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PROGESTERONE AND SPIRINOLACTONE IN HORMONE REPLACEMENT THERAPHY IN HAIR.

***R. Poongavanam*[(1)] *, *S.Mohankumar*[(2)]**

Department of Pharmaceutics, Pallavan Pharmacy College, Kanchipuram- 631 502
*Author for Correspondence: R.Poongavanam
email: rpoonga03@gmail.com

ABSTRACT:

Progesterone is a natural steroid hormone. It can be found in present in brain, adipose tissue, and reproductive organs. It alleviates hormone imbalances. While it is often associated with hair growth and can act as a natural DHT blocker, imbalances or fluctuations in progesterone levels, often triggered by stress, can contribute to hair loss. It has a weak anti-androgenic effect and improves emotional and physical symptoms. It can induce hair loss conditions. Spironolactone is a potassium Sparing diuretic that has strong anti-androgenic activity. Spironolactone helps manage the hormonal stress response, induces androgenic symptoms, and helps to prevent acne, seborrheic, and hair loss. The results demonstrate that spironolactone is a safe and highly effective treatment option for hirsutism, exerting its benefits through inhibition of androgen action at both peripheral and ovarian levels. This clinical study assessed the efficacy and mechanism of action of spironolactone, an ant androgenic agent, in the treatment of hirsutism. A total of 39 women with hirsutism received 200 mg/day of spironolactone. The treatment led to a notable reduction in hair growth rate, hair diameter, and density within two months, with maximum improvement seen at six months and maintained at 12 months. Spironolactone showed equal effectiveness in both idiopathic hirsutism and hirsutism associated with polycystic ovary syndrome (PCOS). The therapy produced a sustained reduction in androgen levels from both ovarian and adrenal sources without affecting Oestrogen or cortisol levels. Side effects were minimal, limited mainly to mild diuresis. It promotes the hirsutism effect and reduces unwanted hair on body parts. Individually, these two drugs can cause hair loss, but when combined, both drugs result in excessive hair growth and control sebum production. Alopecia is caused by genetics, diet, hormonal changes, and lifestyle. Both drugs are used in hormone replacement therapy. Adaptive herbal Supplements are employed for hair damage.

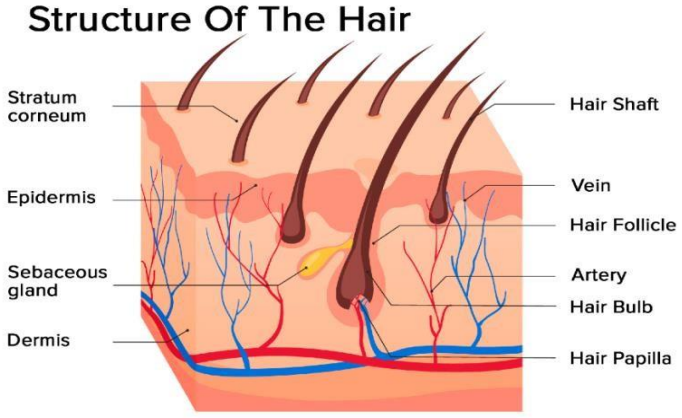
KEYWORDS: Progesterone, hormone, Anti-androgenic, Stress, Spironolactone, Alopecia, Hirsutism, Hormone replacement therapy

INTRODUCTION:

The effect of androgens on hair follicles varies based on them of dead keratinized cells. The hair structure is location on the body. The most frequent type of hair loss occurs during the telogen phase. Hair shedding in the anagen phase typically results from chemotherapy or radiation treatment. The hair follicle is a complex epithelial structure that undergoes cyclical changes after it has developed. The prolonged anagen phase is marked by significant cell growth and final differentiation, featuring the epithelial expansion of the hair follicle into the dermis, along with the regeneration of the matrix, inner root sheath, and the creation of the hair shaft.

Hair is a filamentous material primarily composed of two parts:

- Hair follicle
- Hair shaft and
- Hair bulb.



The primary effect of androgens on hair follicles involves their binding to androgen receptors in the dermal papilla. The hair growth cycle consists of three primary phases:

- Anagen,
- Catagen and
- Telogen.

Anagen is primarily associated with active growth, while telogen represents the shedding phase in the cycle. Oestrogen regulates the hair cycle, but certain hormones can disrupt this process. The hair shaft is composed of three layers: the cuticle, cortex, and medulla. Hair loss factors are genetics, hormonal imbalance, mediations and stress related hair conditions and especially age of the individually peoples differ the hair loss conditions.

PROGESTERONE:

Progesterone It can be found in the brain, adipose tissue, and reproductive organs. Hormones play a crucial role in hair growth. Progesterone, a female sex hormone, can contribute to conditions that cause hair loss. Abnormal levels of progesterone, whether too high or too low, can disrupt the hair cycle. At the hair follicle level, progesterone reduces the conversion of testosterone into DHT. The effects of prolactin (PRL) on hair growth have also been extensively studied, and both PRL and its receptors have been found in the scalp skin of humans. Hormone Replacement therapy is used for both hair and skin conditions. Hair growth and loss are significantly influenced by progesterone. Other hormones, such as luteinizing hormone (LH), which might indirectly affect androgen synthesis, are regulated by progesterone. A balanced hormonal environment for hair growth is maintained by appropriate progesterone levels, while high androgen levels can lead to hair

MECHANISM:

Progesterone contributes to hair growth mainly by blocking the enzyme 5-alpha reductase, responsible for converting testosterone into dihydrotestosterone (DHT). DHT is a hormone that contributes to the shrinking of hair follicles, resulting in hair loss. By lowering DHT levels, progesterone may assist in reducing hair loss and even encourage hair growth

DIAGRAM:

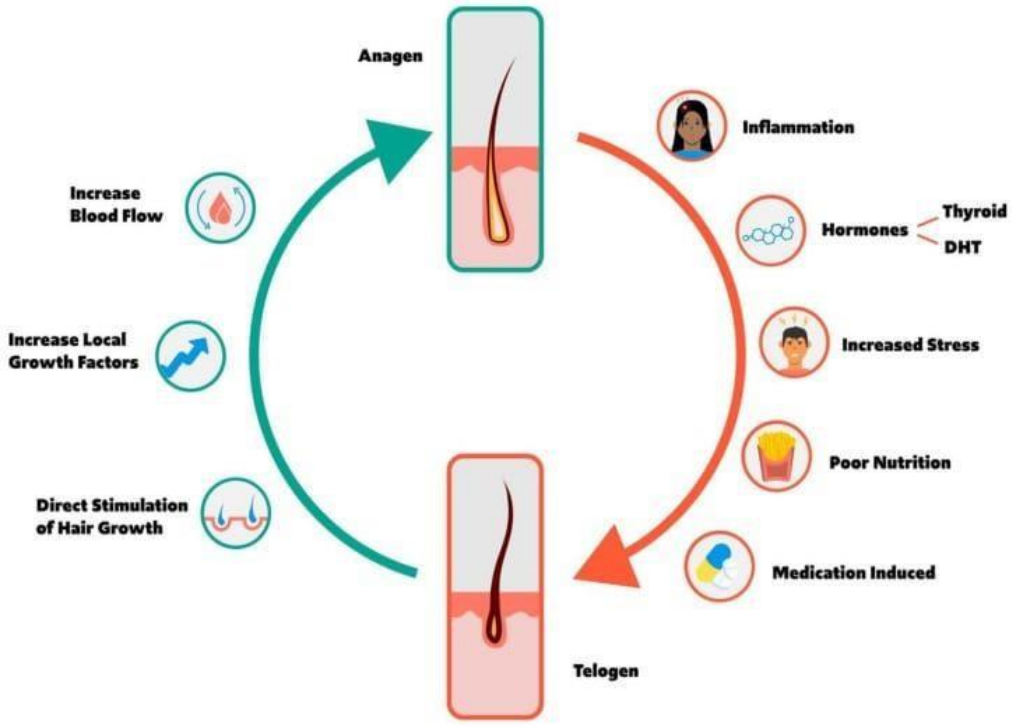


Fig no.2

ROLE:

- Hair cycle regulation
- Sebum regulation
- Progesterone treatment, whether natural or synthetic, is frequently incorporated into hormone replacement therapy to mitigate the effects of Oestrogen dominance and promote hair regrowth
- Anti-androgenic properties

WHY PROGESTERONE TO USED?

Spironolactone is a diuretic that spares potassium. It is anti-male hormone. Spironolactone aids in lowering androgen hormones, which subsequently decreases excess sebum and acne. In women, manage excessive hair growth in women (hirsutism), and treat certain forms of hair loss (alopecia) in women, as well as to lower testosterone levels in transgender individuals. Blocking androgen receptors- spironolactone blocks the effects of androgens suc as testosterone and dihydrotestosterone (DHT)which contribute to excessive hair growth. This systematic review and meta-analysis aim to assess the safety and effectiveness of both oral and topical spironolactone in the treatment of acne

PATHWAY FOR ANDROGENETIC ALOPECIA:

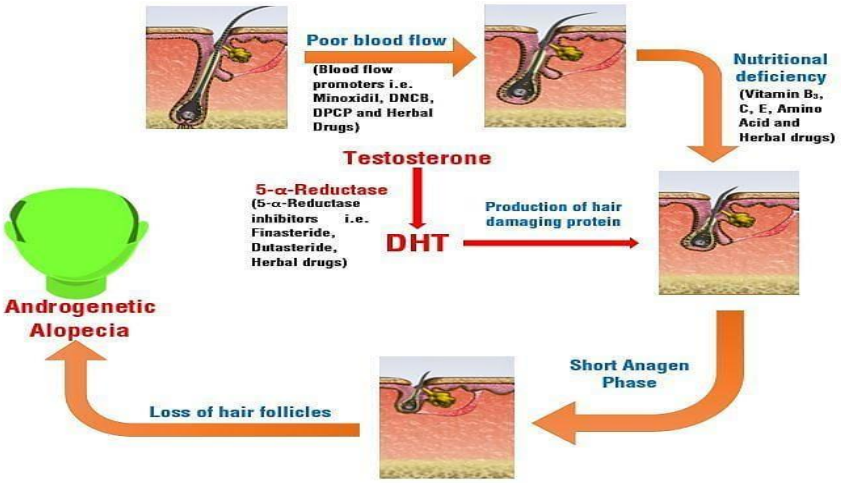


Fig no:3

BENEFITS FOR SPINOLACTONE IN HIRSUTISM AND ACNE:

- Anti-androgen effect
- Reducing excessive hair growth
- Decreasing hair thickness
- Improving the acne symptoms
- Reduce sebum production

ROLE OF HORMONES ON HAIR AND SKIN:

OESTROGEN:

Human skin serves as a significant target for hormones with glucocorticoids, growth factors, and cytokines influencing local Oestrogen production through aromatase, which is predominantly found in the pilosebaceous unit. Oestrogen receptors (ERs) are plentiful in both the dermis and epidermis, with the highest concentration located in the genital area, face, and lower limbs. ERβ is present in sebaceous glands (mirroring the distribution of ERα) and in human eccrine sweat glands. Furthermore, ERβ is extensively found in the skin, particularly in dermal papilla cells, dermal fibroblasts, adipocytes, melanocytes, and keratinocytes within the outer root sheath.

ANDROGEN:

Unlike Oestrogen and progesterone which decline rapidly, androgen secretion, which is already relatively low in women, declines gradually with menopause and aging. Androgens play a role in modulating hair growth and sebum production in the pilosebaceous unit. The relative increase of androgens during the menopause leads to clinical hyperandrogenism manifesting as sebaceous gland hypertrophy and androgenetic alopecia of female pattern due to regional reduction of hair renewal and growth, which can be aggravated by genetic and exposome factors.

DIHYDROTESTOSTERONE:

Dihydrotestosterone (DHT) is an androgenic steroid hormone synthesized through the enzymatic activity of 5-alpha-reductase type 2, which transforms testosterone into DHT in specific target tissues.

THYROID HORMONE:

One of the recognized symptoms associated with both hypothyroidism and hyperthyroidism is hair loss. Human skin cells contain thyroid hormone receptors; thus, any changes in the levels of thyroxine or triiodothyronine will result in modifications to human skin and hair follicles. A study investigating the direct effects of T3 and T4 on human hair follicles in vitro revealed that both T3 and T4 inhibit the apoptosis of human hair matrix keratinocyte cells, with T4 also demonstrating a significant stimulatory effect on their proliferation.

NUTRITIONAL DEFICIENCIES:

- **MINERALS**

Micronutrients, such as vitamins, play a crucial role in maintaining the normal cycle of hair follicles and promoting the cellular turnover of matrix cells within hair follicle bulbs. Selenium, a mineral known for its protective properties against oxidative damage and its role in hair follicle morphogenesis, has been linked to reduced hair growth and hair loss in selenium-deficient rats and mice. In human studies, selenium supplementation in patients with deficiencies resulted in hair re-pigmentation and enhancements in alopecia conditions.

There are several mechanisms by which both iron and vitamin D have possible effects on hair growth. As the role of iron and ferritin levels increase in nondividing cells, rapidly proliferating cells such as hair follicle matrix cells have lower levels of ferritin and higher levels of free iron.

Amino acid

Fatty acid

Vitamins

Biotin, which serves as a cofactor for carboxylation enzymes and is found in dietary sources such as protein, has undergone more thorough evaluation regarding its impact on hair characteristics. It is incorporated into numerous supplements and serums aimed at promoting hair health. Contrary to various misconceptions, biotin primarily enhances hair strength rather than stimulating hair growth.

HOW TO STOP STRESS RELATED HAIR LOSS:

- Stress management
- Dietary changes
- Vitamin supplements
- Lifestyle changes
- Poor sleep
- Topical treatment
- Hydration

MEDICATIONS:

MINOXIDIL:

In patients suffering from androgenic alopecia, the response to hair regrowth was found to be related to the serum levels of minoxidil in the blood. Conversely, none of the individuals with alopecia areata who were treated with either 1% or 5% minoxidil experienced any hair regrowth, even though their minoxidil blood levels were similar. Enhanced local absorption of the topical minoxidil solution could facilitate hair regrowth in cases of androgenic alopecia.

Microneedles made from hyaluronic acid (HA) are utilized to administer minoxidil to the dermal papilla cells of hair. The HA solution by itself showed a decrease in hair loss in mice suffering from alopecia.

Oral minoxidil is infrequently utilized in the management of androgenetic alopecia (AGA) and female pattern hair loss (FPHL), primarily due to its side-effect profile at conventional dosages. Although off-label administration of oral minoxidil has been reported to enhance hair density in patients, it may lead to complications such as postural hypotension, fluid retention, and hypertrichosis Fluid retention can often be addressed through the use of Platelet-rich plasma (PRP), which is an autologous concentration of human platelets suspended in a minimal volume of plasma. Platelets function as cellular reservoirs that generate, store, and release a variety of growth factors capable of promoting the proliferation of stem cells and the replication of mesenchymal cells, fibroblasts, osteoblasts, and endothelial cells.

FINASTERIDE:

Finasteride is classified as a 5-alpha-reductase inhibitor. Physicians may recommend this medication for the treatment of male pattern baldness or benign prostatic hyperplasia (BPH). Finasteride functions as a DHT blocker. It operates by inhibiting 5-alpha-reductase, thereby reducing the levels of circulating DHT, which can assist in preventing hair loss.

HAIR TRANSPLANTATION:

Hair transplantation entails the movement or transfer of hair follicles from the occipital region to areas affected by baldness. The ideal candidates for this surgical procedure are women who possess a high density of hair in the donor area located on the occipital scalp and who experience significant hair loss or thinning in the frontal scalp.

Follicular unit hair transplantation represents a surgical approach to treating baldness, wherein follicular units—natural clusters of hair—are meticulously dissected under a stereomicroscope and subsequently transplanted into the bald regions to achieve a natural appearance

HERBAL SUPPLEMENTS:

Pumpkin seed oil, curcuma, rosemary leaves, aloe vera, ashwagandha, Amala, and nettle leaves contribute to improving the scalp, enhancing hair follicles and thickness, and strengthening hair growth while reducing hair loss.

COMMON SIDE EFFECTS FOR PROGESTERONE AND SPIRINOLACTONE:

Fig no.4

INCREASED HAIR SHEIDINNG:

- Serum ferritin
- Vitamin B12
- Oestradiol
- Thyroid stimulating hormone Serum and red cell folates

MEDICATIONS THAT MAY CAUSE HIRSUTISM AND HYPERTRICHOSIS:

HIRSUTISM	HYPERTRICHOSIS
Anabolic	Cyclosporine
Danazol	Diazoxide
Metoclopramide	Hydrocortisone
Methyldopa	Minoxidil
Phenothiazines	Penicillamine

COMBINATION FOR PROGESTERONE AND SPIRONOLACTONE EFFECTS:

PROGESTERONE:

Spironolactone is a recognized and effective therapy for hirsutism and acne, especially in women suffering from androgen excess disorders like PCOS. Acting as an anti-androgen, it functions by obstructing androgen receptors and diminishing the effects of dihydrotestosterone (DHT) in the skin and hair follicles. Consequently, this results in lower sebum production, enhancement of acne, and a reduction in the growth of undesired facial and body hair. Overall, spironolactone represents a safe and advantageous choice for addressing androgen-related skin and hair issues.

SPIRONOLACTONE:

It controls hirsutism issue, encourages hair growth, and decrease sebum production in hair. Spironolactone is crucial in managing acne. Its antiandrogenic properties inhibit sebum production and the growth of sebaceous effectively reducing the number of lesions, even in cases where serum androgen levels

are not elevated. As an anti-androgen, it functions by blocking androgen receptors and inhibiting the effects of dihydrotestosterone (DHT) in the skin and hair follicles.
This results in decreased sebum production, improvement in acne, and a reduction in the growth of unwanted facial and body hair.

CONCLUSION:

Progesterone and spironolactone are effective hormonal therapies for treating androgen-related conditions such as hirsutism, acne, and hair loss. Spironolactone functions as an anti-androgen by blocking androgen receptors and reducing sebum production, which helps in managing acne and excessive hair growth. Progesterone, particularly when given in the form of oral contraceptives that include anti-androgenic progestins, plays a role in regulating hormonal imbalances and reducing ovarian androgen production. The combined application of these treatments produces a synergistic effect, resulting in significantly improved clinical outcomes for patients with hyperandrogenic symptoms. However, long-term use requires medical supervision to monitor side effects and maintain hormonal balance

REFERENCES:

1)Nicole Natarelli 1, Nimrit, Gahoonia2, Raja K Sivamani 3,4,5,6, * Integrative and Mechanistic Approach to the Hair Growth Cycle and Hair Loss Doi: 10.3390/jcm1203089 PMCID: PMC9917549 PMID: 36769541
2)Karishma Desai; Bianca Almeida; Mariya Miteva Understanding Hormonal Therapies: Overview for the Dermatologist Focused on Hair https://doi.org/10.1159/000512888
3) Deepani Rathnayake, Rodney Sinclair Use of spironolactone in dermatology PMID:21413684
4) David C. Cumming, MD; James C. Yang, MD; Robert W. Rebar, MD; et al Treatment of Hirsutism With2Spironolactone doi:10.1001/jama.1982.03320340049034
5) Panel G, Fabbrocini, M. Cantelli, A. Masara, M.C. Annunziata, C. Marasca, S. Cacciapuoti Female pattern hair loss: A clinical, pathophysiologic, and therapeutic review https://doi.org/10.1016/j.ijwd.2018.05.001
6) Antonella Tosti MD, Massimiliano Pazzaglia MD Drug Reactions Affecting Hair, https://doi.org/10.1016/j.det.2007.01.005
7) Poonkiat, Suchonwanit, Sasima Thammarucha & KanchanaLeerunyakul Minoxidil and its use in hair disorders: a review https://doi.org/10.2147/DDDT.S214907
8) D. Hugh Rushton, PhD, Investigating and managing hair loss in apparently healthy women
9) MELISSA H. HUNTER, M.D., and PETER J. CAREK, M.D. Medical University of South Carolina, Charleston, South Carolin Evaluation and Treatment
10f Women with Hirsutism
11) C. CAROLYN THIEDKE, M.D., Medical University of South Carolina, Charleston, South Carolina Alopecia in Women
12) Konstantinos Anastassakis Androgenic Alopecia from A-To-Z https://doi.org/10.1007/978-3-031-08057.