Chapter 6

OVERVIEW OF MICELLES FOR ANTIFUNGAL THERAPY

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1. INTRODUCTION

Over the past two decades, the incidence of fungal infections has increased significantly. Worldwide, more than 1.6 million people die each year from fungal infections, and more than 300 million people currently suffer from serious fungal infections. In addition, the widespread use of antifungal drugs has had serious consequences for antifungal therapy. Resistant strains have emerged, leading to treatment failures. The current antifungal options are limited by the existence of toxicities and drug-resistant strains. There are many approaches to develop antifungal therapy, including the synthesis of new compounds, the use of biological extracts, the modification of the delivery methods or forms of antifungal drugs, and the combination of known antifungals with other drugs/agents. Nanotechnology is a promising strategy for reasons such as providing a high spectrum, overcoming the issues in toxicity, and providing better diffusion and effectiveness. Micelles are spherical amphiphilic colloidal structures with a hydrophobic core and a hydrophilic shell and their particle diameters range from 5 to 100 nm. Recently, micelles have attracted attention in the pharmaceutical field due to their unique properties, size, shape and biocompatibility, which enhance drug loading and modified release. This review focuses on providing an overview of the role and importance of micelles in antifungal therapy.

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Due to the advantages of nanotechnology and micelles in antifungal therapy, various investigations are being undertaken on these topics. In the study by Suwan et al.(47), silver nanoparticles with Psidium guajava aqueous extract were developed using green synthesis. Although these nanoparticles show a particle size of 96±4 nm, aggregation is observed over time. For this reason, micelles produced by direct mixture of Poloxamer 407 (F127) polymer were used to stabilize these nanoparticles. The particle size of micelle-coating nanoparticles was found in the range of 70.4±0.8 nm to 258.6±11.4 nm, and zeta potential values were observed below -22 mV. In the in vitro inhibition study against Candida albicans, micelle-coating nanoparticles showed a 2-fold higher inhibition area at the end of 90 days than those not coated with micelles.

5. CONCLUSION

Micellar systems stands out in antifungal treatment because of their unique properties, size, shape and biocompatibility, which enhanced drug loading and modified release. The studies have shown that micelles loaded with antifungal agents could increase efficacy and reduce dosage and side effects. Even so, further studies are needed to evaluate how they behave biologically and to assess safety.

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