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HAIR CARE PROMISING HERBS: A REVIEW

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ABSTRACT

Hair is a major esthetic display feature of the human body, especially in social and sexual interactions. Hair loss is not just a cosmetic problem but psycho-sociological problem also. Alopecia is a universal problem, could have an adverse effect on physiological life and self-esteem between both the genders. The side effect associated with synthetic drug has limited its pharmacological benefits hence the drug of choice is plant origin which adds value necessary to replace the synthetic medicine. India is a repository of medicinal plants. Besides healthcare, herbs are also used for beautification of the body and for preparation of various cosmetics. In traditional Indian system of medicine, several plants and herbal formulations are reported for hair growth promotion but lack of sound scientific background and information limits their use. About 1000 kinds of plants extract have been examined with respect to hair growth. This review describe the use of some natural products for hair growth promotion, plant parts used, chemical composition, the active responsible for effect and with a brief description of major use. Thus this article focus the use of variety of medicinal plants traditionally reported with clinical and scientific evidence.

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INTRODUCTION

Hair follicle

The end product of hair follicle proliferation and differentiation is the hair shaft, which, together with its surrounding root sheaths, is derived from epithelial cells. The dermal papilla, a cluster of mesenchymal cells at the base of the follicle, also plays an essential role in hair growth (Fig 1). In humans the formation of hair follicles takes place during embryogenesis, and no new hair follicles form after birth. However, the character of individual follicles can change drastically over time. Thicker and darker hairs replace fine lightly pigmented hairs in the beard at the stage of puberty. Conversely, thick scalp hairs convert into fine small hairs later in life. Paradoxically, both processes occur in response to the hormone testosterone¹.

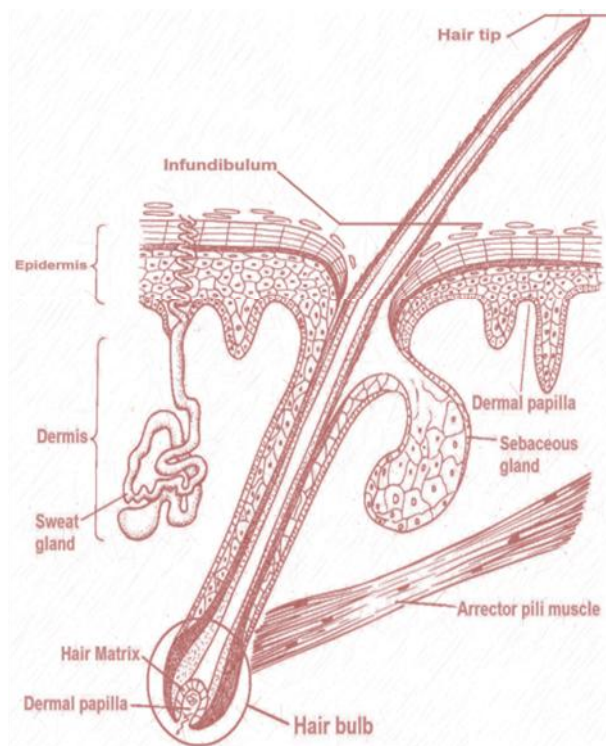


Fig 1: Anatomy of Hair.

Hair follicle growth cycling

The human hair follicle totally regenerates itself every 3–5 years². An active growth stage is anagen (from the Greek *ana*, again and *genein*, to produce), followed by a regressive, catagen, stage (from the Greek *kata*, down and *genein*, to produce) which gives rise to a resting, telogen, follicle (from the Greek *telos*, end, and *genein*, to produce)^{3,4}. The average scalp contains 90000-140000 terminal coarse, medullated & pigmented hairs and many more vellus and indeterminate fine hypopigmented unmedullated hairs⁵. The time duration of each phase depends on the type and location of the hair follicle. Under physiological conditions, approximately 85% of scalp hair follicles are in anagen while 15% are in a telogen phase. The duration of anagen in healthy scalp hair follicles is typically two to six years and is the principle determinant of hair length. The anagen phase is followed by a short resting phase, catagen. Catagen is characterized by a cessation of protein and pigment production, involution of the hair follicle and a fundamental restructuring of the extracellular matrix⁶. During catagen, much of the follicle undergoes programmed cell death (apoptosis)⁷, reducing its size as it enters telogen. In telogen, the hair follicle regresses to less than half its anagen phase size. Follicular regeneration at the onset of the next anagen phase requires the activation of rarely cycling epithelial stem cells located in the permanent, BULGE region of the follicle⁵. Morphologically, all that remains is a peg of epithelial cells overlying a cluster of quiescent dermal papilla cells. Hair cycle synchronization is lost after the second moult wave shortly after birth. Hereafter hairs cycle independently and seasonal moulting is not seen in humans. Under normal physiological conditions, each hair follicle will continue to cycle throughout life⁶ (Fig 2).

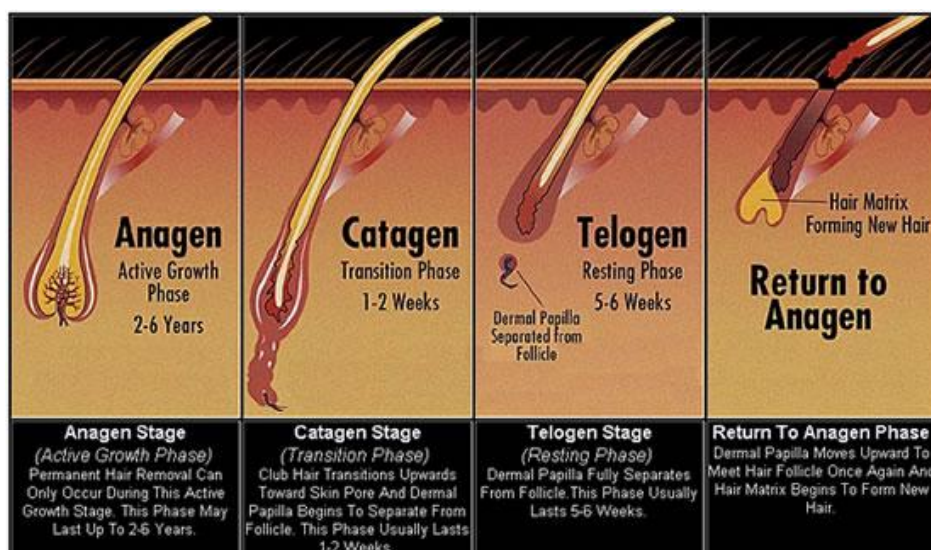


Fig 2: Normal growth cycle of human hair.

Hair follicle growth cycle modulation

The key event in the hair growth cycle that contributes to alopecia is the relationship of exogen hair shedding to anagen and telogen. If exogen occurs in a specific sequence during early anagen then old telogen hair fiber is shed but replaced quickly with new anagen hair fiber. By contrast, if exogen occurs predominantly during telogen then the shed hair is not immediately replaced. The result is a hair follicle that does not contain any hair fiber. As such it does not donate to hair coverage. The longer the duration of telogen perhaps the greater the chance of exogen occurring during telogen. The longer the duration of kenogen when a hair follicle is devoid of any hair fiber, the lack of hair coverage is maintained. Consequently, a priority in the development of treatments for several alopecias is the development of growth cycle modulators that reduce telogen and prolong anagen duration ⁹.

Androgenetic Alopecia

Androgenetic alopecia (AGA) (synonyms: calvities hippocratica, male pattern baldness, androgenetic effluvium) is progressive thinning of the scalp hair that follows a defined pattern ^{10,11}. As baldness progresses, the hair follicles go through numerous hair cycles faster and with each one the follicles become shorter, finer, and less pigmented until the initially large terminal hair follicle has become a small vellus hair follicle, thin nonpigmented hair with much shorter growth period (Fig. 3). It follows a characteristic pattern, with the hair initially receding bilaterally backwards from the frontal-temporal region: in severe cases, regression of the hair line continue, denuding the crown region of the scalp ¹². At present, it is reasoned that there are three main reasons for this: genetic determination, age and androgens ¹³. The tendency to balding of the male type is autosomal dominant heredity. Both homozygous (AA) and heterozygous (Aa) males show changes, but only when a certain age is reached, and the androgen level is normal. The frequency of AGA depends on ethnic and familiar factors. It is very common in the white races, accounting for about 95 % of all types of alopecia. As AGA progresses, seven degrees of male baldness can be distinguished according to Hamilton-Norwood classification (Fig. 4). This was initially described by Hamilton in 1951 and then modified by Norwood in 1975 who divided androgenetic hair loss in men into two common patterns: the **regular type**, characterized by hair loss that begins in two different areas (at the temples and in the crown); and less common **type A**, that is characterized by “front-to-back” hair loss ¹⁴.

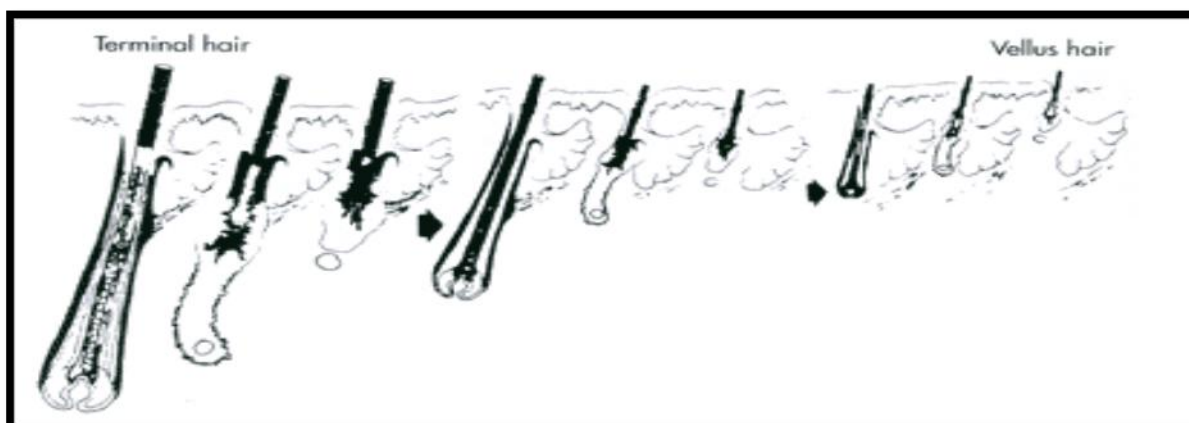


Fig. 3. The hair follicle miniaturization.

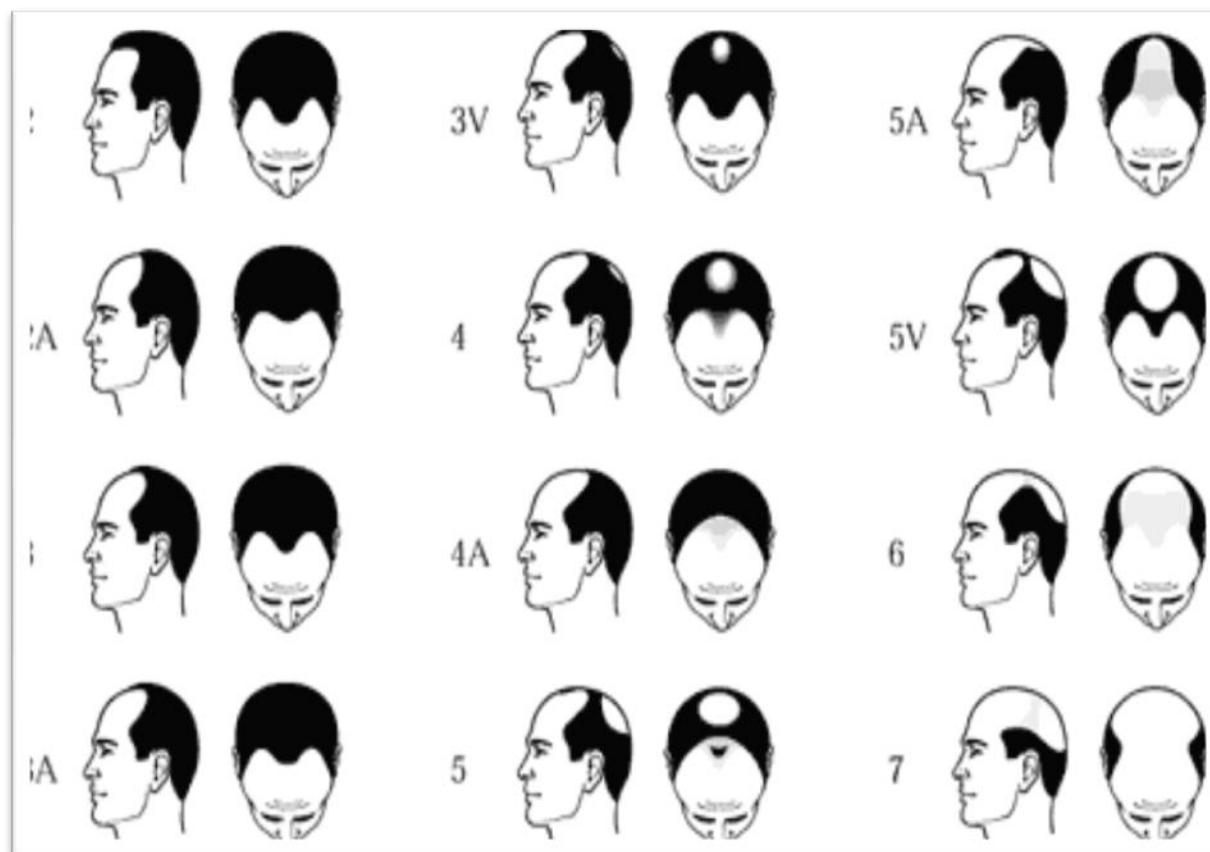


Fig. 4. Hamilton-Norwood scale.

(Type 1: No recession, Type 2: Temporal recession. Mild recession along frontal hairline; Type 2A: Entire frontal hairline recedes; Type 3: Further frontal recession. Deeper recession at corners;

Type 3V: Hairloss predominantly in vertex (crown); Frontal hairline recession may be present; Type 3A: Hairline recedes back further; Type 4: Further frontal hair loss and temporal recession. Enlargement of vertex (crown). Solid band of hair across top separating front from vertex; Type 4A: Hairloss moves past „mid-coronal“ line; Type 5: Frontal bald and temporal areas enlarge further. Band separating the two areas becomes narrower and sparser; Type 5A: Hair loss extends towards the vertex; Type 6: Frontal and vertex balding areas merge into one and increase in size; Type 7: Narrow horseshoe band of hair. Low hairline in permanent zone may be sparse.) (adopted from the ref.14).

Presently there are two approved treatments for androgenetic alopecia minoxidil and finasteride. Both minoxidil and finasteride require living hair follicles in order to work. Topical application of minoxidil is the most widely recommended treatment, but offers little practical benefit only. It was originally used to treat high blood pressure, but the drug was also found to stimulate hair growth. Minoxidil appears to work by gradually enlarging and lengthening hair follicles that had been shrinking due to the action of excessive amounts of the hormone DHT. Minoxidil may also extend the growth phase of the hair follicle, but the efficacy of minoxidil is variable and temporary. Finasteride is an oral prescription medication. It is approved for use in men only, because of its high potential for causing birth defects. Finasteride is an inhibitor of the enzyme 5 α -reductase. By inhibiting this enzyme, finasteride decreases DHT synthesis and thus reduces the destructive effects of excessive amounts of DHT on the hair follicle. However, it has considerable side effects¹⁵.

Side effects

Although hair growth is the desired outcome of topical minoxidil in the setting of AGA, it can become a nuisance when it occurs in unwanted areas. Hypertrichosis is the most common side effect seen in patients taking oral minoxidil, but it can also occur in patients using the topical formulation. Sufficient systemic absorption, as noted above, may translate to unwanted hair growth elsewhere on the body. In data from a placebo controlled clinical trial including 1333 females, 50 patients (4%) noted a dose-related (5%>2%>placebo) side effects of hypertrichosis.

Elsewhere, 5 of 56 (8.9% of women) developed severe hypertrichosis of the face and limbs after using topical 5% minoxidil twice daily for AGA. The hair resolved 1 to 3 months after discontinuing the drug. These findings suggest that the amount of minoxidil absorbed is enough to cause remote pharmacological effects, including hair on the arms, chest, and sacral area. Hypertrichosis is reported more frequently in women than in men. It is unclear whether this is because it is truly more common or just more noticeable.

Minoxidil may also cause local cutaneous complications. While it is infrequent, patients may suffer scalp irritation or the worsening of seborrheic dermatitis. There are many reports of contact dermatitis. These were historically thought to be caused by minoxidil itself, but patch testing recently identified propylene glycol (present in minoxidil solution) as the causative agent in 9 of 11 patients, while only 4 of 11 reacted to minoxidil. Other reports of mothers using topical minoxidil include a fetus born with hypertrichosis and a fetus born with aplasia of the lower body (caudal regression syndrome). One 28-year-old woman used topical 2% solution twice daily throughout pregnancy. At 22 weeks of gestation, ultrasound showed vascular malformations of the brain, heart, and colon, with enlarged ventricles and many hemorrhages in the brain. Staining showed increased CD34 and CD31 immunoreactivity, suggesting a neoangiogenic process. It is difficult to know whether these events were a result of minoxidil or were isolated events, but it is worthwhile to discuss these potential risks with young women of childbearing age. If planning to become pregnant, they may want to wait until after they have delivered and finished breastfeeding. They also may benefit from a temporary increase in hair growth during pregnancy¹⁶.

Treatment of male pattern hair loss (MPHL) and benign prostatic hypertrophy is currently treated by 5 alpha reductase inhibitor, finasteride. Finasteride blocks the conversion of testosterone to the more potent androgen dihydrotestosterone (DHT) in many tissues including the skin, hair follicles, and prostate. Lesser known effects of the 5 α reductase inhibitors are that they also block the conversion of progestogens and glucocorticoids: progesterone to 5 α dihydroprogesterone and deoxycorticosterone to 5 α -dihydrodeoxycorticosterone, respectively. When Propecia was approved for the treatment of MPHL, it was known through several doubleblind randomized controlled trials that it may cause a small but significant amount of sexual dysfunction with libido, orgasm, and erectile problems^{17,18,19}. These trials reported that the sexual side effects resolved with time or with discontinuation of finasteride.

Since, Propecia's release, post- marketing surveillance has found that a subset of young men who take finasteride experience persistent sexual side effects despite the discontinuation of the medication^{20,21}. Unfortunately, less common adverse effects of a medication are often only uncovered after several thousands of patients have been exposed to the medication. In April of 2011 the product labeling for Propecia in the United States was updated to include the side effect of "difficulty in achieving an erection that continued after stopping the medication." Irreversible neurological effects of a medication have been reported and studied with tardive dyskinesias, which are caused by the use of phenothiazines for treatment of schizophrenia²².

Clinical trials have demonstrated increased incidences of decreased libido, ED, ejaculatory dysfunction and gynecomastia. Erectile dysfunction, ejaculatory disorders, and decreased libido were more frequently observed in finasteride- than placebo-treated men (15% vs. 7%, respectively). Reduced ejaculate volume, erectile dysfunction, loss of libido, and gynecomastia were more common in the finasteride group ($P < 0.001$). Physicians should inform men who are considering a 5 α -RIs therapy about the incidence of sexual adverse effects. In some patients, these adverse effects are persistent and may be prolonged and patients do not recover well after discontinuation from drug use²³.

Table.1: Various allopathic medicine along with their mechanism and adverse effect²⁴

NAME OF DRUG	MECHANISM	ADVERSE EFFECTS
Minoxidil(1%,2%,5%)	Peripheral Vasodilator and activate gene regulating hair---protein	Dandruff
Finasteride	5- α -reductase	Impotence, erectile dysfunction
Dutasteride	5- α -reductase	Same
Spiroinolacton	It inhibits the production of androgens and also blocks the action of androgen at the receptor sites.	Gynecomastia
Cimetidine	Antiandrogen	Galactorrhea, gynecomastia
Oral contraceptive	Reduce the production of ovarian androgens	Headache
Oral corticosteroids (prednisone)	Unknown	Headache
Topical corticosteroids (betamethasone, clobetasol, triamcinolone,)	Unknown	Unknown
Anthralin	Antimitotic	Stains the skin a yellowy-brown

Comprehensive information which possess scientific and traditional evidence about herbs for hair loss:

Many types of treatment are available to treat alopecia in different system of medicine like allopathic, homeopathy, ayurveda or can be surgical like transplantation but none of them is fully satisfactory. To avoid or reduce unwanted side effects of allopathic drugs most of person switch over to herbal medicine. To prevent the hair loss and regrowth of hairs various herbs are being used like aloe vera, amla, bhringra, brahmi, etc., which are been discussed below with very comprehensive information which possess scientific and traditional evidence about herbs to stop hair loss, and we hope that you will find your answers here and get back to your original hair.

Amla is known as amritphala in Sanskrit, which literally means the fruit of heaven or nectar fruit. Amalaki is one of the highest natural sources of Vitamin C (3,000 mg per fruit). Prevents premature graying of hair and makes them strong and free from dandruff. The fruit is the richest source of Vitamin C and is a diuretic, aperient, Laxative and hair dye. Amla power and oil are used traditionally in Ayurvedic applications for the treatment of scalp. Indian gooseberry is an accepted hair tonic in traditional recipes for enriching hair growth and pigmentation. The fruit, cut into pieces is dried preferably in the shade. These pieces are boiled in coconut

oil till the solid matter becomes charres. This darkish oil is excellent in preventing graying. The water in which dried Amla pieces are soaked overnight is also nourishing to hair and can be used for the last rinse while washing the hair. Indian gooseberry is used in various ways. The best way to take it with the least loss vitamin C, is to eat it raw with a little salt. It is often used in the form of pickles and it is dried and powdered. The berry may also be used as a vegetable. It is boiled in a small amount of water till soft and taken with a little salt. Dried amla fruits are boiled in coconut oil and then ground to form amla oil. This is a very effective conditioner and prevents balding and graying of hair. For oily hair, mix half a cup of Amla juice, half a cup of lime juice and some water. Apply this to make an antigrase hair wash²⁵.

Lipi et al investigated increase in hair growth activity of *Embllica officinalis*. It holds the promise of potent herbal alternative for minoxidil. Also suggest excellent results of hair growth in formula prepared by cloth pouch boiling method (*Embllica officinalis* (Euphorbiaceae), *Bacopa monnieri* (Scrophulariaceae), *Trigonella foenumgraecum* (Leguminosae), *Murraya koenigii* (Rutaceae)²⁶. Dixit et al reported hair growth activity of *Cuscuta reflexa* Roxb. Stem through the periodic transformation of hair follicle from telogen to anagen phase²⁷. Rho et al suggested that the *Asiasari radix* is the root and / or Rhizome of *Asiasarum heterotropoides* (Aristolochiaceae) extract has hair growth promoting potential, and this effect may be due to its regulatory effects on both cell growth factor gene expression²⁸.

Orafidiya et al investigated the efficacy of the leaf essential oil of *Ocimum gratissimum* Linn. (Ocimum oil) in promoting hair growth in cyclophosphamide-induced hair loss and concluded that ocimum oil may be capable of enhanced normal hair growth and promoting follicular proliferation in cyclophosphamide-induced hair loss²⁹. Matsuda et al indicated that *Ginseng radix* possesses hair growth promoting activity and that G-Rb1, may be one of the active constituents of Ginseng radix in the mouse vibrissal hair follicle organ culture model³⁰.

Kobayashi et al investigated that *Ginkgo biloba* leaf extract promote hair regrowth, through combined effects on proliferation and apoptosis of the cells in the hair follicle thus suggesting potential as a hair tonic³¹. Pathak et al investigated hair growth promoting activity of *Tridax procumbens* promotes the growth of hair³². Roh et al found that the extract of dried roots *Sophora flavescens* has outstanding hair growth promoting effect. *Sophora flavescens* extract induced mRNA levels of growth factors such as IGF-1 and KGF in dermal papilla cells, suggesting that the effect of *Sophora flavescens* extract on hair growth may be mediated through the regulation of growth factors in dermal papilla cells. In addition the *Sophora flavescens* extract revealed to possess potent inhibitory effect on the type II 5 Y-reductase activity³³.

Dixit et al investigated of *Citrullus colocynthis* promotes the growth of hairs. Also found least hair growth initiation and completion time, maximum number of hair follicles in anagenic phase. 5 α -Reductase has been implicated as one of the major causes of hair loss. It may be rewarding if studies to unfold the mechanism of action of herbal extracts are undertaken using this bed³⁴. Jain et al. investigated the hair growth activity of almond oil, til oil and coconut oil preparation containing aerial part of *Zizyphus jusaba*, *Cuscuta reflexa*, *Citrus burgamia*, *Lagenaria sicaraia*, *Hibiscus rosasinensis* and *Allium cepa*, seed of *Trigonella foenumgraecum* and fruits of *Embellica officinalis*³⁵.

Aromatherapy and include scalp blood circulation *Ginkgo biloba* (ginkgoaceae), *Thyme vulgaris* (lamiaceae), *Cedrus atlantica* (Pinaceae). Few herbal preparation and method of application for the treatment of alopecia as *Phyllanthus embellica* (Euphorbeaceae), *Rosmarinus officinalis* (labiatae) *Allium cepa* (liliaceae) *Glycyrrhiza glabra* (leguminosae). *Bacopa monnieri* include alkaloids, saponins and sterols. Spore of *Lygodium jubonicum*- inhibit testosterone 5- α -reductase activity. It contain oleic acid, linolic acid and palmitic acid. *Eclipta alba* extract with potential for hair growth activity. *Semecarpus anacardium*, *Trigonella foenumgraecum*. *Trigonella conniculata*, *Zizyphus jujube* essential oil, *Hibiscus rosasinensis*. *Tridax procumbens* L. (Compositae) is a weed found throughout India. The plant is known to local people as "Ghamara" and is dispensed for "Bhringraj" by some of the practitioners of Ayurveda. *Cuscuta reflexa* Roxb.(Convolvulaceae) is a leafless, twinning, parasitic dodder with slender long yellow stems distributed in tropical and temperate region and common throughout India³⁶.

Tricosanthes cucumerina Linn. commonly called as snake gourd is a monoecious annual climbing herb with branched tendrils. It is a rich source of nutrition and is highly constituted with proteins, fat, fibre, carbohydrates, vitamin A and E. The fruit is rich in vitamin C and E, cucurbitacin B, cucurbitacin E, isocucurbitacin B. Leaves of *Tricosanthes cucumerina* is used in the treatment of head ache, alopecia, fever, abdominal tumors, bilious, boils, acute colic, diarrhoea, haematuria and skin allergy^{37, 38, 39}. *Abrus precatorius* Linn. commonly called as Rosary pea or Jequirity is a perennial climber, with alternately arranged pinnately compound leaves. *Abrus precatorius* is used as a folk-medicine for the treatment of bronchitis, laryngitis, hair fall and hepatitis⁴⁰.

Psidium guajava extract increased the level of Alkaline phosphatase and hair density in chemotherapy induced alopecia mice. The methanolic extract of *Eclipta alba* showed improvement of hair growth. Green tea contains a high amount of purine alkaloids, flavonoids, caffeic acid derivative, volatile oil and catechins including epigallocatechin gallate. The Epigallocatechin gallate showed significant result by increased hair growth. Ethanolic extract and petroleum ether extract of *Citrullus colocynthis* was found to increase rate of hair growth initiation. *Primula obconica* leaf for its hair growth activity on human volunteers was much more effective than corticosteroids. *Zizyphus jujube* essential oil from seeds showed a significant result for length of hair, hair thickness and hair follicles. Polyherbal ointment of *Embllica officinalis*, fruit *Centalla asiatica* leaf, *Aloe vera* leaf, *Ocimum sanctum* leaf, *Eclipta alba* extract were evaluated for hair growth activity showed significant result as compare to single hydroalcoholic extract of different extract of various plants. Hair formulation of *Embllica officinalis* *Bacopa monnieri*, *Trigonella foenumgraecum*, *Murraya Koenigii* showed a hair growth activity in a dose dependent manner⁴¹.

The hydroalcoholic extract of *Embllica officinalis*, *Centella asiatica*, *Aloe vera*, *Ocimum sanctum* and *Eclipta alba* and Polyherbal formulation showed reflective results for hair growth activity⁴².

The crude chloroform and acetone leaf extracts of *Naringi Crenulata* possesses hair growth promoting activity⁴³. Lipi et al reported excellent results of hair growth were seen in hair formulation of *Embllica officinalis* (Euphorbiaceae), *Bacopa monnieri*

(Scrophulariaceae), *Trigonella foenumgraecum* (Leguminosae), *Murraya koenigii* (Rutaceae) prepared by cloth pouch decoction method of oils preparation technique⁴⁴.

Ravichandran *et al* had reported the clinical efficacy and safety of ‘Herbal Antidandruff Shampoo’ in the management of dandruff. A polyherbal shampoo containing the extracts of *Rosmarinus officinalis*, *Vetiveria zizanioides*, *Nigella sativa*, *Santalum album*, *Ficus bengalensis*, *Citrus limon* and oil of *Melaleuca leucadendron* was used in the study. The study concluded that the test formulation is effective due to synergistic anti fungal, anti inflammatory and local immunostimulatory actions of its ingredients. The herbal antidandruff shampoo formulation was found to be effective and safe in the management of dandruff⁴⁵.

Ravichandran *et al* reported that Herbal Hair Loss Cream consisting of extracts of *Butea monosperma* and *Butea parviflora* is a safe and effective in prevention of hair loss. It helps in regeneration of new hair by six months in men and women⁴⁶. Pooja *et al* reported that excellent results of hair growth were seen in formulation containing crude drugs fruits of *Embellica officinalis*, flowers of *Hibiscus rosa sinensis*, leaves of *Bacopa monnieri* and seeds of *Trigonella foenumgraecum* which were prepared in varying concentration by boiling method of oils preparation technique⁴⁷.

Fenugreek seeds are very nutritious and as a result they are effective in reducing hair loss, baldness and thin hair. They also contain progressive hormones that increase hair growth. There are natural emulsions for hair moisturizing that contains high concentration of proteins and are similar to fenugreek seeds, they have the ability to eliminate hair loss and hair damage⁴⁸. Jung In Yoon *et al* reported the efficacy of essential oil from seeds of *Zizyphus jujuba* for its potential role on hair growth by in vivo method possesses hair growth promoting activity⁴⁹.

Many plants such as *Cuscuta reflexa* Roxb, *Prunus dulcis* seeds and herbal formulations of *Hibiscus rosasinensis* Linn. are evaluated in in-vivo & in-vitro conditions and found effective in traditional system of medicine for hair growth promotion. Proanthocyanidine from grape seeds (*Vitis Vinifera*) and beta-sitosterol in saw palmetto (*Serenoa serrulata*) have shown remarkable effect. *Hibiscus rosa sinensis*, *Calotropis gigantea* and Polyherbal formulation in combination of both the plants extract shows better growth than the patch with minoxidil⁵⁰. Sukirti Upadhyay *et al*, reported that the petroleum ether extract of *Glycyrrhiza glabra* roots has potentials as a hair growth promoting agent for females⁵¹.

Saw Palmetto or *Serenoa repens*, is an herbal remedy that is processed from fruit of the American dwarf pine tree. It often is used to treat benign prostatic hypertrophy because of its ability to inhibit 5 α -reductase levels by 32% without affecting testosterone levels in men. Extracts of saw palmetto also have been shown to have a partial antagonistic affect on testosterone receptors. It is most likely that these 2 actions led to saw palmetto being used as a hair loss remedy. In this study, researchers studied the efficacy of a softgel containing β -sitosterol 50 mg and saw palmetto 200 mg extract (components of the HairGenesis™ Softgels discussed later) versus placebo in treating AGA. They found that 60% of patients taking the active softgel rated their hair growth as improved from baseline as opposed to only 10% of the patients taking placebo⁵².

The leaves and flowers of *Hibiscus rosa-sinensis* have hair growth promoting and anti-greying properties. Moreover, in India the herbal products in the market intended for hair growth include the extract of various parts of *Hibiscus rosa-sinensis*. Petroleum ether extract of leaves and flowers of *Hibiscus rosa-sinensis* was evaluated for its potential on hair growth by in vivo and in vitro methods and it is concluded that the leaf extract, when compared to flower extract, exhibits more potency on hair growth⁵³. It is well accepted that the leaves and flowers of *Hibiscus rosasinensis* have hair growth promoting and antigreying properties⁵⁴. In India, the herbal products in the market intended for hair growth include the extract of various parts of *Hibiscus rosasinensis*. Adhirajan *et al* reported that the leaf extract of *Hibiscus rosasinensis* has a potential effect on maintaining the hair growth in-vivo and in-vitro methods⁵⁵.

Ali *et al* reported that *Nardostachys jatamansi* having hair growth activity⁵⁶. Bagchi *et al.*, reported that the extract of *Nardostachys jatamansi* is used in the preparation of hair oil, hair tonic, promoting hair blackness, growth and luster⁵⁷. *Eclipta alba* is traditionally known to potentiate hair growth promotion and the methanol extract of *Eclipta alba* may have potential as a hair growth promoter⁵⁸. *Eclipta alba* Hassk is reported to possess Hepatoprotective, antimicrobial, anti-inflammatory, analgesic, immunomodulatory, antiviral and promoter for blackening and growth of hair⁵⁹.

Aloe vera L. or *A. barbadensis* gel is used traditionally for hair loss and for improvement in hair growth following alopecia. Inaoka *et al.* reported that aloenin is the major constituent responsible for promoting hair growth without irritating the skin⁶⁰. *Rosmarinus officinalis* Linn is an aromatic herb surrounded by tradition and legends but with improvement culinary, medicinal and cosmetic properties. In folk medicine it is used to stimulate growth of hair as a rinse. Rosmarinic acid have antioxidant effect⁶¹. *Lawsonia alba* L. has been cited as a growth accelerator and was used in an ancient Egyptian formula to cure the loss of hair. The incidence of contact dermatitis appears to be extremely rare with the use of henna. Henna leaf have anti-inflammatory & antiallergic effect⁶². Thakur *et al* investigated that α -sitosterol and wedelolactone responsible for hair growth activity. 5 α -reductase inhibition contributes in treatment of androgenic alopecia. 5 α -reductase inhibition by α -sitosterol has been well documented in this study⁶³.

Dixit *et al* investigated hair growth activity of a mixture of *Eclipta alba* hassk, *Citrullus colocynthis* shrad and *Tridax procumbens* Linn⁶⁴. Sagar *et.al* had formulated anti-dandruff liquid cream shampoo, using active extract of *Tridax procumbens* which was compared with standard Ketoconazole shampoo. The formulation was evaluated using various parameters which prove its efficacy and safety. The toxicity studies of formulation did not show any toxic effect⁶⁵. Mohamad *et.al* had formulated and evaluated herbal shampoo powder with antidandruff property using *Ocimum sanctum* and *Azadiracta indica* as antidandruff agents along with *Acacia concina*, *Trigonella foenum graecum*, *Lawsonia inermis*, *Hibiscus rosasinesis*, *Sapindus laurifolia* as other ingredients of shampoo powder. The herbal shampoo powder was found to contain all good characters of an ideal shampoo and also it was found to be harmless, more effective and economic⁶⁶. The Methanol extract of *Buxus wallichiana* possess good antioxidant and hair growth activity⁶⁷. The extract of *Asiasari radix* showed the most potent hair growth stimulation in C57BL/6 and C3H mice experiments⁶⁸.

Algae extract seaweeds or sea vegetables have long known to have curative power as they contain high level of essential amino acid, minerals and vitamins. Some seaweeds such as *Atlantic Kelp*, *Himanthalia Elongata* are used as hair growth remedies. They act as anti-oxidant to reduce and heal damages to the scalp and hair and also provide rich source of essential building blocks (e.g. amino acid and vitamins) to help in growing new hair and adding the shine to the hair. *Channelled Wrack* is derived from a seaweed (Phaeophyta). It contains isoflavones, which in recent studies have been demonstrated to have potent antioxidant properties, comparable to that of the well-known antioxidant vitamin E that can help to revitalize, renew and refresh the skin of the scalp. *Channelled Wrack* also inhibits testosterone binding factors that can lead to hair loss in women. It is used in hair loss product as it promotes hair growth and improves hair thickness. *Ginkgo Biloba* is a very popular herbal remedy that is thought to help with many problems, among them improving the circulation of blood to the brain and skin. The majority of herbalists who prescribe this for loss of hair do so believing that the increase of blood to the brain and skin delivers more nutrients to the hair follicles and so promotes hair re-growth. Green Tea (*Camellia Sinesis*) is another popular herbal remedy as it is believed that the enzyme 5-alpha-reductase is inhibited by the catechins found in the green tea. Some herbalists claim that you will reduce the risk of male pattern type baldness if you drink several cups of green tea or take it in capsule form on a daily basis. He Shou Wu or Fo-Ti (*Polygonum Multiflorum*) is an ancient Chinese herb that has been used for centuries for hair loss and baldness. It is frequently available in both tea and capsule form and is one of the main ingredients found in many commercial remedies for the treatment of hair loss. In a recent study published by American Botanical Council (read article), the authors note that this Chinese botanical shows promise as a hair and color restorative and is capable of inducing terminal hair to grow instead of vellus hair (the fine baby hair growth associated with use of minoxidil). Pygeum (*Pygeum Africanum*) is taken from the bark of the evergreen tree and works in a very similar way to green tea. It has been used to treat problems with the prostate for many years in China and can be taken in pill or capsule form. Saw Palmetto (*Serenoa Repens*) is a very popular choice among with hair loss; this is due to the fact that it also has the ability to protect the prostate. Not only does it encourage the hair to re-grow but it also slows down the loss of hair. Stinging Nettle (*Urtica Dioica*) Stinging Nettle blocks the conversion of testosterone into DHT; this is the main cause of hair loss in men. It can be bought in either pill or capsule form and is said to be more effective when used in combination with saw palmetto or pygeum. Dong Quai (*Chinese Angelica*) Like He Shou Wu, Dong Quai is a traditional Chinese herb that is used to stop hair loss and even regrow hair. Dong Quai contains phytoestrogens, which reduces the formation of DHT. *Panax Ginseng* used in Asia for thousands of years, Ginseng's well known benefits include promoting vascular circulation and regulating cellular metabolism. Used in shampoo or hair tonic, Ginseng helps to nourish and strengthen hair. The above herbs were relied on by many long before scientists started creating hair loss drug or treatment. While there are skeptics who laugh at these remedies, others beg to differ. After all, what works for some, may not work for others⁶⁹.

Allium Sativum oil is used for severe skeletal pains, insect stings, preventing hair fall and promoting the growth of the lost hairs. *Amygdalus Communis* species is correctly called as *Prunus communis* Arcangeli, also as *Prunus amygdalus* Batsch. The bitter almond tree, like the sweet, is a native of Iran and Asia Minor, and is indistinguishable in botanical characters. The bitter almond oil is used for hair fall, nourishing the hair root, hair conditioner, and arthralgia. *Anthemis Nobilis* (Chamomile flowers) is used as oil extract for nourishing the hairs of head and eyebrow, sciatic and joint pains, arthritis, and used as anti-inflammatory. *Cicer Species* chick pea oil is used for nourishing the hairs of head and eyebrow, rheumatoid arthritis, muscle paresis, and used as anti-inflammatory. *Corylus Avellana* the filbert oil for nourishing the hairs of head and eyebrow, sciatic and joint pains, arthritis, and backache. The oil extract supports the compromised muscles and joints. *Myrtus Communis* oil is used for itching, hair fall, dandruff, nourishing the hair roots, and the inflammations of urinary tract. *Olea Europaea* called as common olive is a famous medicine among native practitioners. The olive oil is used as a laxative, purgative, liver protector, cholagogue, and prevents the hair fall. *Peganum Hermala* oil extract is used as hair tonic, nourishing the hair root and prevention of hair loss and dandruff. *Ricinus Communis* castor bean oil is used as laxative, purgative, and also for radiological study, joint pains, and nourishing the hair root. *Rosemarinus Officinalis* oil for preventing hair fall, nourishing the hair roots, sciatic and joint pains, rheumatoid arthritis, and used as anti-inflammatory. *Urginea Maritime* the Shore sea onion oil extract is used as hair falling due to breakage, segmental hair fall, and nourishes the hair roots. It is also used as joint and muscle pains. *Urtica Dioica* the big-sting nettle oil nourishes the hairs, and is used for rheumatoid arthritis, gout, eczema, and spasmodic contractions⁷⁰.

Traditionaional claims to control hair loss:

Lawsonia inermes

The leaves of this herb is used. It has hair pigment improving principle. It corrects scalp pH to mild acidic that can check fungal growth on scalp. A natural hair conditioner, heals & protects hair. *Aloe Vera* Gel - This has all known micronutrients that are inevitable for the regeneration of sick hair follicles. Smoothing of skin and its hair re-growing effect is utilized. Good sleep inducer also. A miraculous plant for hair loss treatment & thicker and healthier hair. *Eclipta Alba* - This is another herb taken totally. This contains hair re-growing principles. Abundant vitamin-C and ferrous iron contribute. The best known Ayurvedic herb to stop hair loss. *Phyllanthus Emblica* - The fresh juice of it contains tannins and vitamin-C gives scalp a coating and regeneration of the sick hair follicles. Natural tonic for hair growth & premature graying of hair. *Bacopa Monnieri* - This water plant has hair growing components. The antioxidant helps for the regeneration of hair follicles. Good sleep inducer. *Hydrocotyle Asiatica* - Vital amino acids and essential fatty acids required for hair growth and natural pigmentation. *Jatamansi* (*Nardostachys Grandiflora*): For long & strong hair and promoting hair growth. *Methi* (*Fenugreek*): Very beneficial effects on damaged and falling hair. *Saw Palmetto*: A well known herbal remedy to treat hair loss and baldness. *Shikakai* (*Acacia Concinna*): Used to strengthen hair roots and treating dandruff. *Neem* (*Azadirachta indica*): Antibacterial and antifungal properties treat scalp diseases.

Cocos Nucifera oil

The coconut oil has lauric acid that checks scalp infections. It is the vehicle to carry the herbal ingredients on the scalp in most eco-friendly. This is good for skin also. *Ricinus Communis* oil - This also acts as a vehicle. The thickness of the oil gives smooth spreading with fingers easy. It has hair re-growth effect also. Rosemary oil for centuries men and women have massaged their scalps with rosemary in olive oil to keep their hair lush and healthy. Safflower oil is used to increase blood flow to the scalp in Chinese herbal medicine. A safflower oil massage is often recommended by Chinese physicians to help nutrients get to the hair follicles.

Essential Fatty Acids

The omega-3 and omega-6 essential fatty acids found in flax and borage seed oils are important for healthy skin and hair. The also form important antiinflammatory compounds. Superoxide Dismutase: One of the most potent hair growth stimulators is topical oxygen radical scavengers such as superoxide dismutase. Superoxide dismutase may also inhibit the local immune response which underlies many forms of hair loss.

CONCLUSION

Hair on a man's head is an important emblem of health, youth and Vitality⁷¹. Hair growth plays significant roles in human social and sexual communication. People all over the world classify a person's state of health, sex, sexual maturity and age, often subconsciously, by assessing their scalp and body hair. Although hair disorders are not life threatening, their profound impact on social interactions and on patients' psychological well-being is undeniable.

Alopecia areata is a medical condition which is mainly characterized by the loss of hairs from some or all parts of body mainly on scalp. Some time it is also referred as male pattern baldness or spot baldness, because of formation of bald spots. This alopecia usually starts with one or more small, round, smooth bald patches on the scalp and can progress to total scalp hair loss or complete body hair loss. Male has greater tendency of alopecia than female. It may be due to the presence of high amount of androgenic hormone, testosterone, in male. The exact cause of alopecia is unknown which leads to difficulties in treatment.

Research and development of treatments for hair growth disorders is a relatively small area of interest to the pharmaceutical industry despite the considerable commercial potential. In part, the reluctance to enter the field may be because of the complexity of the hair follicle unit and the many issues to be addressed in the development of an effective treatment. Our understanding of how hair follicles function and why changes to the hair follicle density, size and growth cycle occur during disorder development is poorly understood. As a result, no clear avenue of investigation has emerged. However, several biotech companies have been formed in recent years, primarily driven by academic scientists with an interest in hair biology. With time these companies may develop new treatment approaches to hair loss.

The demand for treatments for hair loss fuels a multi-billion-dollar industry. Despite this, most currently marketed products are ineffective, evidenced by the fact that the FDA has approved only two treatments for hair loss. For the treatment of alopecia various allopathic medication like minoxidil and finasteride are available in the market but many of these do not fulfill the requirements and produce a various side effect. Minoxidil and Propecia (Finasteride) are the only two drugs approved by the FDA for hair growth in men. Minoxidil is the only drug available for women with androgenetic alopecia. These drugs have been proven to show positive results for balding conditions on the vertex region of the scalp. Though these drugs are effective, many are wary of their unknown long-term effect and potential side-effects such as hypotension, reoccurrence of alopecia, loss of libido, impotence, decreased volume of ejaculate (each in 3-4%), swelling of lips, skin rashes etc. Management of alopecia with agent devoid of any side effect is still challenge to the medical profession. These crises lead to the search for natural products from plant origin possessing potential hair growth activity.

Current survey suggests that, in many developing countries, a large proportion of the population relies heavily on traditional practitioners and medicinal plants to meet the primary health care needs. This has led to increase interest in alternative remedies such as herbal medicine. Although modern medicine may be available in these countries, herbal medicines have often maintained popularity for historical and cultural reasons. Human beings and their ancestors have always been afflicted by disease. It is quite possible that human beings are relied on medicinal plants for a considerable time. So far reported that even as early as 5,000 years ago, human beings were aware of the medicinal properties of plants. A number of important modern drugs like atropine, morphine digoxin originally discovered through observation of traditional cure methods of indigenous people. Natural products are unequivocally advocated in the cosmetic and hair care industry and about 1000 different plant extracts have been examined with respect to hair growth activity; proanthocyanidine from grape seeds (*Vitis Vinifera*) and [beta]-sitosterol in saw palmetto (*Serenoa serrulata*) have shown remarkable effect. Recently there have been dramatic advances in our understanding of the plant molecules and pathways regulating hair follicle formation and hair growth. The advent of modern or allopathic medicine turned attention of scientist increasingly from plant sources to synthetic preparation as the basis for modern drugs. The advanced research may isolate some other beneficial compound from natural origin which has to eradicate the hair loss problem. The folklore claim of medicine in various regions in the country and worldwide claims the hair growth promotion of medicinal plants belonging to various families, but lack of scientific literatures limited the use of these plants among community. Herbal medicines are a natural alternative for hair restoration, gray hair reversal and/or overcoming the health disorders that often result in thinning of hair.

Here we review these findings and discuss how they might stimulate the development of new, effective therapies. As global scenario is now changing towards the use of safer, nontoxic natural product with traditional use, attempts have been made in the present investigation, containing few traditionally used herbs and modifiers. Hence, it is advisable that we can use herbal product as compared to synthetic products. "HERBS ARE SAFE"

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