

The Influence of Herbal Tea Ingredients on Hair Condition: A Critical Review

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Abstract: Hair loss and graying are prevalent and deeply personal issues affecting millions worldwide, with significant psychological impacts on self-esteem and social perception. In the pursuit of non-invasive, sustainable remedies, a novel herbal tea blend has emerged, promising to address these concerns while offering protection against aging and chronic diseases. This blend, comprising black bean, black rice, sesame, black wolfberry, and polygonatum sibiricum, combines ancient herbal lore with modern nutritional science. Each ingredient targets hair degradation while bolstering overall health. Hair loss and graying, rooted in genetics, hormonal changes, nutritional deficiencies, inflammation, and environmental stressors, are multifaceted phenomena addressed by the blend's antioxidant-rich components. Moreover, the blend's holistic benefits extend to anti-aging, anti-diabetic, and immune-boosting effects. While promising, the blend's efficacy requires further scientific validation. Nonetheless, it represents a compelling natural remedy bridging tradition and modernity, offering hope for improved hair health and overall well-being.

Keywords: traditional Chinese medicine, herbal tea, black bean, black rice, sesame, black wolfberry, polygonatum sibiricum

1. Introduction

In an era where lifestyle-induced ailments intersect with a heightened pursuit of wellness and longevity, the quest for natural health solutions has never been more fervent. Among the myriad of concerns that people face today, hair loss and graying stand out as not only common but deeply personal issues, affecting millions worldwide^[1, 2]. The psychological impact of these conditions can be profound, affecting self-esteem and social perceptions. As society gravitates towards non-invasive, sustainable remedies, a novel herbal tea blend emerges at the confluence of tradition and science, promising not just to address these hair issues but also to offer a bastion against aging and chronic diseases.

The blend, a meticulously curated concoction comprising black bean, black rice, sesame, black wolfberry, and polygonatum sibiricum, is rooted in a rich tapestry of herbal lore and modern nutritional science. Each ingredient is chosen for its specific properties and synergistic effects, aiming to target the root causes of hair degradation while bolstering overall health.

Hair loss and graying are phenomena as old as humanity, with their occurrences being documented and lamented over through centuries. Historically, these conditions were often accepted as inevitable markers of aging, with sparse remedies offering little more than cosmetic solace. However, contemporary science has unraveled the complex web of genetics, environmental factors, and lifestyle choices contributing to these conditions, transforming the approach from resigned acceptance to proactive management^[3, 4, 5]. Amidst this paradigm shift, the discovery and utilization of herbal compounds stand out, harking back to ancient wisdom while being underpinned by empirical evidence.

This unique herbal tea blend we're discussing here is a product of extensive research and traditional knowledge. Black beans and black rice are well-known for their high anthocyanin content, which is beneficial in combating oxidative stress that leads to hair graying and loss^[6, 7]. Sesame seeds contain sesamin and sesamol, which have been scientifically proven to stimulate hair growth and restore pigment production in the follicles, addressing graying at its source^[8]. Black wolfberry is rich in vitamins and minerals that promote scalp health and strengthen hair, while polygonatum sibiricum possesses anti-aging properties that enhance the vitality of hair cells and extend their life cycle^[9, 10, 11, 12].

This tea blend does not merely stop at hair rejuvenation. The holistic benefits extend into anti-aging,

owing to the antioxidants and bioactive compounds that combat free radicals and improve cellular health. The anti-diabetic potential of the ingredients, especially black rice and black beans, through their modulatory effects on blood sugar levels, opens up a panorama of preventive health benefits. These claims are backed up by a growing body of scientific literature that confirms the health benefits of these ingredients.

However, the integration of ancient wisdom into a contemporary remedy poses inherent challenges. Skepticism surrounding the efficacy of herbal remedies and the necessity for scientific validation present formidable obstacles that this tea blend boldly confronts head-on. The objective of this review is to meticulously dissect layers of tradition, empirical evidence, and scientific scrutiny in order to unveil the genuine potential harbored within this tea.

2. Mechanism of hair loss and hair graying

The human hair follicle is a dynamic mini-organ embedded in the skin, capable of undergoing repeated cycles of growth, regression, rest, and shedding throughout life. This cyclic nature is orchestrated by a complex interplay of genetic, hormonal, and environmental factors, which, when disrupted, can lead to hair loss (alopecia) and the premature graying of hair. To unravel the mechanisms behind these phenomena, it's essential to start at the molecular level, where the fates of hair color and density are determined^[2].

2.1 Hair growth cycle and hair loss

The hair growth cycle consists of three distinct phases: anagen (growth phase), catagen (transitional phase), and telogen (resting phase). Hair loss can occur when there are disturbances in this cycle, leading to a shortened anagen phase or an extended telogen phase, resulting in increased shedding and decreased hair density^[2]. Several key factors contribute to this disruption.

2.1.1 Genetic factors

Genetic factors are fundamentally crucial in the development of androgenetic alopecia, a prevalent form of hair loss affecting both genders. This condition emerges due to the hair follicles' inherited sensitivity to dihydrotestosterone (DHT), a potent hormone derived from testosterone. The interaction between DHT and susceptible hair follicles leads to follicular miniaturization, where follicles progressively shrink and the growth phase of the hair cycle, known as the anagen phase, is significantly reduced^[4]. This genetic predisposition results in the thinning of hair and the characteristic patterned baldness observed in individuals with androgenetic alopecia, underscoring the complex interplay between genetics and hormonal factors in influencing hair health and density.

2.1.2 Hormonal changes

In addition to the impact of dihydrotestosterone (DHT), various hormonal shifts, such as those experienced during pregnancy, menopause, or due to thyroid disorders, play a significant role in affecting hair growth cycles. These hormonal changes can either stimulate or inhibit hair follicle activity, leading to alterations in the natural hair growth and shedding phases^[4].

2.1.3 Nutritional deficiencies

Hair is a fast-growing tissue that requires a range of nutrients, including proteins, vitamins, and minerals. Iron is vital for carrying oxygen to the scalp and hair follicles. Vitamin D is important for hair follicle cycling and supporting immune function. Zinc is necessary for DNA synthesis and cell division in hair follicles. Proteins are the main components of hair fibers. Essential fatty acids provide oils that keep the scalp and hair hydrated. Each of these nutrients is linked to the overall health of hair. Deficiencies in these nutrients can disrupt hair growth cycles, leading to weaker hair shafts, reduced hair density, and increased shedding^[2].

2.1.4 Inflammation and autoimmune conditions

Conditions such as alopecia areata involve the immune system attacking hair follicles, causing sudden hair loss. Alopecia areata is a condition where the immune system mistakenly targets hair follicles, leading to sudden and sometimes severe hair loss. This autoimmune response can cause patchy baldness in various areas of the scalp, affecting individuals' confidence and self-perception. In addition to autoimmune reactions, chronic inflammation is another culprit that can severely disrupt the hair growth cycle. Prolonged inflammation around the hair follicles can progress to scarring alopecias, a group of

conditions characterized by irreversible hair loss. In these cases, the inflammation damages the hair follicle to such an extent that it cannot regenerate, leading to permanent bald spots [2].

2.1.5 Environmental stressors

Physical and emotional stress can trigger a type of hair loss called telogen effluvium, characterized by widespread thinning of the hair. Environmental pollutants and toxins can also contribute to hair follicle damage and loss [2].

2.2 Mechanisms of hair graying

Hair graying, or canities, occurs when hair follicles produce less melanin, the pigment responsible for hair color. The process of hair greening is influenced by the following factors [1, 13].

2.2.1 Genetic factors

The timing and extent of graying are largely determined by genetics. Genes involved in melanin production and transfer to hair keratinocytes, such as BCL2, MITF, and MC1R, play crucial roles. BCL2 gene is crucial for the survival and function of melanocytes, the cells responsible for melanin production. MITF serves as a master regulator, orchestrating the expression of multiple genes involved in melanocyte development and function. MC1R influences the type and amount of melanin produced, thus affecting hair color and the graying process [5, 13].

2.2.2 Decline in melanogenic activity

Aging brings about a natural decline in the body's melanogenic capabilities, primarily due to the diminution of melanocyte stem cells within the hair follicles. This decrease in stem cell numbers leads to a reduced melanocyte pool available for melanin production. This reduction is thought to be influenced by accumulated DNA damage, oxidative stress, and hormonal changes [14].

2.2.3 Oxidative stress

Oxidative stress emerges as a significant contributor to the graying process. Reactive oxygen species (ROS), which are highly reactive molecules, can inflict damage on melanocytes and the enzymatic pathways critical for melanin synthesis. Factors contributing to oxidative stress include UV radiation, pollution, smoking, and inflammatory processes [14].

2.2.4 Hormonal and Environmental Factors

Similar to hair loss, hormonal changes and environmental factors can also impact the pigment-producing cells, hastening the graying process. These factors might not directly initiate hair graying but can certainly accelerate its progression [14].

2.3 Treatment of hair loss and hair graying

The interrelation between hair loss and graying hair is complex and influenced by overlapping genetic, hormonal, and environmental factors. Oxidative stress emerges as a common thread, suggesting that antioxidants could play a role in mitigating both conditions. Additionally, the hormonal pathways that lead to hair loss, particularly those involving DHT, offer potential targets for intervention.

Understanding these mechanisms is critical for evaluating the efficacy of any treatment, including the herbal tea blend in question. By addressing factors such as nutritional deficiencies, oxidative stress, and hormonal imbalances, the blend's ingredients may offer a multifaceted approach to promoting hair health. For instance, antioxidants present in ingredients like black wolfberry could theoretically reduce oxidative damage to hair follicles and melanocytes, potentially slowing down graying and loss. Similarly, the anti-inflammatory properties of some components may help mitigate scalp inflammation, a contributor to several forms of hair loss [14].

3. Ingredients and benefits for hair conditions

3.1 Black bean

Black beans are a powerhouse of nutrition, teeming with anthocyanins, proteins, fibers, and essential nutrients that are vital for maintaining hair health and overall well-being [6].

The antioxidant properties of black beans, primarily attributed to their high anthocyanin content, play a crucial role in reducing oxidative stress. This oxidative stress can lead to hair damage and premature graying. By neutralizing free radicals, anthocyanins can help maintain the integrity of the hair follicle and potentially delay graying. Additionally, anthocyanins have anti-inflammatory properties that can help reduce inflammation around the hair follicles, promoting a healthier scalp and potentially reducing the risk of conditions like alopecia.

Emerging studies have begun to shed light on the connection between black bean consumption and improved hair health, suggesting that regular intake may foster a conducive environment for hair growth and retention [6, 15].

3.2 Black rice

Similar to black beans, black rice is rich in anthocyanins, vitamins, and minerals, making it an excellent ingredient for promoting scalp health and hair vitality.

The nutritional bounty of black rice enhances scalp circulation and mitigates inflammation, creating an optimal scalp environment for healthy hair growth and potentially delaying the onset of hair graying. Evidence suggests that the incorporation of black rice into one's diet can have positive effects on hair growth, with its nutrient-rich profile supporting both the strength and longevity of hair fibers [7, 16, 17].

3.3 Sesame

Sesame seeds are laden with beneficial compounds such as sesamin, sesamol, and essential fatty acids, which are known to nourish and support hair health [8, 18].

Essential fatty acids, notably omega-3 and omega-6, play a vital role in enhancing hair health by promoting growth, reducing scalp inflammation, moisturizing hair, and improving its texture and strength. Omega-3s nourish hair follicles and enhance the quality of hair by encouraging growth factors and improving nutrient delivery, thereby boosting hair density and diameter. Their anti-inflammatory properties are crucial for maintaining a healthy scalp, crucial for staving off conditions like alopecia. Additionally, EFAs, especially omega-6s found in evening primrose and borage oil, act as natural moisturizers, preventing dryness and brittleness while improving the hair's structural integrity and imparting a vibrant shine. They also regulate scalp oil production, ensuring hair remains neither too oily nor too dry, thus supporting a balanced and conducive environment for hair health [2, 3].

3.4 Black wolfberry

In addition to similar antioxidant properties, black wolfberry is a good source of essential nutrients such as vitamin C, vitamin A, iron, and zinc, which are vital for promoting hair health. Vitamin C helps in the production of collagen, an important protein for hair strength. Vitamin A is crucial for the growth of all bodily tissues, including hair, and helps in the production of sebum, which moisturizes the scalp. Iron helps red blood cells carry oxygen to the hair follicles, which is essential for healthy hair growth and strength. Zinc plays an important role in hair tissue growth and repair. It also helps keep the oil glands around the follicles working properly. Research highlights the utility of black wolfberries in promoting dermal health, which extends to the scalp, potentially enhancing hair quality and growth [9, 10, 19].

3.5 Polygonatum sibiricum

This herb is rich in polysaccharides, saponins, and flavonoids, known for their anti-inflammatory and anti-aging properties. The bioactive compounds in polygonatum sibiricum offer anti-aging benefits that are beneficial for hair follicles, possibly aiding in reducing hair loss associated with aging and environmental factors. Studies have pointed to its anti-inflammatory and anti-aging benefits, suggesting potential positive impacts on hair health and longevity [20, 21].

4. Other potential health benefits

4.1 Anti-aging benefits

Aging, an inevitable biological process, can visibly impact our bodies. However, scientific research shows that this process can be decelerated by incorporating foods and beverages rich in antioxidants into

our diet. The unique blend of ingredients in this tea has been meticulously chosen for their high antioxidant content, offering a potent defense against oxidative stress.

The high anthocyanin content in black beans, black rice, and black wolfberry contributes to their anti-aging properties by providing protection against oxidative stress and damage caused by free radicals [15]. This blend, along with sesame seeds rich in vitamin E, shields the skin from environmental damages like UV rays and pollution, which accelerate aging signs such as wrinkles and fine lines [22]. Additionally, black wolfberry's high vitamin C content is vital for collagen production, enhancing skin elasticity and firmness, essential for reducing aging signs. Polygonatum Sibiricum, known for its anti-aging properties, promotes skin health, vitality, and longevity, effectively combating fatigue and the visible signs of aging, making this blend a potent mix for preserving a youthful appearance and improving overall skin condition [21, 23].

4.2 Anti-diabetic effects

Diabetes management is a multifaceted approach that involves the careful regulation of blood sugar levels to mitigate the risks and complications associated with diabetes. The integration of certain dietary components, such as those found in a specialized tea blend, can play a crucial role in this comprehensive management strategy.

One of the key ingredients in this blend, black beans, are recognized for their high fiber content. Dietary fiber is essential in diabetes management as it slows the absorption of sugar into the bloodstream. This delayed absorption helps in maintaining more stable blood glucose levels, preventing the dangerous spikes that can occur after meals [24, 25]. The tea also contributes anthocyanins, antioxidants that improve insulin sensitivity, aiding in more efficient glucose uptake and energy conversion, crucial for lowering blood sugar levels [26, 27, 28]. Additionally, sesame adds a rich source of magnesium to the mix, a mineral vital for glucose metabolism and insulin sensitivity, potentially enhancing blood sugar control. Together, these components offer a synergistic approach to supporting blood sugar management, leveraging the slow release of sugars, improved insulin response, and essential nutrient provision to aid in diabetes management and overall health [8, 29, 30].

4.3 Immune system support

A strong immune system is foundational to overall health, and many of the components of this tea blend contribute to enhancing the body's immune response. Known for its immune-boosting properties, black wolfberry is rich in polysaccharides, which have been shown to enhance the function of immune cells. Its high zinc content also contributes to immune defense [9, 10]. Additionally, polygonatum sibiricum has been used in traditional medicine to strengthen the immune system. Its bioactive compounds can stimulate immune activity and improve resistance to infections and diseases [21, 31].

4.4 Cardiovascular health

Black beans and black rice, packed with fiber, anthocyanins, and other bioactive compounds, work synergistically to lower blood pressure, decrease cholesterol levels, and enhance arterial function, promoting a healthy cardiovascular system [32, 33]. Additionally, sesame seeds, abundant in lignans and phytosterols, exert cholesterol-lowering effects, mitigating the risk of heart disease. Integrating these ingredients into one's diet can support optimal heart health and contribute to a balanced and wholesome lifestyle [34].

5. Conclusions

The tea blend presents a holistic approach to health, targeting not only hair loss and graying but also offering anti-aging, anti-diabetic, and immune-boosting benefits. Its composition is a testament to the potential of natural ingredients in supporting overall well-being.

The ingredients within the blend are backed by both empirical research and centuries of traditional use. This dual foundation adds credibility to the health claims associated with the tea, although it also highlights the need for continued research to fully understand its effects. The blend's efficacy is potentially amplified by the synergistic interaction of its ingredients. This synergy underscores the complexity of dietary supplements and the importance of considering the collective action of ingredients in health interventions.

The tea promotes a preventive approach to health care, emphasizing the role of diet and natural remedies in maintaining health and preventing disease. This approach aligns with growing health trends that favor prevention over treatment. While promising, the benefits of the tea blend warrant further scientific investigation. Specific studies focusing on the blend's efficacy, and mechanism of action will be invaluable in validating its health claims.

Finally, it's important to recognize that the consumption of this tea should be considered as part of a broader, balanced approach to health. Adequate nutrition, regular physical activity, stress management, and professional medical advice are essential components of a comprehensive health strategy.

In conclusion, this herbal tea blend represents a promising natural remedy for those seeking to improve their hair health and gain additional health benefits. By bridging traditional knowledge with modern scientific research, it offers a compelling example of how ancient wisdom can complement contemporary health practices. As we continue to explore and understand the full spectrum of its benefits, this tea blend stands as a testament to the potential of natural ingredients in enhancing our overall health and well-being.

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