

# Saw palmetto (*Serenoa repens*) in androgenic alopecia

## *An effective phytotherapy*

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### Abstract

Androgenic alopecia (male type baldness) is a common problem without having any satisfactory solution. *Serenoa repens* (Saw palmetto) is an exotic herb, berries of which are used increasingly in the prevention and treatment of androgenic alopecia with definite success. The active principle of the berries has been found to be phytosterols conjugated with certain esterified fatty acids. They act in synergy to prevent androgenic alopecia through diverse mechanisms. It is reported to be devoid of any adverse side effects unlike synthetic  $5\alpha$ -reductase inhibitors commonly used for prevention and management of androgenic alopecia.

### Introduction

Androgenic alopecia (*alopecia androgenetica*) is an autosomal disorder, which begins in puberty in genetically disposed individuals. Androgenic alopecia is also known as hereditary baldness, male pattern baldness, and seborrheic alopecia and occurs in males and females. This disorder progresses by causing the affected hair follicles to become smaller and correspondingly, the hair becomes finer. Eventually, the fine hairs may be lost and, thus, baldness results in the affected area. The disorder is heterogeneous and increased circulating androgen is one of the causative factors. Alopecia androgenetica affects mainly men

and women between 20 and 50 years of age and accounts for about 95% of hair loss worldwide. The word *androgenetica* is made up of two words, 'androgens' meaning hormones and 'genetica' meaning genetic (hereditary). In males with hereditary hair loss, the male hormone, testosterone comes into contact with an enzyme (known as  $5\alpha$ -reductase), which is present in the hair follicles on the top and crown of the head. Testosterone is then converted to dihydrotestosterone (otherwise commonly referred to as DHT) and it is this DHT that shrinks the hair follicle causing hair loss (Prager *et al*, 2002).

Current research shows that the balding scalp contains

miniaturized hair follicles and increased amounts of dihydrotestosterone (DHT) compared to a hairy scalp. This suggests that it is the excess presence of dihydrotestosterone in the scalp tissue that causes androgenic alopecia in those patients genetically predisposed. Dihydrotestosterone causes a gradual, progressive shrinkage in the length and calibre of genetically programmed hair follicles. This process is called miniaturization. Each succeeding hair cycle results in production of smaller, finer hairs that contribute less to the overall appearance and density of the hair. During the thinning stage of alopecia, the hairs in the affected area are believed to transform from terminal (long, coarse and pigmented hairs, with the bulb of the follicle seated deep in the dermis of the scalp) to vellus (short, fine, thin, and non-pigmented hairs, with the bulb of the hair follicle seated superficially in the dermis of the scalp). It is this transformation to vellus hairs that is equated to baldness. The core of the phenomenon is associated with structural miniaturization.



Saw palmetto plant and berries



There have been numerous proposed treatments for baldness, but only a few have provided effective treatment over a wide range of patients, and none has been based on naturally occurring substances. To date, there has been no safe, efficacious method of treating and/or reversing the progression of this disorder without presenting known negative side effects. Minoxidil, available since 1988, produces a maximum of only 40% cosmetic responses in selected patients with vertex balding who are young, recently diagnosed and display small areas of alopecia. The response to minoxidil is not seen for 4 to 10 months and treatment must be maintained or the hairline regresses. Alopecia androgenetica is expressed in males as baldness of the vertex of the scalp and/or as frontal hair recession. In females, it is expressed as diffuse hair loss or thinning in the fronto-parietal areas. Topical minoxidil is less likely to be effective in frontal hair loss.

Saw palmetto, *Serenoa repens* (Bartram) Small is an American medicinal plant belonging to the family *Arecaceae*. It is a small woody member of the palm family that occurs from the coast of South

Carolina to Georgia (especially southern Georgia), west to coastal Alabama, south throughout Florida. It is not found in India hence imported from USA. Various companies in India like Indian Herbs

Research & Supply Co. Ltd., Saharanpur ( U P ) import Saw palmetto berries and its active principle under stringent quality control measure are extracted to meet the specific requirement of major chemical constituents (phytosterols and esterified fatty acids).

Saw palmetto has palmately divided thick, tough, leaf stems lined with very sharp, saw-like teeth that can easily tear clothes. The extracts of the ripe berry of Saw palmetto contains phytosterols ( $\beta$ -sitosterol, campesterol, stigmasterol), fatty acids (capric, caproic, caprylic, lauric, linoleic, linolenic, myristic, oleic, palmitic, and stearic acid), fixed oil,  $\beta$ -carotene, polysaccharides, etc.

The extract of Saw palmetto berries has been used successfully to treat androgenic alopecia. It acts as a multi-site inhibitor of the hormone dihydrotestosterone (DHT), which is chiefly responsible for androgenic alopecia. Saw palmetto blocks approximately 50% of the binding of DHT to receptors in the target cells (Sultan *et al*, 1984; Carilla *et al*, 1984; Briley *et al*, 1984; and Duker *et al*, 1989). It also

blocks the uptake of DHT into the nucleus of target cells, and strongly inhibits the action of the enzyme testosterone  $5\alpha$ -reductase that reduces the conversion of testosterone to DHT (Cristoni *et al*, 2000). Saw palmetto competitively blocks the translocation of the cytosol androgen receptors to the nucleus. Saw palmetto also increases activity of the  $3\alpha$ -hydroxysteroid-dehydrogenase. This enzyme is responsible for the conversion of dihydrotestosterone into the weaker androgen androstanediol (Koch, 1995; Bach & Ebeling, 1996). The principle molecules responsible for the aforesaid actions of Saw palmetto are phytosterols. But when these molecules are conjugated with certain fatty acids, more precisely esterified fatty acids, the bioavailability as well as bioactivity of phytosterols get improved significantly. So, both the components (fatty acid and phytosterols) work in concert to exert the diverse actions of Saw palmetto. It has been reported that  $\beta$ -sitosterol ethyl esters of laurate, linoleate and linolate inhibit the binding of DHEA with androgen receptors much more effectively than their corresponding unconjugated forms (Khwaja and Friedman, 2000). The saponifiable fatty acids of berries were also reported to possess inhibitory action on  $5\alpha$ -reductase (Weisser *et al*, 1996; Raynaud *et al*, 2002).

The glucosides of sitosterol are known as sitosterolins. These are

chemically glycosides of phytosterols. Generally, glucose is joined to the sterols at 3 $\beta$ -hydroxy position. It has been confirmed that sterolins are more effective than pure  $\beta$ -sitosterols. Both acute and chronic toxicity studies indicated good tolerability of sterolins without any toxic manifestations (Pegel & Walker, 1981). Shimada *et al*, 1997 reported biological activity of the acylglycerides from the berries of Saw palmetto.

Since hair loss is related to DHT, it has been suggested that this natural product would be effective in treating people with hair loss by reducing the amount of DHT in body and around the hair follicles. It is believed to function on a molecular level via competitive inhibition of 5 $\alpha$ -reductase as well as the T1 and T2 5 $\alpha$ -DHT cellular and nuclear androgen receptor sites found within susceptible scalp hair follicles. Unbound 5 $\alpha$ -DHT is then metabolized and excreted out of the body via primary excretion pathways without triggering the secondary and pathological cascade of events associated with this disorder.

## Application

Tests carried out on patients suffering from hair loss have given positive results. Patients were given both Saw palmetto lotion and capsules for a period of six months. Within four weeks of commencement of treatment, patients reported a reduction in the

amount of daily hair loss. After three months continuous daily treatment, a marked improvement in hair density was observed in 91% of the patients treated. Treatment continued up to the sixth month with excellent results. Once treatment was discontinued, patients reported that hair loss resumed and returned to pre-treatment level. In another double-blind clinical trial in males between the ages of 23 and 64 years with mild to moderate androgenic alopecia, the blinded investigative staff assessment report showed that 60% of study subjects orally dosed with Saw palmetto formulation exhibited encouraging hair growth, establishing the effectiveness of this herb in the treatment of androgenic baldness (Prager *et al*, 2002). In a separate study, five individual volunteers from 52 to 56 years of age and another three individual volunteers from 31 to 38 years of age were treated with the topical application of Saw palmetto extracts. Alopecia in these individuals varied from a rating of Hamilton 2 to Hamilton 8. Totally bald scalp devoid of pigmented hair from 5 to 25 years responded to the treatment in an interval of time directly correlated with age, rapidity of hair loss and duration of baldness. In general terms, younger men who were bald for less time responded to the treatment faster than individuals such as older men who were bald for longer periods. The scalp of these individuals indicated increased hair growth (Crandall, 2001). In another study in males and

females between the ages of 18 and 55, who were experiencing androgenic alopecia as determined by the Norwood Class Scale, via clinical investigator evaluation, Saw palmetto capsules were given for six months. Based on the data gathered, all participants (100%) in the study reported an arresting of symptomatology commonly associated with androgenic alopecia and 84% reported an aesthetically meaningful change in the caliber of affected scalp hair. These findings were determined via investigator observation, baseline, intra study, and endpoint photographic evidence, as well as patient reporting. This research study over a six month period did not reveal any side effects, drug interactions or adverse events ([www.hairvitamins.net](http://www.hairvitamins.net)).

## Conclusion

Unlike Finasteride, a synthetic 5 $\alpha$ -reductase inhibitor, *Serenoa repens* does not seem to have the side effects of loss of sex drive or impotence. In fact it has quite the opposite effect. Both men and women have used Saw palmetto as an aphrodisiac. The North American Indians use these berries as a remedy for impotence and low libido. Since women have been cautioned against using Finasteride due to potential side effects that may affect foetus development and cause birth defects, *Serenoa repens* may seem to be a natural alternative for women who are suffering from hair loss.

Normal healthy hair grows about half an inch per month. It may take few months to observe noticeable effects with Saw palmetto. Where the area is completely bald, hair may not grow if the follicles are completely dead. Since it takes years for the hair to become thin, so one must assume that the phytotherapy with Saw palmetto would also take time to reverse the process. Preventing the hair from further thinning is success in itself.

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