 2023; Tinoco et al., 2018). The smoothening of the outermost layer of cells, known as the cuticle layer, polishes the hair and gives it its shine (Yang et al., 2014). However, these effects are not permanent and wear off within 72 hours, and eventually, the shampoos dry out the hair, leading to hair breakage, and they cause the hair to feel rough, coarse, and brittle (Bella All Natural, 2020; Tresemme US, 2018). The drying out of the hair is because there is a very high concentration of protein but a relatively low concentration of water that is added to the hair (Chez Vous, n.d.). These side-effects cause consumers to repeatedly use the shampoo to obtain shiny, soft hair again, resulting in a cyclical process that may be counterproductive. Furthermore, the skin does not allow protein absorption because proteins are large molecules, meaning proteins (and thus keratin) cannot permeate passively across cells' bilipid membranes or the skin due to the stratum corneum, the outermost layer of the epidermis composed of dead keratinocytes (Kalluri & Banga, 2011). This outer layer allows the transport of only small, hydrophobic molecules (Kalluri & Banga, 2011). So, keratin shampoos cannot have the benefit of nourishing hair follicles, either.





More permanent hair benefits can be obtained by focusing on diet, for example by incorporating protein-rich foods or keratin supplements. Once protein-rich foods or keratin supplements are ingested, hydrochloric acid and enzymes in the stomach, such as pepsin, hydrolyze the protein into amino acids. The amino acids are then absorbed into the bloodstream, after which they go to the keratinocytes. These specialized skin cells make keratin from the digested amino acids, which reach hair follicles and nourish them, allowing the hair to grow thicker and look shinier. This is an important point because hair is 95% keratin (Activilong, n.d.) and is dead tissue. The hair follicle, on the other hand, resides underneath the scalp and is alive. The scalp, being the skin covering the head, does not allow for protein absorption, so the only way for the hair follicle to obtain keratin is for the keratin to be ingested, which may come in the form of keratin supplements or food rich in the main constituent amino acids of keratin. The key amino acid in keratin is cysteine, with significant amounts of alanine, leucine, and arginine, too (Madhu, 2018; Zhang et al., 2014). Some foods that are rich in cysteine and thus promote keratin production in the body are chicken, dairy products, eggs, and legumes (Botanical-Online, 2022).

Discussion:

Contrary to claims by many companies, keratin-infused shampoos may negatively affect the hair because they lead to hair becoming coarse, brittle, and dry, and eventually, the weakened strands of hair start to break. Applying shampoo to the scalp may not be a good solution to improve hair quality, but diet may be. An important part of the diet is protein. Amino acids are the building blocks of protein, and there are twenty different types. Eating foods rich in cysteine or taking keratin supplements will lead to a more long-term solution for having healthy, strong hair because the strands of hair will be able to incorporate the keratin and thus grow thicker and shinier.

The next step to further improve or investigate this article is to conduct an experiment to determine the effect of the keratin-infused shampoos on hair compared to regular shampoos by studying characteristics such as the width of the keratin coating on hairs, the reduction of split ends after treatment, and the duration of treatment. This article can be used to elucidate the misinformation companies are disseminating for their benefit and provide accessible knowledge to the public to help them make an informed decision.

Conclusion:

From the research that was done, it is evident that the effects of using keratin-infused shampoos are not a result of the hair absorbing keratin but instead are from a keratin coating on hairs that makes them appear temporarily healthier. For effective long-term solutions of using keratin to promote healthy-looking hair, it is recommended that an individual eat food rich in cysteine or take keratin supplements. Therefore, this work suggests that the keratin-infused branding by companies is misleading because their advertising implies a permanent solution for healthy hair. This article can inform consumers the truth regarding keratin-infused shampoos helping them make more informed decisions on how they can improve their hair's health.

Acknowledgements:

I would like to thank Dr. Ramprakash Galwa for taking the time to explain how the keratin in shampoos forms a protective layer on hairs.

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My name is Raktika Galwa, a 15-year-old student from Fredericton, New Brunswick. I attend Fredericton High School. I am a competitive tennis player and participated in the 2022 Niagara Summer Canada Games and multiple Nationals events. I love reading books, and my favourite genre would be (murder) mystery. Listening to music would be another favourite thing of mine. I love listening to Bollywood and pop music. I aspire to be a doctor in the future because I love to help people, and there can be no better way to do so than saving someone's life.

