

# A REVIEW ON THERAPEUTIC APPROACHES OF HERBAL HAIR FORMULATION FOR HAIR GROWTH

Himani Singh\*<sup>1</sup>, M.A Naidu<sup>2</sup>, Neelesh Malviya<sup>1</sup>

1. Smriti College of Pharmaceutical Education, Indore (Madhya Pradesh)

2. Mandsaur University, Mandsaur (Madhya Pradesh)

**Corresponding Author**

**Mrs. Himani Singh**

**Research Scholar**

**Mandsaur University**

[himani.singh@scopeindore.info](mailto:himani.singh@scopeindore.info)

## ABSTRACT

However hair does not assist any critical physiological condition in human beings but it plays significant role in our social and mental life. Androgenic baldness and circular/spot baldness these are the most conventional type of hair loss. In market most of the synthetic active ingredients are available for the treatment of hair loss still with some limitation. These synthetic compounds are effective but having some side effect. From the classical times in Ayurveda, Unani and Chinese approaches medicinal plants have been generally used for hair growth promotion so that the herbal medicines gaining popularity day by day because they are safer and effective from synthetic. This review article discusses the mechanism of the herbal drug with their phyto-constituents with emphasis in the hair growth promotion activity. It also gives knowledge about different herbs and herbal formulation with their action. So the aim of the present article is to be giving a cumulative knowledge about the hair loss treatment with emphasis on the hair loss cause and type focused on the herbal hair formulation with scientific validation with herbal and synthetic drug or isolated compound for hair growth potential activity. The knowledge condensed in the paper may be an vision to design a new preparations for the treatment of hair loss.

**Keywords:** Androgenic Baldness, phyto-constituents, hair growth, herbal hair formulation

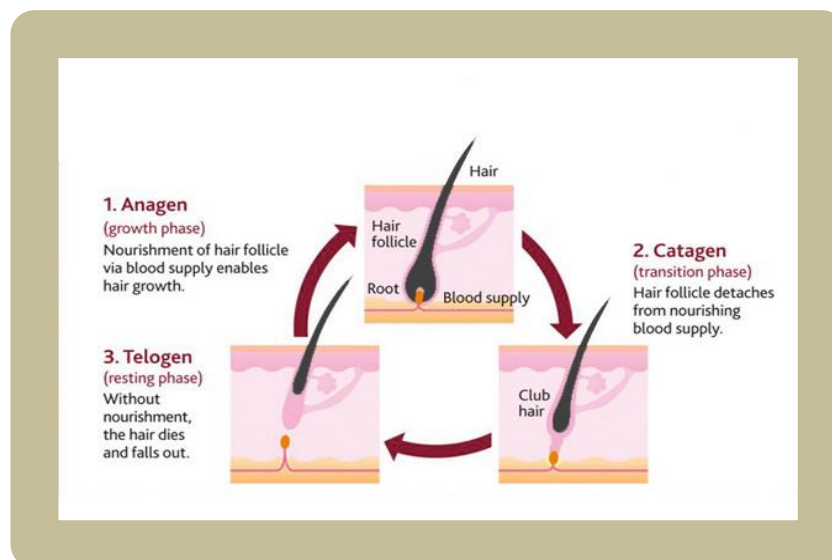
## 1. INTRODUCTION

Hair loss is a disorder in the present scenario because hair has a remarkable impact on the social interactions and physiological well being of the humans. Moreover hair play important role in cosmetic asset and it also play important role in regulation of body temperature.[1] Hair loss can be caused by various factors. Alopecia is main disorder after hair loss basically it is not considering as an enervative or lethal problem, but if someone becomes bald can lead to emotional stress and traumatic condition for those who suffer from premature or excessive hair loss. Hair play essential role as thermal insulation and for social and sexual communication in mammals.[2] Natural products from plant, animal and minerals have been the basis of the treatment of human disease; about 80% of people in developing countries still depend on traditional medicine based on their availability. Herbal medicines are currently in demand and their popularity is increasing day by day.[3] So the aim of the present article is to be giving a cumulative knowledge about the hair loss treatment with emphasis on the hair loss cause and type focused on the herbal hair formulation. It also gives herbal drug action on the preventing hair loss.[4]

### 1.1 Hair and Hair Growth Cycle

A hair can be defined as thread like and slender outgrowth forms a follicle in the skin of mammals and composed mainly of keratin. Hairs are present on most skin surfaces except the palm, palmar surface of fingers, the soles and plantar surfaces of the feet. Hair is considered as vital parts of the body which is derived from the ectoderm of skin, and play role in protective appendages on the body and it is also an accessory structure of the integument along with sebaceous glands, sweat glands and nails. Anatomically hair is dead columns of keratinized cells which are welded together.[5,6] Shaft is the uppermost part of the hair and below the surface that which hair portion imbedded into dermis called root and shaft. Hair root is the underground part and located under the epidermis. The hair shaft is located above the epidermis. Hair root having different type of structure are like Hair follicle- At the end of the hair root tube-like pocket or depression into the skin or scalp is called hair follicle. Hair bulb- It is lowest part hair strand; club-shaped and thick in structure. Dermal Papilla- At the base of the hair follicle cone-shaped small elevation into the hair bulb called dermal papilla. Arrector pili muscle- It is involuntary muscle at the base of the hair follicle, when these muscle contracts, we get goose bumps. Sebaceous glands- these are oil glands which secretes

sebum and connected to the hair follicles. Hair shaft comprised of three layers: the cuticle, cortex, and medulla.[7] Two main types of hair found on the body are vellus hair and terminal hair. Vellus hair (lanugo hair)- short, fine, unpigmented, downy; appears on parts of the body that are normally considered hairless (forehead, eyelids, bald scalp); almost never has a medulla; helps with the evaporation of perspiration; women normally retain 55% more vellus hair than men. Terminal hair- long, coarse, pigmented hair found on the scalp, legs, arms, and bodies of both males and females; it usually has a medulla. Various in-vitro models investigated that hair growth utilizes the hair follicle Dermal Papilla cells (DPCs), which are specialized mesenchymal cells present at the base of hair follicle that play essential roles in hair follicular morphogenesis and postnatal hair growth cycles. The turnover of hair follicles (HF) occurs in cycles with alternating stages of rapid growth and hair shaft formation (anagen), apoptosis-driven regression (catagen) and relative HF quiescence (telogen). Normal hair loss found in a day is about 70-100.[8] Growth rate and replacement cycle altered due to illness, high fever, diet surgery, blood loss or emotional stress. Hair growth is a progressive and coordinated process of cellular proliferation and differentiation of hair follicle. Stem cells play an important role in the provision of hair follicle that generates a mature hair follicle after massive proliferation.[9]



**Fig. 1 Hair growth phase**

## 1.2 Disorders in Hair

The common problems related with hairs are dandruff, pigmentation and hair fall and hair loss (balding). Balding is two types either permanent or temporary and there are various disorders of hair, which causes the hair loss. Alopecia is the most common disorder with pattern hair loss like bald patches called Alopecia areata and the other one is diffuse hair loss called Telogen effluvium. It is helpful to know about whether the condition is nonscarring (means reversible) or scarring (means permanent). Scarring is a rare condition and basically depends upon autoimmune disorder. [10,11] Here is a list of some scarring and non-scarring disorders in Table 1.

**Table 1. Disorder of Hair [12]**

| Type   | Cause   | Clinical feature   | Treatment   |
|--|---|--|---|
| Anagen effluvium (anagen disruption)                   | Chemical-therapeutic agents, Agent which induced poisoning eg; boric acid mercury, thallium)<br>Radiation | Loss of all hair from the scalp  | Cooling of Scalp  |
| Androgenetic alopecia (both male and female hair loss) | Effect by endocrine system by androgens dihydrotestosterone cause   | At beginning bi temporal Recession and sometimes bald patch on scalp                                   | Drugs used in treatment are, Propecia, minoxidil and Finasteride. Hair transplants.     |
| Congenital disorders                                   | Congenital atrichia with papules Ectodermal dysplasia   | --   | --  |
| Telogen effluvium                                      | telogen hairs shedding with no scars, high fever also cause shedding, surgery, crash diet                 | Decreasing uniformity and density of hair all over scalp, it can be checked by positive hair pull test | Best procurement is less frequent shampooing of hairs and then get back hairs in years. |

|                   |   |   |                              |
|-------------------|---|---|------------------------------|
| Alopecia Areata   | Autoimmune disorder or can be cause by genetic factor | Patches of hair loss in a circular manner, Hairs grow back white. | Steroid injection eg kenalog |
| Traction alopecia | Traction from braids, rollers ponytails               | --  | Hair graft                   |

## 2. CURRENT MANAGEMENT OF HAIR LOSS TREATMENT

There is several ways which effect the stimulation of hair growth. Parameters which effect hair growth are linear growth rate of hair, increase in hair fibre diameter, alteration in hair cycle, telogen shortening or anagen prolongation.

- a) Reduction of deficiency of vitamin, nutrients and minerals which can be normal cause of Alopecia.
- b) The process of formation of new blood vessels from the pre- existing vascular network called Angiogenesis.
- c) Therapy which effect female pattern baldness called Anti androgen therapy. [14]
- d) Drugs, which are use in the treatment of hair loss, possibly target growing, multi-billion dollar market worldwide but still there is no profound improvement in the availability of specific therapies.

USFDA approved two drugs for the treatment of hair loss in concomitant androgenic alopecia are finasteride (male pattern baldness) and Minoxidil (both male and female pattern baldness).Some non surgical therapeutic strategies for hair growth promotion are angiogenesis, opening 5-alpha reductase inhibition, vasodilation through potassium channel, androgen antagonism and modulation of hair cycle. The side effects of these synthetic compounds include erythema, scaling, pruritus, gynaecomastia, dermatitis, itching or skin rash [15,16].

### 2.1 Mechanism of Action Hair Loss Treatment

The hair growth cycle majorily having 3 phase known as the anagen (active growth phase; takes 2-7 years), catagen (involuting or regressing phase; takes approx. 2 weeks), telogen (short resting phase; takes approx. 4 months) and exogen (shedding phase) [17]. This cycle can be

effect by various factors and actively regulated by growth factors and cytokines. Some action which are essential for hair growth are increased expression of insulin-like growth factor-1 (IGF-1), fibroblast growth factor (FGF), keratinocyte growth factor (KGF) and vascular endothelial growth factor (VEGF) let maintain the anagen phase, while decreased expression of transforming growth factor beta (TGF- $\beta$ ) promotes hair apoptosis in catagen phase [19,20]. Herbs and their active constituents used in order to promote hair growth showed different types of the mechanisms of action. In general, mechanisms involving

- (1) IGF-1,
- (2) VEGF,
- (3) Epidermal growth factor (EGF),
- (4) FGF-2,
- (5) Endothelial nitric oxide synthase (eNOS),
- (6) Wnt/ $\beta$ -catenin signaling pathway,
- (7) Prostaglandin E (PGE),
- (8) Prostaglandin F (PGF) stimulate hair growth, whereas the mechanism engaging (1) 5 $\alpha$ -reductase, (2) TGF- $\beta$ , (3) FGF-5, (4) prostaglandin D2 (PGD2) inhibit hair growth. [21]





## 2.2 Herbs for Hair Growth Promotion

Various plant extracts and part of plant used for the care of the hair and also having hair growth promoting activity, and after clinical result numbers of herbal products acclaimed having growth promoting activity.[22] Many poly-herbal formulations are studied and manufactured as hair tonic, hair growth promoter, hair conditioner, hair cleansing agent, anti-dandruff agents and also in the treatment of alopecia.[23] This part of review focus on the scientific evidence of hair growth promoting activities of plants their parts used, type of extracts and also in-vitro, in-vivo and clinical trial data available from different experiments. A list of medicinal herbs that proven hair growth activity.[24]






Plant material of *Hibiscus rosa-sinesis* (flower), *Glycyrrhiza glabra* (roots), *Eclipta alba* (plant), *Withania somnifera* (root) and *Bacopa monniera* (leaf) was collected in the month of January- February from the region of Indore (M.P.) identified by comparing with standard herbarium specimens available in Department of Botny, Janata PG college, A.P.S University, Rewa M.P. The various parts of plant drugs are crushed in mixer and passed through the sieve

number 80. The various powder drugs were subjected to pharmacognostic studies. Some herbs listed in (Table2) here with.



**Table 2 Herbs having hair growth promoting Activity [21-37]**

| S.No | Common Name | Biological Name           | Part used         | Extract            | Photo   |
|------|-------------|---------------------------|-------------------|--------------------|---|
| 1    | Bramhi      | <i>BacopamonnieriLinn</i> | Bulb              | Juice              |    |
| 2    | Aloe Vera   | <i>Aloe barbidensisL.</i> | Leaves            | Gel                |   |
| 3    | Asiasari    | <i>Asiasari radix F.</i>  | Roots,<br>Rhizome | Ethanollic extract |  |
| 4    | Bahera      | <i>Terminaliabelirica</i> | Seeds             | Pet. Ether extract |  |



|    |                  |   |              |  |   |
|----|------------------|---|--------------|--|---|
| 5  | Indian Spikenard | <i>Nardostachys jatamansi</i>               | Rhizome      | Pet. Ether extract                             |    |
| 6  | Bhringraj        | <i>Eclipta alba</i> ( L )<br><i>Hassak.</i> | Whole Plant  | Petroleum ether extract,<br>Methanolic extract |    |
| 7  | Licorice         | <i>Glycyrrhiza glabra</i>                   | Root         | Hydro-alcoholic extract                        |    |
| 8  | Ashwagandha      | <i>Withania somnifera</i>                   | Root         | Pet. Ether extract                             |  |
| 9  | China Rose       | <i>Hibiscus rosasinesis</i>                 | Flower, leaf | Ethanollic and Methanolic extract              |  |
| 10 | Bhringraj        | <i>Eclipta alba</i>                         | Hussk        | Methanol extract                               |  |
| 10 | Amarbel          | <i>Cuscuta reflexa</i> Roxb.                | Stems        | Pet. Ether extract                             |  |



|    |              |                                      |      |                       |   |
|----|--------------|--------------------------------------|------|-----------------------|---|
| 11 | Fenugreek    | <i>Trigonellafoenumgra<br/>cecum</i> | Seed | Methanolic<br>extract |  |
| 12 | Indigo Plant | <i>Indigoferatinctoria</i>           | Wood | Ethanollic extract    |  |

### 2.3 Pharmacological Action of Herbal Drugs on Hair Growth [39-44]

**Table3. Herbs with Mechanism of Action**

| Herb                         | Therapeutic action   | Clinical Experiment   |
|------------------------------|--|---|
| <i>Serenoarepens</i>         | 5a reductase inhibitor   | Commercially available  |
| <i>Allium sativum</i>        | Anti inflammatory, antioxidant,<br>antimicrobial                         | In vitro  |
| <i>Elipta alba</i>           | Increase hair follicle number and scalp<br>thickness, anagen induction   | Mice  |
| <i>Zizyphusjujuba</i>        | Hair growth promoter   | Mice  |
| <i>Vitisvinifera</i>         | Hair follicle proliferation stimulator,<br>telogen transformer to anagen | Mice  |
| <i>Thujaoccidentalis</i>     | 5a reductase inhibitor Rat, mouse and<br>cell cultures                   | Rat, mouse and cell cultures                                      |
| <i>Rosmarinusofficinalis</i> | Sebum reduction, antioxidant,<br>antidandruff                            | In vivo, randomized double<br>blind<br>Placebo controlled 28 week |
| <i>Panax ginseng</i>         | Anti-inflame, cell proliferation<br>improvement, prolong anagen hair     | Mice  |
| <i>Glycyrrhizaglabra</i>     | DHT inhibitor, anti inflame  | In vitro  |

|                            |  |                                 |
|----------------------------|--|---------------------------------|
| <i>Acacia concinna</i>     | 5 a reductase inhibitor                              | In vitro                        |
| <i>Asiasari radix</i>      | Cellular proliferator, telogen transformer to anagen | Mice                            |
| <i>Capsicum frutescens</i> | Anagen induction                                     | Mice, human volunteers, 20 week |

## 2.4 Phyto-Constituents of Herbs

Unsaturated aliphatic fatty acids were found accurately inhibited 5a-reductase and some essential fatty acids like linolenic, oleic, linoleic, myristoleic, palmitoleic, and stearic acids, are declared that they have 5a-reductase inhibitory properties and hair growth promoter. [25] For hair loss complementary treatment would be vitamin B, phytoestrogens, and iron. Traditionally essential oil incorporated in hair for hair care.[26]

**Table 4. List of Phyto-Constituents [39-45]**

| Phyto-Constituents  | Herbs  |
|---|--|
| Fatty acids: linolenic, linoleic, palmitoleic, oleic, myristoleic and stearic acids           | <i>Pimentaracemosa, Myrtuscommunis, Cedrusatlantica, Laurusnobilis, Pogostemon patchouli, Rosmarinusofficinalis, Salvia officinalis, S. sclarea, Thymus satureioides, Canangaodorata, T. vulgaris, Lavendula angustifolia, Serenoarepens, Urticadioica, Ocimum sanctum, Perseaamericana, Roystonearegia, Thujaoccidentalis, Zizyphusjuzuba</i> |
| Phytoestrogens: iso flavone; daidzein, genistein, glyciteinlignans; enterodiol, enterolactone | <i>Serenoarepens, Urticadioica, Cucurbitaspp</i>   |
| Vitamin B   | <i>Aloe vera, PerseaAmericana</i>  |

|                            |                            |
|----------------------------|----------------------------|
|                            |                            |
| Proantho cyanidins         | <i>Vitisvinifera</i>       |
| Capsaicin                  | <i>Capsicum frutescens</i> |
| Epigallocatechin-3-gallate | <i>Camellia sinensis</i>   |
| Soymethide-4               | <i>Glycine max</i>         |

## 2.5 Herbal Hair Formulations

**Table5. Marketed Herbal Hair Care**

| Plants in formulation   | Formulation          | Reference |
|---|----------------------|-----------|
| <i>Eclipta alba (L.) Hassak, Hibiscus rosasinensis Linn, Nardostachys jatamansi DC</i>  | Herbal hair oil      | 27        |
| <i>Emblica officinalis, Centellaa siatica(L.) Urban, Aloe vera (L.) Burm.f., Ocimum sanctum Linn., Eclipta alba (L.) Hassak</i> | Poly herbal ointment | 20        |
| <i>Cuscutare flexaRoxb., Citrullus colocynthis Schrad., and Eclipta alba Hassk.</i>   | Herbal cream         | 11        |
| <i>Trigonella foenum-graecum Linn., Semecarpusana cardium L.F., Trigonella corniculata</i>                                      | Herbal gel           | 25        |
| <i>Poriacocos, Thuja orientalis, Espinosilla, Lycium chinense Mill, Coixlacryma-jobi and Polygonum multiflorum</i>              | Cubosomal Suspension | 35        |

|   |              |    |
|---|--------------|----|
| <i>Embelica officinalis</i> Linn, <i>Hibiscus rosa sinensis</i> Linn, <i>Bacopa monnieri</i> L., <i>Trigonella Foenum graecum</i> Linn  | Herbal oil   | 21 |
| <i>Arnica Montana</i> L., <i>Aloe socotrina</i> Linn. , <i>Embllica officinalis</i> Gaertn, <i>Terminalia chebula</i> Retz, <i>Nyctanthe sarbortristis</i> L., <i>Pilocarpus jaborandi</i> Vahl | Herbal cream | 40 |

### 3. CONCLUSION

In the present review, an aim has been made to prominence on treatment of hair loss by herbal products with their mechanism of action. In cosmetic industry hair loss is a common and ever increasing problem. Hair loss found due to various reasons which were mentioned in this article. Marketed drug which is approved by FDA are Minoxidil and Finasteride for hair growth in men. Minoxidil is the only drug which is available in androgenetic alopecia. Synthetic drug not only impart hair growth effect but also impart potential side effect so that's why herbal remedies is the safe and effective option against synthetic drugs. Herbal drug not only safe but only rejuvenate the scalp also. In this review, we sum up some of the herbs that are known to minimize the hair loss rate and also stimulate new hair growth, This article also give knowledge about the mechanism like inhibition of  $5\alpha$  reductase type II enzyme, DHT receptor blockage, decreased level of DHT, supply nutrients, increased blood supply, follicular enlargement and prolongation of anagen phase, and also aromatherapy by which some plants extracts. This review article cumulatively gives knowledge about herbs with their therapeutic effect and their phytoconstituents.

### 4. CONFLICT OF INTEREST

This article content has no conflict of interest.

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