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# Red and Green LED Light Therapy: A Comparative Study in Androgenetic Alopecia

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## Abstract

**Background:** Androgenetic alopecia (AGA) affects both men and women, characterized by progressive hair thinning. While current treatments like minoxidil and finasteride have efficacy limitations and side effects, low-level light therapy (LLLT) using red or near-infrared light has emerged as a promising alternative. Recent animal studies suggest potential benefits from green LED light, though human data are sparse.

**Methods:** This study utilized an innovative LED helmet emitting red and green LED light on respective halves of the frontal scalp, delivering an energy density of 40 J/cm<sup>2</sup> over 20 min. Clinical photography, physician evaluations on a 7-point scale, patient satisfaction, and measurements of hair density and hair diameter were employed. Data were analyzed using linear mixed-effects models, with significance set at  $p < 0.05$ .

**Results:** Seventeen participants (47.1% male, 52.9% female, average age 46.47 years) demonstrated notable improvements after 6 months of treatment. Red and green LEDs both significantly increased hair diameter, non-vellus hair density, and satisfaction scores. Notably, the red LED therapy resulted in a statistically significant decrease in vellus hair density and achieved a greater increase in hair diameter compared to the green LED therapy. Minimal adverse effects were reported, primarily consisting of tolerable scalp heat and mild redness.

**Conclusion:** Both red and green LED therapies effectively enhanced hair growth, increasing density and thickness over 6 months. Red LED demonstrated superior improvements in specific measures. Consequently, both therapies present safe and viable alternatives for the management of AGA, expanding the repertoire of available treatment options.

**Keywords:** androgenetic alopecia; green LED light; hair regeneration; low-level light therapy; red LED light.

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