



REVIEW ARTICLE

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A Review on Alopecia and its Remedies

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Abstract

Alopecia is a non-scarring, autoimmune hair loss on the scalp, and/or body. The etiology and pathogenesis of Alopecia is still unknown. The most common site affected is the scalp in the form of solitary or multiple patches of alopecia. The present review gives a glimpse on etiologic and pathogenic mechanisms, clinical features; remedies using herbal anti-dandruff shampoo.

Key Words: Alopecia, Herbal, Anti-dandruff, Hair loss

INTRODUCTION

Hair loss problems and Dynamics of hair loss: Before knowing the dynamics of hair loss, it's a necessary to know the hair follicle growth. Usually hair follicle growth occurs in cycles (Fig. 1). Hair follicle cycle consists three phases, a long growing phase (anagen), a short transitional phase (catagen) and a short resting phase (telogen). A new hair growing in the follicle at the end of the resting phase, after the hair falls out (exogen) and this leads to the starting of the new cycle again. In the length of the three phases, with the duration of the anagen determining the type of hair produced, particularly its length. Each day usually about 100 hair strands reach the end of their resting phase and hair falls out. Hair loss in non scarring alopecias, including *Alopecia areata* (AA) essentially represents a disorder of hair follicle cycling^(1,2,3). It is believed that in AA, an as yet unidentified trigger stimulates an autoimmune lymphocytic attack on the hair bulb. Anagen arrest occur because of occurrence of inflammation is specific for anagen hairs. During the growing if disturbance may happen and that is anagen arrest. This anagen arrest causes abnormal loss of anagen hairs (anagen effluvium). A related but distinct entity observed very frequently in women is 'telogen effluvium'. This is an umbrella term inclusive of conditions wherein the affected hairs undergo an abrupt conversion from anagen to telogen (anagen release), clinically seen as localized shedding of hair in the telogen and morphologically identified as hair with a depigmented bulb^(4,5).

Hair loss problem in human life

Both men and women's are suffering from hair loss problem. As hair loss leads to baldness so patients are usually afraid of experiencing it. The influencing factors causing hair loss are shortly reviewed in terms of the conditions of the hair in the follicles and the biosynthesis of hair which impact to the fragility of hair. The androgenic hormones which involved in the hair loss are testosterone and dihydrotestosterone. Generally, hair loss is influenced by both internal factors which going from enzymes to hormones and external factors^(6,7). Dandruff is a most common problem affecting the scalp and it affects more than 50% of population during their life and causes major discomfort. It causes the embarrassing situation in society so everyone try to be free from dandruff. It is usually characterized by the flakes on the scalp. Dandruff's frequency and severity can be seen mostly in young men. Because of extensive problem of hair loss a variety of antifungal agents are available in the market for the treatment of dandruff,

but even though complete control could not be reached till the date. The daily uses of most of the shampoos not only make hair dull but also have other negative effect because of its chemical contents (8,9,10).

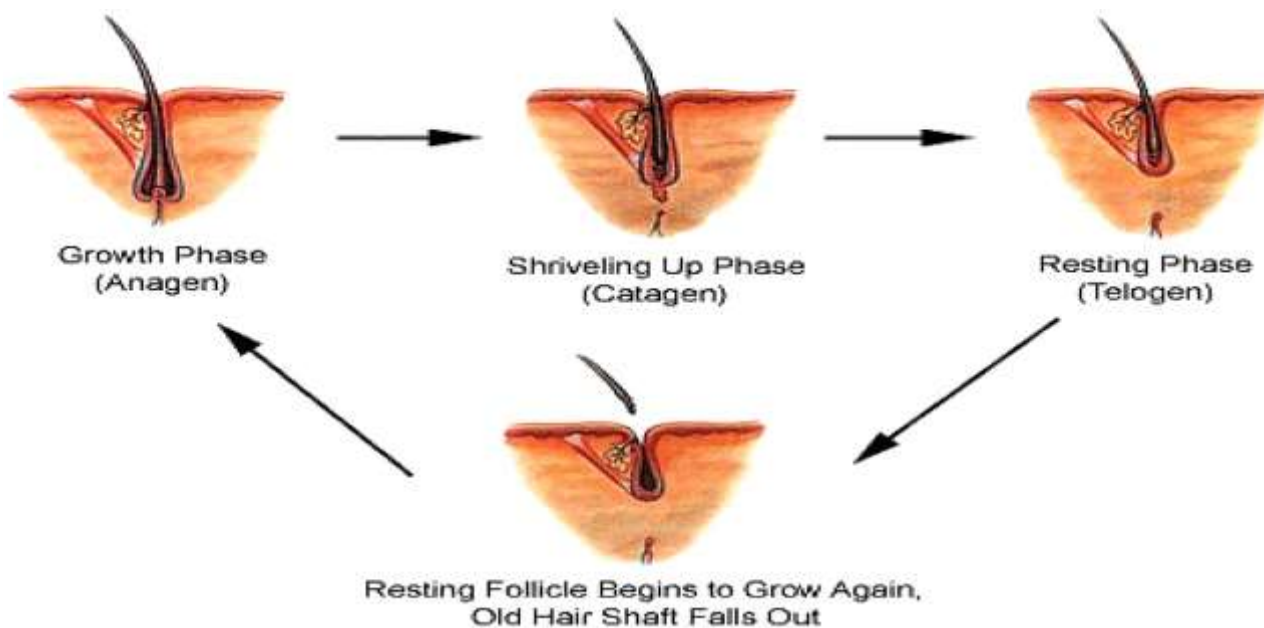


Figure 1: Hair Follicle Growth Cycle

Hair loss causing internal and external factors.

Internal factors which cause the hair loss comprise genetic reasons controlling the metabolism of hormones and active substances appropriate for hair growth. The gene *Fgf5* is responsible to encode the transcription factor for expression of fibroblast growth factor 5 (FGF5). In the proliferation of the hair follicles growth factor 5 (FGF5) plays an important role (11).



Figure 2: Factors influencing Alopecia areata

Usually baldness is due to genetic reason, there are mainly three types: The first is *androgenic alopecia* which usually seen any time after puberty. Generally the problem will increase by increasing age. The second is *telogen effluvium* which is frequently related with genetics, as hormone imbalance mainly during pregnancy leads to suddenly stopping of hair follicle growth so leads to hair loss. Both these types of baldness happen in sequence until all hair is lost. The third type is *alopecia areata* as shown in Fig.3 which indicates the spot or patchy baldness ⁽¹²⁾. Thyroid imbalance, allergic reaction and diabetes mellitus are some other internal factors which causes the hair loss. High or low concentration of thyroid makes interruption of biosynthesis of testosterone and dihydrotestosterone that influences the hair growth. It is observed that, when testosterone is converted to dihydrotestosterone leads to hair loss. Allergic reaction as the indicator of hypersensitivity reaction influences the activation of progressive fibrosis of the per follicular sheet occurs in lesions ⁽¹³⁾. Diabetes mellitus can also cause hair loss. The growth of hair is influenced by the concentration of glucose which can interact with keratin of hair follicle which is known as glycosylation. Diabetes also influences the blood circulation to hair follicles affecting the ability of the hair follicle to form metabolites. This also reduces the hair growth due to malnutrition ⁽¹⁴⁾.



**Figure 3: Patchy hair loss “common type of alopecia”
(Image included with permission of volunteer)**

External factors other than human body such as substances and environmental conditions which influence on the human body. Psychic disorders, hair styling gels, consumption of drugs mainly chemotherapeutics agents are some of the external factors. Not only psychic disorder but also a stressful daily life can also lead to several diseases including hair loss. Many works in sedentary life style lead to less spare time for cooling down the metabolic reaction of the body. To maintain these activities, the body also demands good nutrition for respective metabolic action. It is evident that even deficiency of protein and vitamin can cause hair loss.

Therefore consuming sufficient nutrition is necessary in order to prevent hair loss. It's a known fact that, vitamins from vegetables and fruits play a vital role in supporting the length and strength of hair roots. Consumption of anti-cancer drugs such as derivatives of cisplatin, aclarubicine and doxorubicine reduce the proliferation of hair cells by being toxic especially to proliferating cells. The most common problem in the youths is usage of hair styling gel which influences the growth of hair especially when chemicals and mechanical equipment are involved ^(15,16).

Fungal diseases:

Fungal diseases are very common but mostly they are not deadly and fearsome as bacterial or viral infection, so peoples are less cautious regarding fungal problem. Fungal infection in human are mostly a superficial and subcutaneous organs especially skin and other peripheral organs. In a very rarely and in some severe cases, fungal infections of lungs, oesophagus, bronchi and sometimes male reproductive glands have been reported as a common fungal infections being affects as a common dandruff, pityriasis versicolour, ringworm and severe seborrheic dermatitis ^(13,16,17).

Dandruff:

Most common fungal disorder mainly in youth is a dandruff problem. Half of the teen-age populations of any ethnicity and irrespective of gender are suffering from dandruff problem, but mostly more in male population between age group of 20 to 40 years are suffering from dandruff problem. In both developing and developed countries dandruff problem is generally a major problem that causes very great public health concern. It has been noted that, ancient people from India used *Sapindus mukorossi* for head bath. In today's life style use of this herbal culture is decreased. Hence dandruff is characterized by slight to moderate scaling of the scalp with irritation or erythema associated with the sensations of dryness ^(15,17,18). The main symptoms of scaling of the scalp suggest impairment in desquamation process. It's a known fact that in most of the persons suffering from dandruff, the hair fall is a very common problem in the current scenario. There is a need to control the formation of dandruff on the scalp by using many chemical substances. Imidazole derivatives are mainly used to control the dandruff problem, mainly Ketoconazole ⁽²¹⁾. Apart from imidazole's, other substance such as zinc pyrithione, selenium sulphide, piroctone olamine, ciproxirolamine and others may be used in anti-dandruff preparations. In market a wide variety of antifungal agents are available for the treatment of dandruff but a complete cure is far from reach. Most of the available anti-dandruff agents are either fungistatic in action or are expensive in nature ^(15, 16, 21). Fungal infections are most common skin infection in the human and other higher animals. Most of the fungal parasites are generally opportunistic pathogens and are members of the normal skin flora. Formation of rusty white flakes on skin is the main pathological condition of dandruff, and this white flakes of skin separates from the skin and fall from the scalp. Also the flakes of dandruff and peeling of skin, is observed beyond the scalp region, in the eye corners, eyelashes, eyebrows, regions in the ears and corners of nose and also near cheekbones. It is believed that people who have over active sebaceous gland usually suffer from dandruff, which make their scalp oily ⁽¹⁸⁾. The common belief is that the dandruff is higher in males, due to the effect of male hormone testosterone which leads to increasing sebaceous gland secretions. Till the date there is no report to support this evident that, no complete cure for this disease and temporary reservation is conventional treatment. From the many evidence it has been found that, there is permanent treatment for dandruff, and it's a common problem with no serious ailment. Many cosmetic companies taking a lot of efforts, much time, and money is spent to get rid of it. Presently in market there are several anti-dandruff shampoo are available and most are chemicals too and used daily by many users. Somehow, most people associate dandruff filled hair, with lowering of their self-esteem, and continue to try more and more products having the tag of 'anti-dandruff' on it ^(17, 19). Sometimes this infection may become severe form with heavily affected 'continuously peeling off' scalp, and this may affect other areas like nose corner, ears, eyelids, and other regions. This may be heredity known as *Seborrheic dermatitis*. Not only fungal problem causes dandruff, apart from this even, sedentary life style, oily skin, use of hair gel, stress, tiredness, temperature extremes, infrequent hair washing, use of ointments with alcoholic content, or obesity might increase the risk of dandruff ⁽¹⁸⁾.

Neurologic conditions, including Parkinson's disease, and stroke is often linked with *Seborrheic dermatitis*. Human Immunodeficiency Virus (HIV) has also been linked to certain cases of seborrheic dermatitis.^(2,11,20)

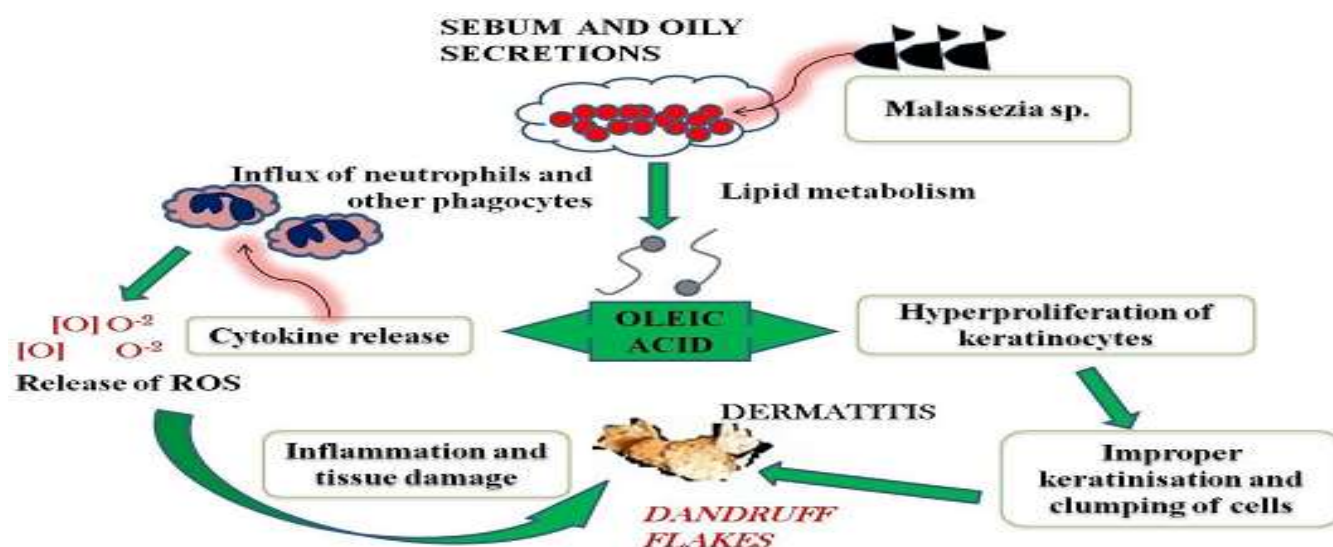


Figure 4: Dandruff- Etiology and Various Factors

Shampoo

Shampoo may be defined as a cosmetic preparation intended for the washing of hair and scalp, packed in a convenient form for use. Hair follicle many times coat with the surface grease and dirt. The nutrients essential for the hair growth unable to reach the hair root, so dead cell generation from the scalp increases, these dead cells are known as dandruff. Removal of this dead cell from scalp is very essential so that many anti-dandruff shampoos were formulated. The primary function of the shampoo is the cleansing or detergent action, but removal of dandruff also one of the important characteristic of good shampoo. The character of good shampoo is, it has to possess good foaming character, as it gives aesthetic effect as well as good cleaning sensation. In current practice most of the shampoos containing synthetic chemicals which gives side effect mainly because of usage of surfactants, more frequently alkanolamides which are the potential carcinogenic agents because of its nature of producing nitrosamine. Most of the marketed preparation produces the stable foam because they often contain alkanolamides. By using natural raw material to formulate cosmetics, mainly shampoo is a challenging task. The main challenge in the formulation of the shampoo is the selection of the material and various excipients and it has to justify rationally as a natural material and to formulate them in to cosmetics and its functionality has to be compared with the synthetic equivalent. The primary function of the shampoo is cleansing the hair, mainly of scalp debris, accumulated sebum, and residues of hair-grooming preparations. According to the World Health Organization, herbal medicines are being used by about 80% of the world population primarily in the developing countries for primary health care. In today's market scenario shampoo market is strongly dominated by the synthetic one. Surfactants like Sodium Lauryl Sulphate (SLS) based detergents are present in almost all synthetic shampoo preparation but the concentration will vary considerably from brand to brand and even within a manufacturer's product range. It's a known fact that, regular usage of shampoo containing of synthetic ingredients. This synthetic ingredients causes the severe dryness of hair and shaft leads to hair fall and destroying budding hair shafts. Herbal ingredients or their formulations are the best alternative to synthetic agents, as they are not harmful unlike synthetic. In current days the usage of natural product in cosmetics gaining a huge acceptance. A list of plants which are commonly used in shampoos is given in table (Table No. 1) along with their common names and reported functions. Natural botanicals may be used in their crude form, purified extracts, or derivatives are added to effect. Now-a-days, many herbal shampoos are available in the market which contains herbal ingredients such as plant extracts and essential oil. There are large numbers of plants which are reported to have beneficial effects on hair and are commonly used in shampoos.

Shampoo may be described as a cosmetic preparation meant for the washing of hair and scalp, packed in a convenient form for use. Its primary function is of cleansing the hair of accumulated sebum, scalp debris and residues of hair-grooming preparations. When we look in to traditional shampoo market it is strongly dominated by shampoo's of synthetic origin. Sodium lauryl sulfate based detergents are the most common but the concentration will vary considerably from brand to brand and even within a manufacturer's product range. These shampoo's of synthetic ingredients are harmful especially during regular usage. This causes severe dryness of hair and shaft leading fall in hair and destroying budding hair shafts. Herbal ingredients or their formulations are viable alternative to synthetic agents. During the past few decades, there has been a dramatic increase in the use of natural products in cosmetics ⁽²²⁾.

Table 1: Commonly used herbals in shampoos

Sr. No.	Common Name	Botanical Name	Part used	Category
1	Kurunthotti	<i>Sida cordifolia</i>	Leaves	Antidandruff activity
2	Tulsi	<i>Ocimum sanctum</i>	Leaves	Antimicrobial agent
3	Neelamari	<i>Indigofera tinctoria</i>	Leaves	Hair coloring and hair growth promoter
4	Henna	<i>Lawsonia inermis</i>	Leaves	Hair coloring and hair growth promoter
5	Soap nut	<i>Sapindus indica</i>	Fruit	Detergent
6	Shikakai	<i>Acacia concinna</i>	Powder	Detergent
7	Vetiver	<i>Vetiveria zizanioides</i>	Root	Coolant and anti-bacterial agent
8	Hibiscus	<i>Rosa-sinencis</i>	Leaves	Conditioning agent
9	Amla	<i>Emblica officinalis</i>	Fruit	Strengthen hair, antidandruff agent, hair growth promoter
10	Linseed	<i>Linum usitatissimum</i>	Seed	Sequestering agent
11	Lemon	<i>Citrus lemon</i>	Fruit	Antidandruff, natural cleanser, pH modifier
12	Guar gum	<i>Cyamopsis tetragonolobus</i>	Powder	Thickening agent

Causes, signs and symptoms

Dandruff is characterized by excessive peeling of dead skin that forms on scalp (Figure 1-3). It is embarrassing as it leads to visual nuisance, redness and irritation. Patients with dandruff often experience one or more additional symptoms apart from to skin flaking (Table 2). These other symptoms are mainly pruitus (66%), irritation (25%) and dry scalp (59%).

Table 2: Synthetic Products for Treatments of Dandruff and Their Drawbacks

Sr. No.	Drug	Products	Drawbacks
1.	Zinc Pyrithione	Head and shoulders	Increased scaling if in continuous use.
2.	Coal Tar	Neutrogena T/Gel, Tegrin	Has an earthy smell. Can give light colored hair, an orange tint and treated skin may become more sensitive to sunlight.
3	Selenium sulfide	Selsun, Excel	Can discolor hair blonde, gray or chemically colored hair.
4	Salicylic acid	Lonil T	Leaves scalp dry leading to more flaking.
5	Ketoconazole	Nizoral	Nausea, Vomiting, Hepatitis, Loss of hair, rashes, doses higher than required for most fungi.
6	Miconazole	Davis	Frequent hypersensitivity fever and chills, skin rash or itching.

Treatment Strategies: Synthetic Vs Natural

Treatment of dandruff can be done mainly by three ways based on its mechanism of action these include keratolytic, antimicrobial and anti-proliferative agents. It has been observed that only shampooing and keratolytic treatments like salicylic acid is mainly beneficial in patient with milder dandruff condition as it will remove a considerable amount of flakes. Most of commercially

available anti-dandruff medication contain antifungal agents. These medications are pyrithione zinc, selenium sulfide, Ketoconazole and ciclopirox etc. reported that, they reduces the visible symptom of flaking and restore the underlying skin condition. There are a slew of medicated shampoos that are offered to dandruff sufferers, but many of them contain chemicals or drugs that have risks of their own. Presently in market most common anti-dandruff shampoos are composed of either selenium sulfide or zinc pyrithione. Both selenium sulfide and zinc pyrithione are known as cytostatic agents, which reduces the growth of the outermost layer of skin, in this case on the scalp. The main problem with this therapy is that, they can be very irritating to some people's skin, and therefore result in making the original dandruff problem worse instead of better. Many synthetic antifungal preparations like coal tar, salicylic acid, miconazole, selenium sulfide, ketoconazole, zinc pyrithione have been tested against many fungal species which causes dandruff, but the frequent infections and the recurrences have made the therapy costlier. Most of the herbal plants or their constituents are made to rubbed on the hair in order to remove dirt and, and it is conceivable that most plants used by man have at some time been tried on the hair. The following are the tabular representations of the outcome of extensive literature survey showing, scientific name, common name (Hindi name), parts used of the plants and their using pattern in hair care with references. There are several research has been showing that, study of natural antifungal especially against *Malassezia*, *Candida albicans* are rare and therefore, not much was reported on the same, worldwide. The literature survey on natural antifungal against, *Malassezia* spp. and findings are presented in the Table 4. There are several botanicals such as *Piper betle*, *Hibiscus rosa-sinensis*, *Lawsonia inermis*, *Datura metal*, *Mangifera indica*, *Nyctanthes arbor-tristis*, *Camellia sinensis*, *Vitex negundo*, *Citrus aurantifolia* which have been claimed to have antidandruff activity in traditional hair care for the treatment of Dandruff but scientific validation for most plants is lacking. People in India are using botanicals in hair care differently (extracts and oil) and their complex combinations with other ingredient like honey, sugar, milk, water etc. for various purposes such as blackening of hair, dandruff treatment, in hairfall, conditioning of hair etc.

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