Exploring the potential of herbal drugs for the treatment of hair loss

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Abstract

Hair loss can be recognized as a life-threatening disorder. It is a health condition during which hair is lost from some or all areas of the body, usually from the scalp. However, it has a great harm to a person’s self-respect, mental health, and entirety quality of life. Balding can be caused because of various reasons, like genetic tendencies, environmental triggers, exposure to chemicals, medicines, nutritional deficiency, extreme stress or long illness etc. In present article, we have covered information about loss of hair loss, types of alopecia, causes and various medicinal plants and parts they're of used in treatment prophylaxis or treatment of hair loss.

Keywords: Hairs; Alopecia; Medicinal plant; Herbal formulation.

Graphical Abstract

1. Introduction

Hair is one of the fundamental pieces of the body got from ectoderm of the skin, is defensive enhancement on the body and considered adornment design of the integument alongside sebaceous organs, sweat organs and nails [1]. As per Ayurveda, pitta dosha is the essential driver of going bald. Ayurvedic medicine for hair loss contains herbs which will arrest hair fall and improve hair development. There are various causes for hair loss and therefore the phenomenon remains not fully understood. Plants have been generally utilized for hair development advancement since past as reported in Ayurveda, Chinese and Unani systems of drugs [2].

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2. Alopecia (Hair loss)

Alopecia is a dermatological issue that has been seen for more than 2000 years and besides, it has been a typical issue in beautifiers similarly as fundamental clinical benefits practice. It is a synonym of baldness, involves absence or loss of hair, especially of the top. Alopecia is typical all through the world and has been evaluated to impact between 0.2 % and 2% of the absolute people [3]. Alopecia is perhaps the most widely recognized trichinosis in clinical, which brings about a huge effect on human soul and psychology. Over past years, the rate of alopecia has been expanded. The occurrence of alopecia is due to the nutritional imbalance caused by a combination of environmental pollution, stress, frequent dyeing and perm, drinking, smoking, diet and so on [4-5].

The age of patients with hair loss tends to be younger. 40% of patients suffered from alopecia require relevant treatment [6-7]. Alopecia has likewise been seen as significant symptom of anticancer medications, immunosuppressant and numerous other medication therapies. Mental stun, enthusiastic strain, central disease, mistakes of refraction, endocrine aggravation, neurocirculation unsteadiness and hereditary inclination are additionally the known reason for alopecia [8].

There are numerous medicines for alopecia, including hair relocate, beautifying agents and prescription. Clinical treatment shows an extraordinary impact on improving hair development. A lot of medications that prevents alopecia by repressing the male hormone. The two famous agents, Finasteride (a synthetic 5-α-reductase inhibitor) and minoxidil (a vasodilator), are used to treat alopecia by suppressing male hormone [9-10]. Nevertheless, the use of these two drugs is limited due to their severe side effects [11]

3. Composition and Hair Growth Cycle

Hairs can be characterized as - "improved epithelial construction framed because of keratinization of germinative cells," hairs are the outgrowths from the follicles existing on the skin. Hair is composed of keratin with chemical constituents such as Carbon(C), Nitrogen (N), Sulphur (S), & Oxygen (O). Hair development fluctuates from one individual to another but on average hair grows about 15-30 mm/ month. It is also called as epidermal subsidiaries as they begin from the epidermis during embryological advancement [12-13]. Every hair falls in following three cyclic stages [14]

3.1. Anagen (Growth stage)

The anagen stage can be short as 2 years to up to 8 years. Around 80 % of hair is generally in anagen stage. On a solid scalp, there are around 1,000,000 hair and 90% of the follicles are constantly in the anagen period of hair development.

3.2. Catagen (Involution phase)

In the catagen stage, the development action increments and hair moves to the following stage, catagen stage is between 10-14 days.

3.3. Telogen (Resting phase)

The telogen stage is a state at which the hairs move into resting state. This stage goes on for 90-100 days. All in all, 50-100 hair at irregular is shed each day. An increment of in excess of 100 hair for each 6-fat constituents a condition of going bald or alopecia, but it very well may be brief [15-16].

4. Types of Hair Loss

There are various types of hair loss as discussed below [17-19].

4.1. As per Ayurveda

Ayurveda, a 5000-year-old back traditional system of medicine developed in India. It has classified hair loss under three categories viz.

- Khalitya (loss of hairs)
- Palitya (Premature hair graying)
- Indralupta (Alopecia areata ortotalis)
4.2. As per Anglo-Indian medicine system

4.2.1. Alopecia Areata (Primary stage)
Alopecia areata is a typical immune system illness that outcomes in the deficiency of hair on the scalp and somewhere else. It as a rule begins with at least one little, round, non-scarring smooth patches.

4.2.2. Mild Brief Alopecia Areata
Patient with repeated transient alopecia areata yet never changes over into alopecia totalis or universalis. 25% of alopecia cases are record by the dermatologists and it is perhaps the most widespread types of alopecia.

4.2.3. Mild Transient Alopecia Areata
Patient with repeated transient alopecia areata yet never changes over into alopecia totalis or universalis.

4.2.4. Transient Alopecia Areata
Patient with Alopecia areata in progressive stage and some of them changes over into Alopecia totalis /Alopecia universalis.

4.2.5. Temporary Alopecia Areata
Patient with Alopecia areata in advanced phase and few of them converts into Alopecia totalis/Alopecia universalis.

4.2.6. Ophiasis Alopecia Areata
Ophiasis kind of alopecia areata shows a band like going bald. It happens generally in the transient or the occipital area of the scalp, and subsequently it is harder to treat, as most medicines have a delayed action on these regions.

4.2.7. Alopecia Totalis
Loss of hair from the entire Scalp.

4.2.8. Alopecia Universalis
Loss of hair from whole body including eyebrows and eyelashes.

4.2.9. Scarring Alopecia
Any provocative interaction (consumes, bacterial diseases, ringworm, injury) adequate to cause permanent loss of follicles, influenced region referred as scarring alopecia.

4.2.10. Tricostilomania
This kind of hair loss is referred as compulsive pulling or repetitive self-pulling by a patient himself/herself.

4.2.11. Traction Alopecia
Hair style that ties hairs so tight can cause much traction at the root of hairs, and can develop traction alopecia.

4.2.12. Chemotherapy and hair loss
Chemotherapy is elite therapy for malignant growth patients yet it influences typical cells and hair follicles as well. This causes going bald and known as anagen effluvium type of alopecia.

4.2.13. Diffuse Alopecia
Excessive Loss of hair everywhere on the scalp without creating a patch. Hair loss due to adverse effect of the cosmetic treatments like hair colors, dye, straightening, softening, rebounding, perming etc., which contains harsh chemicals can trigger hair loss for certain people. Telogen effluvium (TE) and chronic telogen effluvium- (CTE) Dietary lacks, Crash dieting High grade fever, Anemia, Blood loss, Hormonal imbalance and pregnancy etc. can cause telogen effluvium type of hair loss telogen word is known for latent phase of the hair and fluvium means.
4.2.14. Androgenetic alopecia

Androgenetic alopecia is the most common form of hair loss in both men and women and is characterized by the loss of hairs in defined pattern. When it affects women, it results in diffuse alopecia over the mid-frontal scalp (female pattern hair loss).

In men however the pattern of hair loss usually starts with a retreating hairline which then advances to thin the top of the head [20-21].

The effect of androgenetic alopecia is overwhelmingly mental. While men expect age-related going bald, similar interaction in ladies is typically unexpected and unwelcome at any time [22].

Male Pattern Baldness

Hair loss resulting in thinning is referred as alopecia. When it’s associated with hormones (androgens) and genetics, it’s referred to as androgenetic alopecia. When androgenetic alopecia exposes a space of the scalp it is called baldness. Male pattern bald is described by a subsiding hairline or potentially going bald on the top and front of the head.

Male pattern hair loss is an inherited condition, caused by a genetically determined sensitivity to the consequences of dihydrotestosterone, or DHT in some areas of the scalp. DHT is believed to shorten the expansion, or anagen, phase of the hair cycle, from a usual duration of 3–6 years to only weeks or months. This happens along with miniaturization of the follicles, and progressively produces less and better hairs. The creation of DHT is regulated by an enzyme called 5-alpha reductase. A few qualities are included, representing contrasting time of beginning, movement, pattern and severity of hair loss in relatives. The susceptibility genes are acquired from both mother and father. At this time, genetic testing for prediction of balding is unreliable (Fig. 1).

![Figure 1 Stages of male pattern baldness](image)

Female Pattern Baldness

The most widely recognized type of going bald found in ladies is androgenetic alopecia, also referred as female pattern alopecia or baldness. This is viewed as hair thinning predominantly over the highest and sides of the top. It affects approximately one-third of all susceptible women, but is most ordinarily seen after menopause, although it’s going to begin as early as puberty (Fig. 2).

![Figure 2 Stages of female pattern baldness](image)
Ordinary hair fall is roughly 100-125 hairs each day. Luckily, these hairs are replaced. Genuine balding happens when lost hairs are not regrown or when the day-by-day hair shed surpasses 125 hairs. Hereditarily, hair loss can come from either parent's side of the family [23].

### 4.3. Causes of Hair Loss

There are several factors that are responsible for the hair loss. These factors includes acute illness, poisons, autoimmune disorders, poor blood circulation, chemicals (hair dyes), poor diet or malnutrition, chemotherapeutic agents, prescription drugs, diabetes, psychological, radiation exposure, etc [24].

### 5. Medicinal plants used in hair loss

#### 5.1. Ginkgo biloba

The drug is known to improves cerebral microcirculation and hence increases oxygen supply. Ginkgo biloba leaf extract promote hair regrowth through combined effects on proliferation and apoptosis of the cells within the follicle, thus recommending potential as a hair dressing (Fig. 3) [25].

**5.1.1. Part used**

Leaves

**5.1.2. Chemical constituents**

Lactones (6%): Diterpenoids, Ginkgolides A, B, C, J, M, Bilobalide-A, Flavanols (24%). Kaempferol, Quercetin, Isorhamnetin, bio-Flavin, sitosterol and anthocyanins.

**5.1.3. Mode of Application**

The drug is separated in coconut oil and is massaged for a minimum of 2 minutes.

#### 5.2. Allium cepa L.

It has also been found essential in patchy baldness. The affected part should be rubbed with onion juice morning and evening till it's red. It should be rubbed with honey afterwards. It contain Zinc that helps to secrete the scalp with much needed oil and avoid dandruff which will cause hair loss. Iron is involved within the oxygenation of your body's red blood cells. It is essential for normal hair growth and maintaining healthy hair (Fig. 3) [26].

**5.2.1. Parts used**

Onion Juice

**5.2.2. Chemical Constituents**

Protein (albumin), allyl propyl disulphide, diallyl sulphide, alliin, allicin. It also Contains some mineral like potassium, zinc, calcium, magnesium and traces of chromium.

#### 5.3. Asiasari radix

Asiasari radix extract has hair growth promoting potential, and this effect may be due to its regulatory effects on both cell growth factor gene expressions (Fig. 3) [27].

**5.3.1. Parts used**

Roots & Rhizomes

**5.3.2. Chemical constituents**

Safrole (18.4%), Methyl eugenol (18%), methoxytoluenes& 3-benzodioxole derivatives.
5.4. Eclipta alba (L) Hassak

Eclipta alba is a component in various polyherbal formulations for hair growth promotion. Methanolic extract has been shown potential as a hair growth promoter. It is also reported that the petroleum ether extract of E. alba promotes follicular enlargement and prolongation of anagen phase (Fig. 3) [28-30].

5.4.1. Part used
Whole plant

5.4.2. Chemical constituents
Flavonoids & iso-flavonoids: Wedelolactone, Desmethylwedelolactone, Triterpene, Glycosides & Saponins: Eclalbasaponins I-VI, -amyrin.

5.5. Hibiscus rosa-sinensis Linn

Leaf extract of Hibiscus rosa-sinensis increases hair length and the anagen/telogen ratio of hair follicles in mice [66]. Formulation containing Eclipta alba Hassk, Hibiscus rosa sinensis Linn, NardostachysJatamansi have excellent hair growth promoting activity, they mainly act by an enlargement of follicular size and a prolongation of the anagen phase (Fig. 3) [31].

5.5.1. Parts used
Leaves & Flowers

5.5.2. Chemical constituents
Flavonoids; Anthocyanins and Cyaniding-3, 5-diglucoside, Cyaniding-3-sophoroside-5- glucoside, Quercetin-3,7-diglucoside, Quercetin-3-diglucoside.

5.6. Phyllanthus embelica

Iron is involved within the oxygenation of your body's red blood cells. It is necessary for normal hair growth and maintaining healthy hair. If the amount of iron cannot be replaced with food intake, iron deficiency will cause hair loss because of oxygen deficiency. Its polyherbal ointment and herbal hair oil have hair growth promoting activity (Fig. 3).

Herbal Formulation containing Tridax procumbens (Linn.), Hibiscus rosa sinensis (Linn.), Trigonella foenum graecum (Linn.), and E. officinalis (Linn.) showed synergistic effects by significant increase in hair growth activity [32].

5.6.1. Part used
Fruits

5.6.2. Chemical Constituents
Vitamin C, Phyllemblin, tannin, phosphorous, iron, calcium.

5.6.3. Mode of Application
Indian gooseberry oil, prepared by boiling dry pieces of Indian gooseberry in coconut oil, is viewed as a significant hair tonic for advancing hair development. A mixture of ansame quantity of fresh Indian gooseberry juice and lime juice, used as a shampoo also stimulates hair growth and prevents hair loss.

5.7. Rosmarinus officinalis

The essential oils enter your system through the olfactory system (inhalation) and/or through your skin and reach your circulatory system (the blood) where they bind to receptors and change the chemical composition. For local herbal therapy stimulates hair follicles and it is proved as safest way to cope up with different type of hair loss (alopecia), however perfect pharmacological actions of these herbs and oils are still not known (Fig. 3) [33].
5.7.1. Chemical Constituents
Angustifolia Miller (Labiatae) Rosmary constitutes 1-2% volatile oil containing 0.8-6% of esters and 8-20% of alcohols. The principal constituents are 1, 8-cineole, borneol, camphor, bornyl acetate and monoterpenic hydrocarbons. The major components of lavender oil are Lavandulol, linalyl acetate, linalol, lavendulyl acetate, terpineol and cineol.

5.7.2. Mode of Application
These oils were massaged into the scalp for a minimum of two minutes daily for seven months.

Figure 3 Herbal drugs and main chemical constituent

6. Analysis of herbal drugs
Herbal drugs wholly or parts or extracts or their formulations are analyzed by routine quality control methods. These includes high performance thin layer chromatography, high performance liquid chromatography, Uv-spectrophotometry, gas chromatography, etc [34-95].

7. Future Prospective
Although many natural drugs have been discovered, it is still necessary to search for novel hair promotion agents with more effective and less toxicity. Furthermore, the underlying mechanisms of many compounds with hair-growth promotion activity have not been studied or explained in detail.

Even though some effective hair-growth promotion drugs are developed from botanical sources, there still remains an untapped resource in herbal medicines.
8. Conclusion

Thus, herbal drugs provide a new revolution for hair development having potency for curing alopecia with no side effects. These herbal extracts having numerous phytoconstituents can treat alopecia either by supplying nutritional supplements. There are also some natural treasures having essential oil active constituents which may be used as aromatherapy for treating alopecia by improving scalp blood circulation.

Compliance with ethical standards

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Disclosure of conflict of interest

The author declares no conflict of interest.

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