



Antimicrobial activity of *Origanum vulgare* essential oil (Oregano) and its compound isolated against cells of *Streptococcus* spp., *Candida* spp. and *Staphylococcus aureus* MRSA.

Natalia Kaori Aida*, Janaina P. Barbosa, Thaís R. de Oliveira, Vanessa S. Cardoso, José F. Höfling.

Abstract

Origanum vulgare essential oil and its isolated compound carvacrol have antimicrobial effects demonstrated in the literature as antibacterial and antifungal activity. The objective of this work was to evaluate the antifungal activity of essential oil and compound against standard strains of *Candida* spp., *Streptococcus* spp. and *Staphylococcus aureus* Methicillin resistant by the M27-A3 broth microdilution method (CLSI, 2008) in the determination of MIC and CFM. Commercial antifungal Fluconazole and Chlorhexidine were used as susceptibility parameters.

Key words:

Origanum vulgare, Carvacrol, Medicinal plants.

Introduction

The use of plants as an alternative to medicinal treatments is an ancient practice. Studies on medicinal plants have become increasingly relevant, and ethnobotanical and ethno-pharmacological knowledge is considered essential for the development of new drugs. Several plants have been tested in order to find active biocomposites that can be used in the development of new drugs¹, since microbial resistance has brought great problems in the treatment of infectious diseases and the development of new agents antimicrobial agents². The present study aimed to study the antimicrobial activity of *Origanum vulgare* essential oil and its isolated Carvacrol compound against *Candida*, *Streptococcus* and *Staphylococcus* microorganisms.

Results and Discussion

The antifungal and antibacterial activities of *O. vulgare* essential oil and its isolated compound Carvacrol were tested by the Broth Microdilution technique (CLSI, 2008) and Gullo (2012). The essential oil of *O. vulgare* demonstrated inhibitory activity for the genus *Candida*, *Streptococcus* and for the strain of *Staphylococcus aureus* at concentrations between 0.5 and 0.125 mg/ml; while carvacrol varied in concentrations between 0.250 and 0.0625 mg/ml. The fungicidal and bactericidal activities expressed concentrations of 0.5 and 0.250 mg/ml for the essential oil and 0.250 to 0.125 mg/ml for the compound. These data initially demonstrate the antimicrobial action of this essential oil, as well as its isolated compound, corroborating the literature, pointing out that they have antimicrobial activity, exhibiting action against these microorganisms in different ways and can be used to treat resistant infections and/or act as adjuvants.

Chart 1. Results of visual reading of MIC and CFM/CBM of the strains tested.

Reference strain	<i>O. vulgare</i>		Carvacrol		Fluconazole / Chlorhexidine
	MIC	MFC	MIC	MFC	
	mg/mL	mg/mL	mg/mL	mg/mL	
<i>C. albicans</i>	0,250	0,5	0,125	0,250	1
<i>C. dubliniensis</i>	0,125	0,5	0,0625	0,250	1
<i>C. glabrata</i>	0,125	0,5	0,0625	0,250	1
<i>C. parapsilosis</i>	0,125	0,250	0,0625	0,250	2
<i>C. krusei</i>	0,250	0,5	0,125	0,250	32
<i>C. guilliermondii</i>	0,125	0,250	0,0625	0,250	1
<i>S. mutans</i>	0,5	0,5	0,250	0,5	3,75
<i>S. mitis</i>	0,250	0,250	0,125	0,125	3,75
<i>S. oralis</i>	0,5	0,5	0,250	0,250	15
<i>S. gordonii</i>	0,250	0,250	0,125	0,125	7,5
<i>S. salivarius</i>	0,250	0,5	0,250	0,250	3,75
<i>S. sanguinis</i>	0,250	0,5	0,250	0,250	7,5
<i>S aureus</i> MRSA	0,5	0,5	0,250	0,5	

Conclusions

Origanum vulgare essential oil and isolated compound Carvacrol are biologically active in a dose dependent manner against the species tested in their planktonic form.

Acknowledgement

CNPq and Piracicaba School of Dentistry/UNICAMP

¹Amjad MS, Qaem MF, Ahmad I, Khan SU, Chaudhari SK, Malik NZ, Shaheen H, Khan AM. Descriptive study of plant resources in the context of the ethnomedicinal relevance of indigenous flora: A case study from Toli Peer National Park, Azad Jammu and Kashmir, Pakistan. *PLoS One*. 2017; 12(2): e0171896.

²Ayaz M, Ullah F, Sadiq A, Ullah F, Ovais M, Ahmed J, Devkota HP. Synergistic interactions of phytochemicals with antimicrobial agents: Potential strategy to counteract drug resistance. *Chem Biol Interact*. 2019 May 31;308:294-303.

³CLSI. Método de referência para testes de diluição em caldo para a determinação da sensibilidade de leveduras a terapia antifúngica. Clinical and laboratorial standards institute. *CLSI Norma M27-A3*. 2008 v.28, n.14, 2 ed.

⁴Gullo FP, Sardi JCO, Santos VAFFM, Sangalli-Leite F, Pitangui NS, Rossi SA, de Paula e Silva ACA, et al. Antifungal activity of Maytenin and Pristimerin. *Hindawi Publishing Corporation*, 2012.