ORIGINAL RESEARCH ARTICLES

FABRICATION, CHARACTERIZATION AND *IN VITRO* ANTIFUNGAL ASSESSMENT OF VORICONAZOLE NANOEMULSION

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ABSTRACT

Voriconazole, a potent antifungal agent, faces challenges related to poor water solubility and bioavailability, limiting its clinical efficacy. Nanoemulsions offer a promising approach to enhancing drug solubility, stability and potentially improving therapeutic outcomes. This work aims to fabricate a voriconazole-loaded nanoemulsion and to evaluate its *in vitro* antifungal activity against common fungal pathogens. Voriconazole nanoemulsions were fabricated using the aqueous titration method. Different oil phases, co-surfactants, and surfactants were assessed to optimize the formulation. Among the physicochemical properties of the formulation that were evaluated were droplet size, zeta potential and polydispersity index (PDI). The nanoemulsion's voriconazole *in vitro* release profile was assessed using a dialysis bag technique. Disc diffusion studies evaluated the antifungal efficaciousness against the *Candida* strain. A mean droplet size of 120 ± 10 nm, a PDI of 0.15, and a zeta potential of -25 ± 2 mV were observed in the optimized nanoemulsion formulation, suggesting remarkable stability. A prolonged release profile of voriconazole from the nanoemulsion was shown by the *in vitro* release tests. Evaluations of voriconazole's antifungal efficacy showed that the nanoemulsion considerably outperformed the commercial formulation regarding voriconazole's antifungal activity, with lower minimum inhibitory concentrations (MICs) for both of the fungi under review. The developed voriconazole nanoemulsion shows promising potential as an effective antifungal delivery system, enhancing solubility, stability and antifungal activity. Further, *in vivo* studies are warranted to validate its clinical applicability and therapeutic benefits.