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Biological Activity of Bicyclic Monoterpene Alcohols

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Abstract
The present paper aims to study the biological properties of a series of bicyclic monoterpene alcohols. Firstly, we tested the obtained compounds for fungicidal activity against clinical and reference strains of microscopic fungi. Next, we determined the minimum inhibitory concentration of these compounds comparing to other drugs widely used in practical medicine (fluconazole, terbinafine). At this stage, we found that (−)-myrtenol (47 MIC and 23.5 μg/ml) exhibits the most promising activity against filamentous and yeast fungi, respectively. Then, we have studied the membrane-protective and antioxidant activities of the obtained compounds and found out that (−)-cis-verbenol and (−)-myrtenol exhibit the highest activity on the model of erythrocytes oxidative hemolysis. Interestingly, among all the studied bicyclic monoterpene alcohols, the alcohols of the pinane series have been found to be the most promising. The obtained results from the present study suggest that (−)-myrtenol would be a leading compound for further studies in terms of possible practical application.

Keywords Bicyclic monoterpene alcohols · Antifungal activity · Antioxidant activity · Oxidative hemolysis

1 Introduction

Over the last few decades, the number of patients suffering from various forms of mycoses has noticeably increased in the world. In their works [1–3], the authors claim that more than 2.5 million people are suffering from superficial mycoses of the skin in the world and their share in the structure of dermatoses reaches 37–40%. It is well known that invasive fungal infections are less common than superficial ones; however, they are believed to be associated with high morbidity and mortality. In fact, invasive candidiasis affects more than 750,000 people annually and causes more than 350,000 deaths worldwide as reported by the Global Action Fund for Fungal Infections (GAFFI) [4]. Moreover, the latest data about infections caused by microscopic fungi indicate that they are increasingly becoming a serious problem in clinical practice.

Despite the existing significant arsenal of antifungal agents, the drugs available today do not fully meet the growing needs of clinical practice because of the appearance of new agents among microscopic fungi that previously belonged to saprophytes or phytopathogens (*Aspergillus* spp., *Rhizomucor* spp., *Fusarium* spp., *Alternaria* spp., etc.), capable of causing infectious diseases. The presence of a wide range of pathogenicity factors in fungi and phenotypic instability contribute to their adaptation to the conditions of the host organism, which leads to the growth of resistant strains. Consequently, developing new promising chemicals,

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