The inhibitory effects of essential oils and substances extracted from various varieties or parts of cinnamon on fungi of the *Candida* genus

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Outline

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Abstract

Cinnamon essential oil (CEO) is primarily derived from cinnamon bark or leaves. Previous studies have shown the strong antimicrobial activity of CEO. In addition, Cinnulin PF®, a commercial cinnamon aqueous extract, has been proven to suppress *Candida* infections. *Candida* infections is mostly cause by *C. albicans*, while *C. auris* is related to multi-drug-resistant candidiasis and candidaemia in humans. This report aims to assess the effects of cinnamon extracts on *Candida* spp. These two studies focus on comparing the antifungal properties of cinnamon extracts and their effects on oral epithelial cells. The disc diffusion and broth microdilution method show greater inhibitory activity of bark CEO in comparison with that of leaf CEO, the mode of antifungal action of the CEOs were determined using electron microscopy and light microscopy. Tight junction integrity of oral epithelial cells was assessed by determination of transepithelial electrical resistance (TEER). IL-6 and IL-8 secretion by oral epithelial cells was quantified by ELISA. In the morphological interference assays, damage to the membrane and inhibition of hyphae formation were observed in both CEOs. Haemolysin activity assays showed that CEOs reduced haemolytic activity in *C. albicans* and *C. auris*. Both of Cinnulin PF® and bark CEO also enhanced the integrity of the oral epithelial barrier. Cinnulin PF® at a concentration of 62.5 μg/mL attenuated the adherence of *C. albicans* to oral epithelial cells, and biofilm formation was reduced by 91%. Furthermore, Cinnulin PF® reduced 29% of IL-6 and 57% of IL-8 secretion by oral epithelial cells. In conclusion, CEOs exhibit potent *in vitro* antifungal activities against *C. albicans* and *C. auris* at low concentrations. The ability of cinnamon extracts to attenuate growth, biofilm formation and adherence of *C. albicans*, strengthen the epithelial barrier, exhibit anti-inflammatory and anti-haemolytic activities suggest that they are promising agents for treating *C. albicans* infection.

References

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