**Objectives**: Dermatophytosis, a prevalent fungal infection, often results in treatment failure due to the emergence of resistant strains. Among these resistant strains, *Trichophyton indotineae*, a newly identified dermatophyte species, has emerged as a major concern in dermatology. This species is particularly problematic because of its high level of intrinsic resistance to terbinafine *in vitro* and its rapid global spread. As a result, *T. indotineae* has significantly contributed to a rising incidence of severe *tinea* infections that are resistant to antifungal treatment. Increasing resistance to conventional antifungal therapies underscores the need for innovative approaches. In this context, it is crucial to evaluate Plasma-Activated Water (PAW) as a potential sterilizing agent against arthroconidia, the primary infectious form of dermatophytes that have been isolated from various clinical cases. This study investigates PAW as a novel, unconventional antimicrobial strategy specifically targeting *T. indotineae* and its arthroconidia.

**Materials & Methods:** PAW was generated using distilled water and a GlidArc reactor. The final characteristics of the PAW were as follows: conductivity of 446 ± 25 µS/cm, pH of 2.78 ± 0.12, redox potential (ORP) of +1.06 V, NO₂ concentration of 192 ± 10 mg/L, NO₃ concentration of 1550 ± 95 mg/L, H₂O₂ content of 2.6 ± 0.12 mg/L, and O₃ concentration of 1.08 ± 0.07 mg/L. In this study, eight terbinafine-resistant clinical isolates of *Trichophyton indotineae* from Greece and Romania, identified by sequencing, as well as their arthroconidia, were used. Additionally, standard fungal strains (*Trichophyton interdigitale* ATCC 28185, *Trichophyton rubrum* ATCC 28188, and *Trichophyton mentagrophytes* ATCC 9533) were included for comparison. The strains were subcultured on Potato Dextrose Agar supplemented with cycloheximide (300 mg/L) and chloramphenicol (50 mg/L), and incubated at 28°C for 7 days. The final inoculum concentration ranged between 1 × 10⁵ CFU/mL and 2.5 × 10⁵ CFU/mL and was subsequently treated with PAW at a ratio of 1:10 for different exposure times (3, 5, 7, 10, 15, and 20 minutes). Precise volumes of the mixtures were then inoculated onto Potato Dextrose Agar plates to evaluate the reduction in fungal burden after each contact period. Additionally, various instrumental analysis (IA) methods were employed to examine the impact of PAW treatment on the cell structure of the dermatophytes: Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD), and Dynamic Light Scattering (DLS). All experiments were performed in triplicate.

**Results**: A reduction of more than 6 log₁₀ in viable fungal cells was achieved within 10 minutes for all tested strains (Figure 1). The sterilization level (defined as a reduction greater than 6 log₁₀) was reached after 15 minutes for all strains. Instrumental analysis (IA) clearly revealed morphological changes in the treated fungal cells compared to the untreated controls.

**Conclusions**: Significant reductions were observed in all tested strains of *T. indotineae*, including both terbinafine-resistant and reference strains, confirming the fungicidal effect and the potential of this novel approach for the treatment of clinical dermatophytosis. Further studies are required to standardize application parameters and optimize its use in clinical practice.