Nicotine enhances the thickness of biofilm and adherence of *Candida albicans* ATCC 14053 and *Candida parapsilosis* ATCC 22019

Shan Gunasegar, Wan Harun Himratul-Azni


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**Abstract**

*Candida albicans* ATCC 14053 and *Candida parapsilosis* ATCC 22019 HWP1 (hyphal–wall protein 1) are involved in hyphae formation and pathogenesis. The transcriptional ALS3 (agglutinin–like sequence 3) gene in both species are responsible for the development of biofilm and colonization on tooth surfaces. Therefore, we investigated the expression of HWP1 and ALS3 quantitatively in *C. albicans* and *C. parapsilosis* and examined the biofilm structure upon exposure to various nicotine concentrations. *In vitro*, biofilms of *Candida* species were developed directly on slides using the Lab–Tek Chamber Slide System and visualized by confocal laser scanning microscopy. Quantitative real-time PCR was used to measure HWP1 and ALS3 expression in *C. albicans* ATCC 14053 and *C. parapsilosis* ATCC 22019. The results indicated that nicotine has multiplied the number of yeast cells and increased the extracellular polysaccharides (EPS) of *Candida* species. We also found that 1 to 2 mg/ml nicotine could enhance the formation of biofilm. The findings also revealed that the expression of HWP1 and ALS3 in *Candida* species were increased as the nicotine concentration increased. Therefore, nicotine influences the biofilm development of oral–associated *C. albicans* ATCC 14053 and *C. parapsilosis* ATCC 22019.