

**THE IMPACT OF ANDROGENETIC ALOPECIA AND ITS TREATMENT
PROTOCOLS ON THE SEXUAL LIFE OF AFFECTED MALES AND FEMALES:AN
ANALYTICAL LITERATURE REVIEW**

Abstract:

This review will overview all such treatments, along with enlisting the major possible causes and mechanisms that could cause those problems. Androgenetic Alopecia is one of the most common forms of hair loss that affect both males and females. It is a genetically pre-determined disorder that occurs when the body's response to androgens is enhanced or increased. It is seen that 50% of the affected individuals are within 50 years of age, whereas 80% of the people who get affected by alopecia were above the age of 70 years. In the case of low-level LASER therapy, it is slowly becoming a widely accepted, commercial method for treating Androgenetic Alopecia. Although the exact mechanism of action of this low-level LASER therapy is not known yet, it is seen to stimulate certain important processes such as the modulation of reactive oxygen species (ROS), increased production of adenosine triphosphate (ATP), and transcription factor induction. Androgenetic Alopecia is one of them major causes of hair loss in both males and females. It greatly impacts the daily life of individuals as they do not appear to be comfortable with their appearance.

Keywords: Androgenetic Alopecia, adenosine triphosphate, reactive oxygen species, amalgamation

INTRODUCTION

Out of the major hair-related problems that a man and a woman go through in their lifetime, hair loss is one of the most common problems. It is a prevalent hair problem that affects as many as about 50-80% of the population worldwide. (1) Amazingly enough, there is no leading cause that has been declared as the one that is the root cause behind hair loss. Instead, hair loss could be said to arise from an amalgamation of factors that contribute to weakening the hair roots and thus, hair fall in the long term. Whatever the reason is, hair loss could indeed be very distressing for the people experiencing it, mainly because it directly impacts their physical appearance and makes them feel less confident and uncomfortable about themselves. (2)

Androgenetic Alopecia is one of the most common forms of hair loss that affect both males and females. It is a genetically pre-determined disorder that occurs when the body's response to androgens is enhanced or increased. (3) Since Androgenetic Alopecia is seen to affect both males and females, it is seen that either of them has a characteristic pattern of distribution in which they start losing their terminal hair. In males, the pattern of hair loss is majorly from the vertex and the frontotemporal regions, whereas in females, it occurs along the frontal portion of the hairline. However, in both males and females, there could be several other underlying issues or actors as well, that could both increase or decrease the rate of hair fall. (4) There is no predisposition for any age group when it comes to the development or occurrence of androgenetic alopecia, for it was seen to occur at any time after puberty. It affects all races equally, including Whites, Asians, African Americans, and Eskimos. (5)

Since hair loss is indeed a very disturbing loss for the people affected by it, these people are often seen to resort to several treatment options in an attempt to reduce or even reverse their rates of hair loss. Unfortunately, there are several quacks available in the markets who, in order to sell

their businesses, recommend such harsh products or chemical-based treatments that harm not only the hair but also the general health of an individual. For this reason, it is always best to consult a physician or dermatologist for proper consultation and prescription of only those medications that could help reduce or eliminate the problem safely and effectively. Ironically enough, even medicated products are often seen to cause adverse effects and complications in some patients due to their careless usage or wrong dosage. (6)

This review article reflects upon the adverse effects and complications of androgenetic alopecia and its various treatment options on the sexual health of both males and females. Like every other aspect of human health, the sexual well-being of the affected individuals is seen to be get affected due to some treatment protocols that are followed for androgenetic alopecia. This review will overview all such treatments, along with enlisting the major possible causes and mechanisms that could cause those problems.

ANDROGENETIC ALOPECIA AND ITS CAUSES

Androgenetic Alopecia is one of the most common causes of hair loss in human beings. It affects both males and females and is easily one of the most common causes for causing stress and anxiety over hair loss in both genders. Androgenetic Alopecia is seen to occur in all races, with an increased propensity for occurring in Whites followed by Asians and African Americans, and Native Americans, and Eskimos. (7)

It is seen that 50% of the affected individuals are within 50 years of age, whereas 80% of the people who get affected by alopecia were above the age of 70 years. However, there was no discrimination in the occurrence of this disorder between the males and females, as it occurred in both of them equally after the pubertal ages. (8)

There is a particular pattern of hair loss that is seen to occur in androgenetic alopecia. It was seen that in males, the loss of hair was more on the frontotemporal and vertex regions, whereas in females, it is seen to occur along the frontal part of the hairline.

Normally, the life cycle of hair occurs in four stages. These stages are divided into the anagen or 'growth' phase, the catagen or 'involution' phase, the telogen or 'resting' phase, and lastly, the exogen or 'shedding' phase. Approximately 80-90% of the hair is found to be in the anagen phase, which lasts for about six years in an average human being. About 100 strands of hair are lost daily since they are in the exogen phase. (9)

Coming to the pathogenesis of Androgenetic Alopecia, there are two major forms in which the 5-alpha reductase enzyme is found to occur in the human body. Type I receptors are found to occur in the sebaceous glands, sweat glands, and keratinocytes. Type II receptors are found to occur in hair follicles, vas deferens, seminal vesicles, and the prostate gland. (10)

This 5-alpha reductase enzyme is found to be responsible for converting testosterone into dihydrotestosterone (DHT). Dihydrotestosterone has a greater affinity for androgen receptors already present in the body and thus, they are found to play a major role in the development of Androgenetic Alopecia. It is seen that Androgenetic Alopecia occurs due to an increased response of the body to the Type II androgen receptors. (11)

When these receptors get activated, the anagen or 'growth' phase of the hair cycle gets shortened. When the receptors receive continuous stimuli to get activated, it is seen that the follicles get matured early due to a resultant shorter anagen phase. This ultimately results in thin, short, and unhealthy hair follicles that are weaker in strength and sometimes, are not even able to penetrate the epidermis properly unlike the mature hair follicles. This leads to the progressive

loss of hair from the scalp, which leads to pattern baldness occurring in the affected individuals gradually.

For diagnosis, a careful physical and biochemical evaluation of the affected individual is enough to confirm that the person is suffering from Androgenetic Alopecia.

MANAGEMENT AND TREATMENT PROTOCOLS FOR ANDROGENETIC ALOPECIA

Once it has been confirmed that a person is suffering from Androgenetic Alopecia, the next step is to determine how far the condition has exceeded in causing hair loss. Usually, people stick to self-medicating themselves. Their 'treatment' comprises locally sold hair oils, supplements, and creams that claim to restore hair growth back. Although the majority of these so-called available solutions for hair loss are nothing but a product of useless marketing and promotional gimmicks done to sell their products, people are still seen to buy such unreliable, non-medicated treatments for their hair. In many people, these treatments also result in an increased rate of hair fall, which is due to the chemicals not suiting them or reacting adversely to their hair.

So far, there have been many discussions going on regarding the best possible treatment for Androgenetic Alopecia. But since every individual has different body chemistry, it has been found that no treatment is entirely perfect for every single individual. Instead, it is a combination of different treatments that work best for everyone. (12)

Some of the most commonly employed treatment options for Androgenetic Alopecia include:

Topical Minoxidil:

Interestingly enough, Minoxidil is one of the only three topical treatments that have been approved for usage in male and female pattern baldness. The effect of Minoxidil is found to be

the greatest on the vertex and the frontal region of the scalp. Here, it is seen to reduce hair loss by lengthening the anagen or 'growth' phase of the hair cycle. It enhances the regrowth of the hair while also increasing the density and diameter of the hair follicles. (13)

Within fifteen minutes of application of the topical solution of Minoxidil, it was seen that it improves and increases the cutaneous blood flow through the scalp region. This causes arteriolar vasodilation, while also increasing the quantity of vascular endothelial growth factor (VEGF). Minoxidil also plays a vital role in relaxing the smooth muscles, which keeps the hair follicles in focus and allows them to be stimulated as per need. This shows that the focus of Minoxidil is mainly on the hair follicle, on which it exerts its maximum effect. (14)

Topical Finasteride:

Finasteride is a 5-alpha reductase blocker. Since it has been established in the above sections that 5-alpha reductase receptors are found to occur in the hair follicles, and that their increased response to the androgen receptors plays an important role in the development of Androgenetic Alopecia. (15)

Therefore, the topical formulation of Finasteride works to reduce the levels of dihydrotestosterone (DHT) from both the scalp and the plasma. This helps in keeping their levels in the normal range, thus allowing more hair follicles to enter the anagen phase easily.

However, some people reported incidents of contact dermatitis and skin erythema when using topical Finasteride gel. This implies that care needs to be taken when prescribing it to people.

Oral Finasteride:

Just like the topical formulation of Finasteride, there also exists an oral Finasteride tablet with the same mechanism of action. However, unlike the topical solution, this oral tablet is declared

safe only for males with Androgenetic Alopecia. The reason for this is that it has an increased risk of giving rise to fetuses with ambiguous genitalia at birth in pregnant women. For the same reason, it is classified as a 'Category X' type of drug in pregnancy and is completely not recommended to be taken by women as a safety precaution. (16)

However, for males who used the oral tablets of Finasteride, it was found to have successful results and even stabilized hair growth in the majority of the cases.

Spironolactone:

Spironolactone is widely used for the treatment of various cardiovascular diseases. However, in the context of Androgenetic Alopecia, it was found to be helpful in women who were affected by this condition. (17)

Spironolactone was found to be a competitive inhibitor of androgen receptors. Moreover, it was also found to decrease the quantity of testosterone present in the adrenal gland. With lower than the normal amounts of testosterone present, it was obvious that there would not be any dihydrotestosterone (DHT) present to get bound to the androgen receptors, thereby worsening the cases of Androgenetic Alopecia. (18)

LASER Therapy (Low Levels):

If the conventional oral and topical therapies do not work out, or if the person is unable to tolerate these therapies, then light therapies are employed to provide the much-needed relief.

In the case of low-level LASER therapy, it is slowly becoming a widely accepted, commercial method for treating Androgenetic Alopecia. Although the exact mechanism of action of this low-level LASER therapy is not known yet, it is seen to stimulate certain important processes such as the modulation of reactive oxygen species (ROS), increased production of adenosine triphosphate (ATP), and transcription factor induction. All these factors cause vasodilation and

an increased blood flow to the area of interest, that is, the scalp. As a result, hair growth is stimulated from the activated follicles. (19)

All in all, these treatment therapies and others help people get over their fear of not appearing presentable. They help with the treatment of Androgenetic Alopecia in the safest way possible. However, it is only due to the compliance and long-term usage of these treatment modalities that people could see an actual difference in their condition. Without long-term usage, there is almost no chance of seeing any difference.

EFFECTS OF THE TREATMENT OF ANDROGENETIC ALOPECIA ON THE SEXUAL HEALTH OF MALES AND FEMALES

In the previous sections, it was discussed how Androgenetic Alopecia affects the lives of males and females in an equally distressing manner. However, both males and females can benefit from various treatment options available that are prescribed to them by their doctor. In the context of Androgenetic Alopecia, there is an important reason why emphasis is laid on getting the right treatment prescribed for oneself - and that is the fact that there could be important and irreversible consequences on the health of a person that could turn out to be the worst case scenarios in extreme cases. (20)

Like other side effects that are mainly seen to act on the various body systems, this review article focuses mainly on the side effects or complications that could arise in the sexual health of both males and females.

A brief overview of some of the commonly faced conditions and side effects that occur as a result of some of the prescribed methods for the treatment of Androgenetic Alopecia is given below:

Decreased Sex Life:

The first and the most common side effect to be experienced by both males and females is a decrease in the quality of sexual life that they had earlier.

In a research study carried out to explore more about this topic, it was found that both males and females complained that they felt greatly embarrassed and frustrated to carry on with their sexual lives for reasons that they could not comprehend themselves. (21) (22)

A scientific explanation for these symptoms could be the various drugs used for the treatment of Androgenetic Alopecia whose mechanism of action causes a decrease in the libido or sexual performance in both males and females. Examples of such drugs are Finasteride, Dutasteride, and oral Cyproterone acetate, all of which are recommended for the treatment of Androgenetic Alopecia.

Erectile Dysfunction And Ejaculatory Problems:

In the majority of the males who had been prescribed oral tablets of Finasteride, it was seen that some of them complained of developing ejaculatory problems and erectile dysfunction in the long term.

So far, there have not been any studies that have elucidated the exact mechanism that causes these problems to arise, however, it was decided that men should be kept on another first-line treatment for Androgenetic Alopecia, if possible.

These problems created further psychological problems for the affected males and therefore, the males were reluctant for continuing therapy with the same drug, mainly because there is an increased risk for developing persistent erectile dysfunction (PED) in some cases. (22)

Gynecomastia:

In some men who were prescribed oral tablets of Dutasteride, gynecomastia was seen to occur. This was yet another problematic symptom because its presence meant further cosmetic issues in males, apart from Androgenetic Alopecia.

The risk of gynecomastia is considerably increased in males who are taking Dutasteride. This gynecomastia can also cause an increased risk of breast cancer in some males, although this is a rare chance. It is because of this reason that mainly Finasteride is preferred as the first line of treatment. (23)

Although not life-threatening, but there still is a chance that these unwanted side effects could negatively impact the life of an individual in the long term. Therefore, it is always better to start off with a low dose of the prescribed drug, as recommended by the doctor. Androgenetic Alopecia is not a harmful condition; it could be very much reversed, although it takes time due to its slow acting mechanisms.

CONCLUSION

Androgenetic Alopecia is one of the major causes of hair loss in both males and females. It greatly impacts the daily life of individuals as they do not appear to be comfortable with their appearance. However, there are several treatment therapies for Androgenetic Alopecia that have been successfully treating this condition for a long time now. The only drawback of using these treatment therapies are their unwanted side effects that may further cause problems. This article reviews the major sexual life problems that people are bound to experience as a side effect of

these drugs, but on the same hand, advises such people to resort using drugs in a controlled, low-dose to see whether it is suiting them well or not.

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Comment [Dsp1]: There is no need of any correction. The overall presentation and drafting is very good and can be acceptable as it is, but to make it impressive, pls add some relevant images.