Exploring Quinoxaline Derivatives as Potential Antifungal Agents: A Comprehensive Study on Candida and Aspergillus Species Susceptibility

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ABSTRACT

The escalating prevalence of fungal diseases presents a significant global health concern, impacting millions of individuals annually. Fungal infections encompass a spectrum of conditions ranging from superficial to life-threatening systemic diseases, with Candida, Aspergillus, and Cryptococcus species posing substantial threats. Particularly, Candida albicans is a leading cause of invasive fungal infections, including candidiasis and candidemia, with significant mortality rates and economic burdens. Addressing the challenges posed by fungal infections requires innovative therapeutic approaches, especially in the face of emerging drug-resistant strains such as Candida auris. In this context, the antifungal potential of quinoxaline derivatives, exemplified by 2,3-dimethylquinoxaline (DMQ), has garnered attention for its efficacy against fungal infections and wound healing properties. Building on previous research, our study aims to explore the antifungal activity of various quinoxaline compounds against *Candida* and *Aspergillus* species. Notably, compounds such as 2-Methyldibenzo[f,h] quinoxaline and 4-Chloro-7-fluoropyrrolo[1,2-a]quinoxaline demonstrated significant activity against specific *Candida* strains, while 2-Chloro-6-(trifluoromethyl)quinoxaline and 2-Chloro-7-(trifluoromethyl)quinoxaline exhibited efficacy against multiple *Candida* species. However, none of the tested compounds showed activity against certain *Candida* and *Aspergillus* strains, highlighting the diverse responses of different fungal species to these compounds. The observed variations in antifungal activity can be attributed to differences in chemical structure, mode of action, and target specificity among the compounds. While some compounds effectively target fungal vulnerabilities, others may lack the necessary biochemical properties for interaction with fungal cells. In conclusion, our study underscores the need for continued research to develop effective antifungal therapies capable of combating a broad spectrum of fungal infections. By elucidating the molecular mechanisms underlying compound efficacy and exploring novel therapeutic strategies, we can address the evolving challenges posed by fungal diseases and improve patient outcomes.

Keywords: ***Candida*, *Aspergillus,* Quinoxaline derivative, drug resistance**

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