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Insight into Alopecia: A Narrative Review of Prevalence, Pathogenesis and Psychological Consequences

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Abstract

Alopecia, medically defined as hair loss or baldness, is a condition that results in partial or complete hair loss, primarily from the scalp. It can be caused by various factors including genetic predisposition, environmental triggers, chemical exposure, certain medications, nutritional deficiencies, prolonged illness, and severe stress. The two main types are Androgenetic Alopecia and Alopecia Areata, the latter being a chronic inflammatory disorder that targets hair follicles. Though not life-threatening or painful, alopecia can lead to complications such as skin irritation, especially when eyelashes and eyebrows are affected. One of the most distressing side effects of chemotherapy is alopecia. Recent interest has grown in the use of herbal therapies for managing alopecia. These natural treatments are believed to promote hair regrowth through mechanisms such as enhanced scalp blood circulation, topical immunotherapy, application of minoxidil and anthralin, nutritional supplementation, and aromatherapy. Herbal therapies offer several advantages including lower cost, fewer side effects, easy accessibility, multiple modes of action, and better patient compliance. In conclusion, while alopecia is not physically harmful, it can significantly impact quality of life. Natural remedies present promising complementary options for treatment, although further clinical validation is needed.

Keywords: Androgenetic; Areata; Alopecia; Hair; Minoxidil; Anthralin; Follicles; Cicatricial

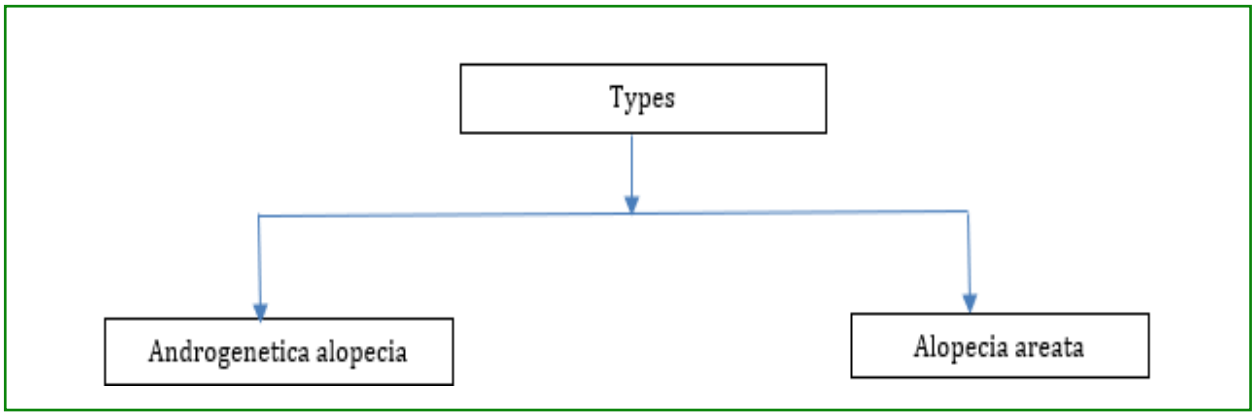
Introduction

One of the most important body parts, hair is formed from the ectoderm of skin. It serves as a protective appendage and is one of the integument's accessory structures, along with sebaceous glands, sweat glands, and nails [1]. Hair, one of the most significant body components, develops from the skin's ectoderm. Along with sebaceous glands, sweat glands, and nails, it is an accessory component of the integument that functions as a protective appendage [2].

The name "alopecia" comes from the Greek word 'alopex' which refers to the lifelong hair loss that animals experience. [3]. Alopecia is a condition that causes patchy, widespread, or complete baldness on different regions of the body, especially the scalp. The hair on the scalp gradually thins due

to this hormonal and hereditary condition [2,4]. Alopecia is a chronic dermatological condition that causes patients to lose some or all of their body and head hair. The condition, which damages the hair follicles, is chronically inflammatory. Although there may be skin irritation and health issues brought on by the loss of eyelashes and eyebrows, it is not unpleasant nor life-threatening. Alopecia is an autoimmune disorder that results from a confluence of genetic and environmental factors, but its etiology and subsequent development are not fully understood [5]. Alopecia, a dermatological condition that has been known about for more than two thousand years, is a frequent issue in both cosmetics and general medical treatment. It is widely used as a powerful vasodilator and has been clinically proven to be effective in the treatment of alopecia. However, using these synthetic drugs is linked to a number of reduced adverse events and is generally not advised for the safe and effective treatment of alopecia, so it is necessary to use drugs with a natural origin in place of the synthetic ones in order to lessen the adverse effects linked to them. Hair loss or baldness is referred to medically as alopecia [6,7].

Types of Alopecia



Androgenetic Alopecia: The most common cause of hair loss in both genders is androgenetic alopecia [8,9], which is followed by alopecia areata [10].

Male & Female Pattern Baldness: Androgenetic Alopecia which is characterised by the loss of hair in a certain pattern, can affect both men and women. When androgenetic alopecia affects women, the majority of the scalp experiences diffuse hair loss. The pattern of loss in men, however, typically begins with a receding hairline and progresses to thin the top of the head [11,12]. AGA is a type of chronic and dynamic hair loss that affects 40% of women and 80% of men in Caucasians under the age of 70. Around miniature hair follicles and hair follicle stem cells are lymphocytes and mast cells in this situation. A shorter anagen phase is a feature of follicleminiaturization [13,14].

Alopecia Areata: Alopecia areata is a non-scarring hair loss condition with a variable course and a wide range of symptoms. It has a cumulative lifetime incidence of roughly 2% and equally affects men and women [2,13]. Alopecia Areata is a frequent, very unpredictable autoimmune skin condition that causes hair loss on the scalp and other parts of the body. It typically begins with one or more tiny, round, smooth patches on the scalp and can proceed to entire scalp hair loss or total body hair loss. The most severe form of alopecia areata is called alopecia universalis.

The hair follicles are still present in all types of alopecia areata and are prepared to start producing hair normally as soon as they receive the right signal. in addition to the presence of other medications such corticosteroids, dithranol, tretinoin, minoxidil, zinc, and systematic signal. No single or combination of pharmacological therapy is providing satisfaction to people with alopecia, including cortisone, irritants, immunosuppressive medications, finasteride, and azelaic acid. Erythema, scaling, pruritus, dermatitis, itching, or skin rash are some of the negative effects linked to using these synthetic chemicals [15].

Psychological Impact of Alopecia

Physiological Problems Associated with Alopecia:
Alopecia-related psychological issues have not always been thoroughly and systematically researched. According to the available data, alopecia is a psychologically harmful condition that causes severe emotional distress as well as personal, societal, and occupational issues [16]. For women in particular, there is a significant connection between hair and identity [17]. Alopecia affects around 40% of women, and 63% of those women report having career-related issues as a result [18]. One indicator of psychological distress is the degree of alopecia. Psychological discomfort is more common in those with severe hair loss [15]. The fact that psychiatric illnesses are more prevalent in people with alopecia than in the general population suggests that those with alopecia may

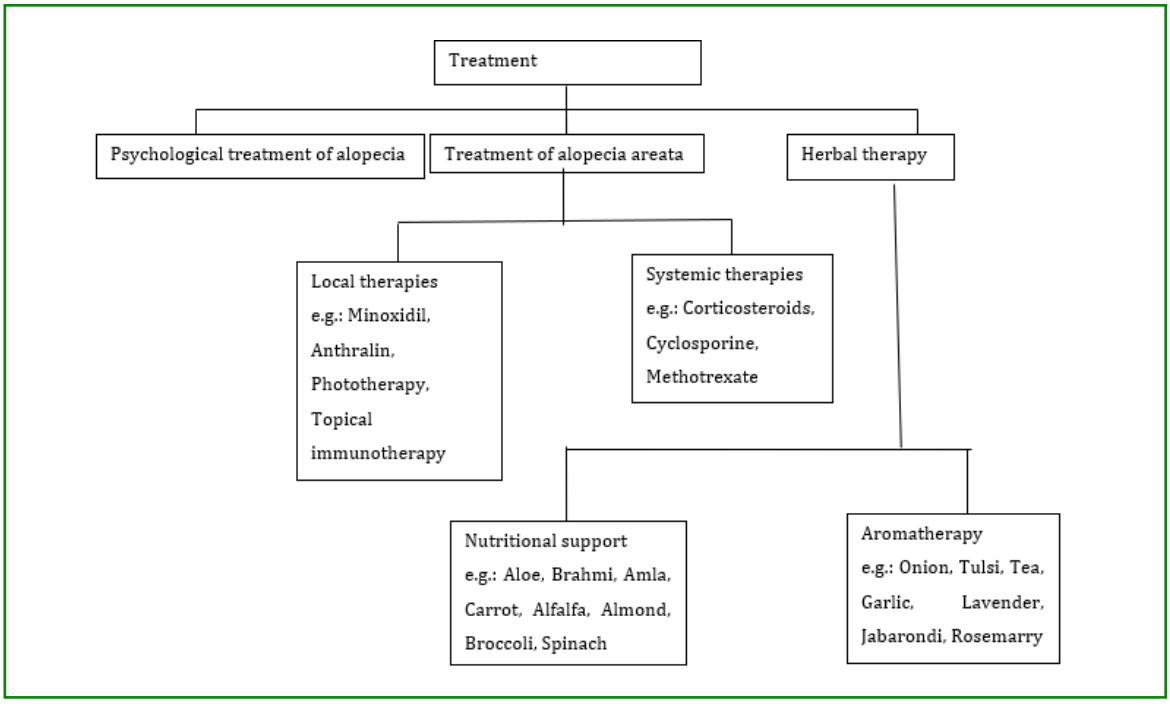
be more likely to experience significant depressive episodes, anxiety disorders, social phobias, or paranoid disorders [19]. A persistent sense of loss was reported by several alopecia patients in a different study, demonstrating that for some people, imitating alopecia may be similar to grieving after a loss [20]. The vast majority of studies demonstrate that controls and those with alopecia experience anxiety and depression at higher rates. Additionally, they have inferior quality of life, lower self-esteem, and poorer body image [21]. Those who lose eyebrows and eyelashes may also have problems with identity change, as these features help to define a person's fact [22].

Alopecia and Children: Alopecia in children may also lead to psychological issues. Alopecia in children may also lead to psychological issues than the controls, who went to the paediatrician for a "minor skin disease." Particularly, they displayed higher levels of anxiety, depression, withdrawal, aggression, or delinquency. Boys were less affected than girls. In a different study, seven of twelve children with alopecia areata had anxiety disorders [23].

Alopecia and Women: Many women's identities depend heavily on their hair. More so than for a male, a woman's hair is symbolically related to femininity, sexuality, attractiveness, and personality [24]. Therefore, losing your hair might negatively impact your body image and self-esteem. Cancer patients with and without alopecia were compared in a study, and those with baldness had worse body images. In addition, women's self-concept deteriorated after hair loss. Some alopecia episodes are significantly influenced by stressful life events [25].

Women with high stress levels are 11 times more likely to experience hair loss than those without [26]. In one study, researchers observed a group of women who lost their hair as a result of chemotherapy. They discovered four reactions that were shared by the majority of the group: being unprepared, being astonished, feeling ashamed, and feeling a loss of self-worth [22]. Losing one's hair is said to be psychologically worse for some women than losing a breast-to-breast cancer since losing one's hair is symbolic of important cultural ideas and values [27].

Treatment



- **Psychological Treatment of Alopecia:** The effectiveness of psychological therapy as a technique of helping persons with alopecia cope with the psychological effects of the condition. There have been no comprehensive research studies or randomized control trials included. Instead of concentrating on specific psychiatric therapy plans, it has concentrated on general coping challenges. it hasn't been thoroughly studied in study. One study described the benefits (reducing psychological problems] of using a support group to help people with alopecia to cope with the disorder [28].

- **Dealing with Alopecia Patients:** Alopecia may be accompanied by psychological issues, and these issues

need to be carefully addressed. Give that medical treatment for the more severe forms of alopecia is largely ineffective, it is critical that the person is helped to learn to live with the disorder and dissuaded from searching fruitlessly for a cure. This may mean referral to psychological services.

- **Treatment of Alopecia Areata:**
- **Local Therapies:**

Minoxidil: A 3% minoxidil under petrolatum occlusion produced hair regrowth in 63.6% of patients in a double-blind, placebo-controlled experiment on extensive AA, compared to 35.7% in the control group. Only 27.3% of patients had hair growth that was cosmetically satisfactory. In a trial contrasting topical minoxidil at 1 and 5% concentrations for the treatment of patients with severe AA, a dose-response effectiveness was demonstrated. With 1 and 5% topical minoxidil, the response rates were 38 and 81%, respectively. Minoxidil 5% solution is applied as an adjuvant to standard AA therapy twice day (with mainly topical or intralesional corticosteroids). The most frequent side effects are hypertrichosis and contact dermatitis. By utilizing minoxidil foam, which doesn't contain propylene glycol, contact dermatitis can be reduced [29].

Anthralin: A few uncontrolled case series are available to evaluate the effectiveness of anthralin in the treatment of AA. There have been reports of response rates of 75% in patchy AA patients and 25% in alopecia total is individuals. For the treatment of 68 individuals with severe AA, anthralin cream 0.5-1.0% was employed. 25% of the patients experienced a cosmetic response. Short-term contact treatment is possible with anthralin 1% cream. Every day, it is first applied for 15 to 20 minutes, then cleansed. Once low-grade dermatitis starts to appear, the contact time is extended by 5 minutes per week up to 1 hour. The contact time is then set and maintained every day for at least three months before assessing the treatment's effectiveness. Anthralin must cause a moderate irritating reaction in order to be effective. Severe irritability, folliculitis, localized lymphadenopathy, and stains on skin, clothing, and fair hair are some of the side effects. Patients should avoid getting this substance in their eyes, and sun protection should be provided for the area that has been treated.

Phototherapy: There aren't many randomized controlled trials for phototherapy using ultraviolet light and psoralen used topically or orally. It was demonstrated by two large retrospective studies that the response rate is no better than the rate of spontaneous remission. The lack of relevant data and the possibility of cutaneous cancers make PUVA a less preferred therapy choice. In a retrospective review of 25 AA patients, narrow-band ultraviolet B was ineffective. A few case studies have demonstrated the effectiveness of the 308-nm excimer laser in treating patchy AA. The initial fluences were 50mJ cm2 below the erythema minimum dose. After that, fluences were raised every two sessions by 50mJ cm2. Every patch received treatment twice weekly for a total of 24 sessions. In 41.5% of areas, hair regrowth has been observed [30].

Topical Immunotherapy: Topical sensitizers' mode of action is not well understood. Antigenic competition, perifollicular cell death, variations in the periphery CD4/CD8 lymphocyte ratio, and interleukin-10 secretion following diphenylcyclopropenone treatment are only a few of the explanations put out. Since 1976, dinitrochlorobenzene has been the only topical sensitizer used to treat widespread AA; however, it has been phased out due to evidence of mutagenicity in the Ames test. Both DPCP and squaric acid dibutyl ester are still in use today. DPCP is preferred because it is cheaper and is more stable in acetone. Although no randomized controlled trials have evaluated the effectiveness of topical immunotherapy in AA, observational studies have used the half-head method to control for spontaneous regrowth of hair. A comprehensive review of published topical immunotherapy studies (SADBE¼ 13 trials; DPCP¼ 17 trials) found little difference between the two agents.

The success rate for DPCP and SADBE ranges from 9 to 87%, with an average of 50 to 60%. In the biggest reported series of DPCP treatment, it was discovered that 17.4% of patients with alopecia total is/universalis, 60.3% with 75-99% AA, 88.1% with 50-74% AA, and 100% with 25-49% AA, had achieved cosmetically acceptable regrowth. In the first responders, there was a 3-month delay between the start of medication and the development of noticeable hair regrowth. Relapse after obtaining considerable regrowth occurred in 62.6% of patients, with relapse occurring on average after 2 and half years. Despite the fact that contact immunotherapy has primarily been employed in the adult community, there are instances of success in the pediatric population. A vesicular or bullous reaction is one of the unwelcome side effects of topical sensitizers. If this reaction materializes, the patient needs to wash the contact sensitizer off and apply a topical corticosteroid to the afflicted area. Other negative effects include erythema multiforme-like reactions, face and scalp oedema, contact urticaria, cervical and occipital lymphadenopathy, flu-like symptoms, and pigmentary issues (hyperpigmentation, hypopigmentation, dyschromia in confetti, and even vitiligo). Phototherapy trials under random control for phototherapy [31].

- **Systemic Therapies**

Corticosteroids: Patients with advanced AA have been treated with systemic corticosteroids. There have been numerous regimens employed with varied degrees of success. In 2005, the one and only oral prednisolone

randomized placebo-controlled study was released. 43 individuals with severe AA were randomly assigned to receive either a placebo or 200 mg of prednisolone once a week. Three months of treatment were followed by three months of observation. 35% of patients in the therapy group had significant hair regrowth, compared to none in the placebo group. During the observation period, the relapse rate was 25%. With prednisolone 300 mg once monthly for 3-6 months, significant hair regeneration was seen in 28/34 individuals (82%) with severe AA. In the report, just 15% of the individuals experienced negative symptoms. Hyperglycemia, osteoporosis, cataracts, immunosuppression, mood swings, obesity, dysmenorrhea, acne, and Cushing syndrome are a few of the negative effects of systemic steroids. Relapse rates have been estimated at 14–100%. The three times per day addition of 2% topical minoxidil may lessen post-steroid relapse. Because of their negative side effects and high relapse rate, systemic steroids are a less preferred treatment in AA.

Cyclosporine: Helper T-cell activation is prevented by the immunosuppressive drug cyclosporine, which also decreases interferon gamma synthesis. Variable results were seen when cyclosporine was used alone or in combination with systemic steroids. The range of the success rate is 25 to 76.7%. However, it should be noted that AA has been observed in a few of Cyclosporine-taking organ transplant patients. According to one study, a poor response to a combination of cyclosporine and methylprednisolone was linked to higher serum levels of soluble interleukin-2 receptor and lower baseline levels of interleukin-18. Because of its extensive side-effect profile and high relapse rate, cyclosporine is not a favoured treatment in AA. Nephrotoxicity, immunological suppression, hypertension, and hypertrichosis of body hair are some of the side effects. To evaluate the effectiveness and safety of this particular formulation in humans, additional research is required.

Methotrexate: Complete regrowth was achieved in 57 and 63% of individuals, respectively, using methotrexate (15-25 mg week 1) alone or in combination with prednisone (10-20 mg day 1). After a median wait time of three months, the beginning of hair regeneration was noticed. 80% of people relapsed (16 out of 20 responders). Negative side effects include brief transient transaminase elevation, ongoing nausea, and lymphocytopenia occurred in seven patients overall. In 64% of the 22 individuals with alopecia total is/AU treated with the same regimens, full hair growth was seen. Response rate was 38% in retrospective research involving 14 kids with severe AA treated with methotrexate (mean dose, 18.9 mg/week1).

- **Herbal Therapy**

Nutritional Support: To maintain a healthy rate of hair growth, it is essential to consume minerals like calcium, iron, copper, chromium, iodine, zinc, and magnesium. A mineral shortage will lessen the likelihood of controlling thyroid hormones, which prevent dry hair and hair loss as well as colour flaws, and blood circulation, which encourages healthy hair development. A body that has too much iron is poisonous.

Before using any mineral supplements, be sure to see your doctor. Biotin, folic acid, and the B vitamins (particularly vitamins B6, B3, and B5, anti-oxidant, sources of biotin are: whole grains, egg yolks, liver, rice and milk). For general well-being vitamin A is essential. As the hair root is kept moisturized, it is also advantageous to hair follicles. Vitamin E is an essential component in encouraging hair development and halting hair loss since it functions as an antioxidant and promotes healthy blood flow to the scalp through enhanced blood oxygen uptake.

The vital vitamin coenzyme Q10 gives our bodies the nutrition required for strong, healthy hair growth. They also contribute to healthy skin, strong nails, and general vigour. The best sources of vitamin E, an antioxidant that strengthens the immune system and protects the nerves, are often fatty foods like yoghurt and soy, dark green vegetables, whole grain products, essential fatty acids, nuts, and seeds. The vitamin A content of carrots is very high. It is an antioxidant that aids in the scalp's healthy sebum production. Hair loss can result from consuming too much vitamin A. Other meals including fruits, eggs, spinach, and broccoli can also assist to encourage hair development and stop hair loss.

Some of them are Summarized below:

Aloe

- **Common Name:** Kawar, *Aloe vera*
- **Biological Name:** Aloe barbedensis
- **Family:** Liliaceae
- **Part Used:** Leaves
- **Use:** 75 potentially active ingredients, including vitamins, enzymes, minerals, sugar, lignin, saponins, salicylic acids, and amino acids, are found in aloe vera. 47 Vitamins A, C, E, B12, and folic acid are all found in *Aloe vera* and they all help to promote healthy cell growth, shiny hair, and the treatment of hair loss and balding [32].

Brahmi

- **Common Name:** Brahmi
- **Biological Name:** *Bacopa monniere*
- **Family:** Scrophulariaceae
- **Part Used:** Entire Plant
- **Use:** Saponins, tritepenoids, and bacosides are the active ingredients found in *Bacopa monniere*. Because of its bio-chemical components, it aids in providing the scalp with the essential nutrition, enhancing hair development, and healing temporary baldness [33].

Alfalfa

- **Common Name:** Alfalfa
- **Biological Name:** *Medicago sativa*
- **Family:** Fabaceae
- **Part Used:** Leaves
- **Use:** Alfalfa contains rich in vitamins A, C, E, and K. Like other herbs, it includes a high concentration of antioxidants. When used as a supplement it can stop hair loss [34].

Amla

- **Common Name:** Indian Goose Berry, Amla
- **Biological Name:** *Phyllanthus emblica*
- **Family:** Rosaceae
- **Part Used:** Fruit
- **Use:** Amla is rich in important fatty acids, vitamin E, and vitamin C, all of which help to strengthen hair follicles, promote hair growth, enhance scalp health, and treat hair loss or baldness [35].

Carrot

- **Common Name:** Wild Carrot
- **Biological Name:** *Daucus carota*
- **Family:** Apiaceae
- **Part Used:** Root
- **Use:** Vitamins A and E are essential components for healthy hair and carrot oil is a rich source of them. Carrot oil rich in beta carotene is an important ingredient to prevent hair loss [36].

Almond

- **Common Name:** Badam
- **Biological Name:** *Prunus amygdalus*
- **Family:** Rosaceae
- **Part Used:** Seed Oil
- **Use:** Almond oil has a significant concentration of oleic acid and to lesser extent, linoleic acid. There is no doubt that taking almond oil supplements will benefit people with alopecia because they are DHT inhibitors. Due to its abundance in Vitamin E, almond oil really serves as the ideal hair oil for treating hair loss. Almond oil also contains biotin, which is essential for the healthy growth of your hair [37].

Spinach

- **Common Name:** Palak, Flat-Leaf Spinach
- **Biological Name:** *Spinacia oleracea*
- **Family:** Chenopodiaceae
- **Part Used:** Leaves
- **Use:** The rich iron, protein, vitamin A&C, and other micronutrient content of spinach helps to maintain the health of your hair, mature the follicles, and promote hair growth [38].

Broccoli

- **Common Name:** Broccoli
- **Biological Name:** *Brassica oleracea*
- **Family:** Brassicaceae
- **Part Used:** Flower
- **Use:** In men, the chemical ingredient sulforaphane found in broccoli may increase the number of hair strands by 7%, while in women suffering from androgenetic alopecia, it may aid in promoting growth [39].

Aromatherapy

Treatment for alopecia can include the use of aromatherapy. It uses extracts that are extremely concentrated and taken from the flowers, leaves, bark, and roots of numerous plants, including *Arnica montana*, *Cedrus atlantica*, *Lavandula agustifolia*, *Oscimum sanctum*, *Pilocarpus jabarondi*, *Rosmarinus officinalis*, *Thyme vulgaris*, etc.

In aromatherapy, the essential oils enter your body through your skin and olfactory system (inhalation). The essential oils enter the bloodstream, much like orally consumed herbs, where they attach to receptors and alter the chemical composition.

These oils function on a spiritual level as well as a cellular level to relax and strengthen the nervous system and promote well-being. Although topical herbal therapy has been shown to be the safest technique to treat many forms of hair loss (alopecia), the exact pharmacological activities of these herbs and oils are still unknown.

Some of them are Summarized below:

Onion

- **Common Name:** Onion, Bulb Onion
- **Biological Name:** *Allium cepa*
- **Family:** Alliaceae
- **Part Used:** Cloves
- **Use:** The antibacterial and antifungal properties of onions which are a storehouse of Sulphur have been utilized to give hair the nutrients it needs for a healthy growth as well as to strengthen it.
- After using cepa j u i c e as a treatment for alopecia areata for six months, there was a noticeably greater increase in hair growth [40].

Garlic

- **Common Name:** Garlic
- **Biological Name:** *Allium sativum*
- **Family:** Alliaceae
- **Part Used:** Cloves
- **Use:** Several vitamins and minerals including vitamin B-6 and C, manganese, and selenium, which all support healthy hair and prevent baldness are abundant in raw

garlic [41].

Tea
- **Common Name:** Tea, Tea Leaves
- **Biological Name:** *Camellia sinesis*
- **Family:** Theaceae
- **Part Used:** Leaves
- **Use:** Green tea might promote hair regrowth. Researchers included topically produced green tea in one short investigation. Three patients who had alopecia received EGCG extract to their scalps. Significant increases in the activity of hair growth were observed after 4 days [42].

Tulsi
- **Common Name:** Tulsi
- **Biological Name:** *Oscimum sanctum*
- **Family:** Lamiaceae
- **Part Used:** Whole Plant
- **Use:** Tulsi is good for hair because it stimulates blood flow and encourages hair development and is rich in antioxidants and vitamin K [43].

Lavender
- **Common Name:** Lavender
- **Biological Name:** *Lavandula agustifolia*
- **Family:** Lamiaceae
- **Part Used:** Flowering Top
- **Use:** Linolool, geraniol, and linalyl acetate are all components of lavender oil. It is known to be effective for alopecia areata, skin reproduction, and cell growth [44].

Jabarondi
- **Common Name:** Jabarondi
- **Biological Name:** *Pilocarpus jabarondi*
- **Family:** Rutaceae
- **Part Used:** Leaves
- **Use:** Hair loss and dandruff can be treated with jabarondi oil. The oil also protects against hair damage and early hair ageing while feeding the hair roots.

Rosemarry
- **Common Name:** Rosemarry
- **Biological Name:** *Rosmarinus officinalis*
- **Family:** Lamiaceae
- **Part Used:** Flowering Tops
- **Use:** Rosemary oil has been shown to promote hair development in some types of hair loss, such as alopecia areata and androgenetic alopecia [45].

Kaunch Beej
- **Common Name:** Kaunch beej
- **Biological Name:** *Mucuna pruriens*
- **Family:** Fabaceae
- **Part Used:** Seed
- **Uses:** Methionine and lysine, two essential amino acids that are present in kaunch beej powder, as well as seeds consumed in the diet, boost hair growth and renew the texture of tresses. This prevents balding and early greying by regulating hair loss. By revitalizing skin and bolstering hair, kaunch beej seed powder also improves the exterior appearance.

This is mostly due to its extraordinary high amino acid content and strong antioxidants. In addition, kaunch beej powder's slightly coarse quality makes it an excellent exfoliating agent, totally removing dead skin cells from the face, body, and scalp in addition to giving skin and hair a revitalized appearance and beautiful glow.

A significant amount of vitamins C and E are also present in kaunch beej which helps to improve the health of the skin, hair, and immune system.

Conclusion

Alopecia remains a prevalent concern among urban populations, often exacerbated by stress, environmental factors, and lifestyle changes. While conventional treatments such as topical minoxidil and oral finasteride are widely used, they may be associated with adverse effects. This review highlights the potential of various herbal medications, rich in diverse phytoconstituents, to effectively manage alopecia with fewer side effects. These herbal extracts may act as nutritional supplements or through aromatherapy to support hair regrowth. However, despite promising preliminary findings, there is a pressing need for more robust, large-scale clinical trials to validate the efficacy and safety of these herbal therapies. Future research should focus on standardized formulations, dosing protocols, and long-term outcomes. Comparative studies between herbal and synthetic treatments could also provide valuable insights into their relative effectiveness and mechanisms of action, paving the way for integrated therapeutic approaches in alopecia management.

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