



Editorial

Laser- and light-based therapies for hirsutism in darker skin

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Hirsutism, the excessive growth of terminal hair in a male pattern in women, is characterized by coarse and pigmented hair growth in androgen-dependent areas such as the face, chest, abdomen, and back. It may be idiopathic hirsutism (IH) or related to hormonal imbalance, most commonly polycystic ovary syndrome (PCOS). PCOS is a complex endocrinopathy characterized by insulin resistance, hyperandrogenism, ovulatory dysfunction, and polycystic ovary morphology. It is the most common endocrinopathy in women and has detrimental reproductive, cardiometabolic, and psychological health implications. Although hirsutism affects approximately 10% of the general population, its prevalence rises considerably to 70–80% among women with PCOS.

Hirsutism exerts profound psychological effects on affected women, including impaired self-esteem, reduced quality of life (QoL), and increased depression. Conventionally, hirsutism management revolved around temporary hair removal techniques such as waxing, shaving, and epilating. For women with PCOS, oral pharmacological therapies such as combined oral contraceptive pills (COCPs) and antiandrogens, while offering some efficacy, may be contraindicated or have adverse effects (AEs) and are often inadequate. Here comes the role of lasers and light-based therapies for hirsutism.

Laser- and light-based hair reduction therapies have gained popularity for longer-term management of hirsutism with minimal systemic AEs. Whereas IH has regular ovulatory cycles and normal circulating androgen levels, PCOS-related hirsutism is associated with excess ovarian-derived androgens and hair follicle hypersensitivity to androgens. Hyperandrogenism stimulates the production of terminal hairs, increases hair follicle size, and prolongs the body hair growth phase (anagen phase), making PCOS-related hirsutism a distinct subgroup compared with those with IH. Laser- and light-based hair reduction therapies for the management of hirsutism in women with PCOS, both alone and in combination with systemic therapies, are effective in reducing hirsutism severity, improving psychological well-being, and enhancing QoL in women with PCOS, with generally tolerable AEs. Combining COCPs or metformin with laser treatment may offer additional benefits.

COCPs are the first-line pharmacological treatment recommended. They contain synthetic estrogen and progestin combinations. COCPs reduce hyperandrogenism through suppression of gonadotropin secretion, inhibition of ovarian androgen production, and increased sex hormone-binding globulin to reduce androgen bioavailability. COCPs also regulate the menstrual cycle, control contraception, and provide endometrial protection for PCOS. Although generally considered safe, they are contraindicated in thrombotic risk, cardiovascular disease, and with a history of migraines.

In second-line treatment where the response to COCPs is suboptimal or contraindicated, antiandrogens such as spironolactone and finasteride may be used. Antiandrogens block androgen

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receptors, decreasing androgen production and inhibiting 5- α reductase to reduce testosterone to dihydrotestosterone conversion. Administering antiandrogens demands careful consideration in women due to their potential teratogenicity risk. Comprehensive patient counseling is vital, and the adoption of reliable contraception practices is essential for sexually active women.

Laser and light therapies are promising non-invasive procedural therapies for reducing hirsutism. They provide long-lasting results and work by selective photothermolysis, whereby a specific wavelength of light targets melanin concentrated in hair follicles, leading to their destruction. However, patients with darker skin are more likely to experience AEs due to the concentration of melanin in the hair follicle and the epidermis, which can cause thermal damage to adjacent tissues. Common AEs include skin burns, blistering, hyperpigmentation or hypopigmentation, purpura, and, in some cases, leukotrichia or paradoxical hypertrichosis.

Ruby laser is typically avoided due to its excessive absorption by melanin, increasing risks of AEs. The longer wavelength neodymium-doped yttrium aluminum garnet (Nd: YAG) laser is generally safest for Fitzpatrick Skin Types 4–6, although alexandrite and diode lasers are also effective. Long wavelengths, longer pulse durations, and conservative fluence levels can minimize epidermal damage while effectively targeting hair follicles in darker skin types. Pre-treatment test spots, pre-cooling, and parallel cooling may also enhance safety.

In a systematic review on hirsutism in PCOS (published in July 2024), alexandrite laser demonstrated significant

improvements in hirsutism severity and psychological outcomes, with high-fluence laser treatment showing superior results compared with low-fluence treatment. In addition, alexandrite laser has been found to be more effective than intense pulsed light (IPL) in reducing hair counts and prolonging hair-free intervals. The combination of diode laser with systemic agents (metformin or COCP) showed promising improved psychological outcomes. Similarly, the combination of IPL and metformin was superior to IPL alone in reducing hair counts and thickness. The comparison between the two diode lasers revealed no significant overall difference in hair reduction, but there were some differences in hair width and greater patient tolerance. Most of these studies were done on fair-skin people (Fitzpatrick Skin Type 4 or less).

Nd: YAG laser is preferred for darker skin types because the longer wavelength (1064 nm) selectively penetrates the deeper levels of the dermis, thereby reducing the risk of superficial thermal damage. Women without PCOS (IH) required fewer laser sessions to achieve more than a 50% reduction in hair count compared with women with PCOS. Further, more favorable outcomes have been observed in women with IH, showing more significant reductions in various trichoscopy parameters, including hair shaft thickness, color, and hair density per cm², compared with those with PCOS-related hirsutism. These findings suggest that women with PCOS may necessitate greater numbers of laser treatment sessions to achieve hair reduction compared with their counterparts without PCOS.

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