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# Cold Atmospheric Plasma as a Promising Strategy Against Emerging Antifungal Resistance in Dermatophytosis

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**ABSTRACT**

Dermatophytosis (tinea) affects approximately 20–25% of the global population. The majority of skin and nail infections are caused by the *Trichophyton mentagrophytes* complex and *T. rubrum*. However, a novel species, *T. indotineae*, is rapidly emerging as a significant concern, replacing *T. rubrum*. *T.* This species poses a serious threat due to frequent resistance to terbinafine resistance, which is caused by mutations in the squalene epoxidase gene. This growing resistance, especially to terbinafine, represents a global health concern. In Iran, for instance, *T. indotineae* is increasingly prevalent, with approximately 15% of isolates resistant to terbinafine. While alternative antifungals exist, they often come with adverse effects, and resistance to these medications is also rising, underscoring the need for safer, more effective treatments. Preclinical studies have shown that cold atmospheric plasma (CAP) can inhibit the germination of dermatophyte conidial, hinder hyphal growth, and reduce the potential for infection. Early clinical reports suggest that CAP could be a promising and safe adjunct therapy for chronic dermatophytosis, particularly in antifungal-refractory cases. To advance this evidence, our team has designed a triple-blinded randomized clinical trial to evaluate CAP's efficacy in treating refractory dermatophytosis. We hope this study will address significant challenges and pave the way for the future clinical adoption of CAP.

*Keywords:* Antifungal resistance, Cold atmospheric plasma, Dermatophytosis, *T. indotineae*

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