Preliminary studies for the aplication of *Thymbra capitata* essential oil as potential antimicrobial agent in Bacterial Vaginosis

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Abstract

Bacterial vaginosis (BV) is the most common gynecological clinical condition in women in reproductive age, and has been associated with an increased risk of development of preterm labor, spontaneous abortion, and several sexually transmitted diseases such as HIV [1]. BV is not only a condition that involves excessive growth of anaerobic microorganisms, but also involves the presence of an adherent biofilm [2]. Despite its high prevalence, the aetiology of BV remains unknown, but frequently *Gardnerella vaginalis* is the main microorganism associated with this disorder [3], that is often the main species in biofilms presented in BV [4]. These results led to the theory that the microorganisms that form biofilms may be relevant for the aetiology of BV [5]. Traditionally, the treatment of BV involves the antibiotics metronidazole, clindamicin or tinidazole [6]. However, the recurrence rate remains high and this can be related to the biofilm-forming ability of *G. vaginalis* [5]. In this context, recently it was reported that natural compounds, such as *Thymbra capitata* essential oil, can reduce the activity of biofilms [7]. To test if *T. capitata* could be used in the treatment of BV, we determined the biofilm-forming ability and the effect of essential oil in seven strains of *G. vaginalis* isolated from women with BV. Thus, the biofilm-forming ability was assessed under anaerobic conditions for 48 hours, allowing each strain to form biofilm. These assays revealed that in fact, *G. vaginalis* strains produced moderate to tenacious biofilm. We then determined the sensibility of the tested bacteria to the common antibiotics used to treat BV. Not surprisingly, most of strains were resistant of metronidazole and tinidazole which are more commonly administered. However half of strains were sensitive to clindamicin. We then evaluated the antibacterial activity of essential oil upon *G. vaginalis* strains, determining minimum inhibitory concentration (MIC) and minimum lethal concentration (MLC). The *T. capitata* essential oil exhibited a potent anti-*G. vaginalis* effect, which was confirmed by the low values of MIC (0.16 µL.mL-1) and MLC (0.16 - 0.31 µL.mL-1). To conclude, these results showed that *T. capitata* essential oil presents a strong antibacterial activity upon antibiotic resistant and biofilm forming of *G. vaginalis* strains, reinforcing the potential interest of this essential oil as antimicrobial agent in the treatment of BV.

Keywords: Bacterial vaginosis; *Gardnerella vaginalis*; essential oils; novel antimicrobial agent

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