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Antimicrobial properties of Camellia oleifera oil

Leticia M. Estevinho[1], Xesús Feás [2], Carmen Salinero[3], J. Pedro Mansilla [3], Pilar Vela [3], María J. Saínz [4], M. Pilar Vázquez-Tato[2], Julio A. Seijas [2]*

[1] CIMO, Mountain Research Centre, School of Agriculture, Politechnic Institute of Bragança, Portugal.
[2] Dept. of Organic Chemistry. Faculty of Sciences. University of Santiago de Compostela. Aptdo. 280. 27080-Lugo. Spain
[3] Areeiro Phytopathological Station, Pontevedra Deputation, Subida a la Robleda s/n., E36153 Pontevedra, Spain
[4] Department of Plant Production, University of Santiago de Compostela, E27002 Lugo, Spain

Abstract:

Camellias have been used in oriental ethnomedicine and appear very promising for pharmaceutical exploitation since modern science has made it possible to specify their potential medical significance with antimicrobial, antioxidant, antiallergic, antiviral and skin healing properties. In the present study oil obtained from seeds of Camellia oleifera was studied for its antimicrobial activity using clinically isolated bacterial and yeast strains. The oil evidenced antimicrobial activity, and showed different selectivity and MICs for each microorganism tested. Obtained results indicate that the tested oil acted best in relation to Gram (-) bacteria than Gram (+). The data obtained in the in vitro models clearly establish its antimicrobial potency.

Keywords: antimicrobial, Camellia oil, Gram negative, Gram positive

1. Introduction

Camellias have been used in oriental ethnomedicine and appears very promising for pharmaceutical exploitation since modern science has made it possible to specify their potencial medical significance [1]. Important, *Camellia* seeds are used for extracting high quality oil, employed extensively as cooking oil and cosmetic in Asiatic countries. Galicia (NW of Spain) has a strong and increasing presence in *Camellia* markets. Today, the bulk of the industry's exports are as young plants for flowering and gardening purposes, but this is gradually increasing to provide a more diverse and value added portfolio; and obtention of *Camellia* oil appears as a new opportunity. In the present work *Camellia* oils produced in Galicia from seeds of *C. oleifera*, were studied for their antimicrobial activity (against clinical isolated strains of *Escherichia coli*, *Bacillus cereus* and *Candida albicans*). The information obtained from the

present study can be used to evaluate the potential use of *Camellia* oil as food product for improving human health, as well as for other food technology uses.

2. Material and Methods

Plant material and oil obtention

Samples of fruits of *C. oleifera* (CO) were collected on summer 2010 from healthy plants grown in the live germplasm *Camellia* bank at the Estación Fitopatolóxica do Areeiro (Pontevedra, Galicia, NW Spain).

Antimicrobial activity tests

The microorganisms used in this study were clinical strains of *Bacillus cereus Candida albicans* and *Escherichia coli*. Antimicrobial tests were carried out according to [2], using Nutrient Broth or Yeasts Peptone Dextrose on microplate (96 wells). Amphotericin B and Gentamicin were used as controls. Antimicrobial activity was detected by adding 20 µL of 0.5% TTC solution. The Minimum Inhibitory Concentration (MIC) was defined as the lowest concentration of camellia oil that inhibited visible growth. All the determinations were carried out in triplicate and the results are given as mean ± standard deviation (SD) in µg/mL.

3. Results and Discussion

The MIC was used as a parameter of the significant inhibitory effects induced by oils in the growth of the tested microorganisms, as indicated by the TCC staining (dead cells are not stained by TTC). All the oils evidenced antimicrobial activity, and showed different selectivity and MICs for each microorganism. The treatment of bacterial infections is increasingly complicated by the ability of bacteria to develop resistance to antimicrobial agents [3]. Numerous reports have emphasized the need for less and better use of antibacterials, improved infection control, and the development of new agents [4]. Some of the common nosocomial infections are: urinary tract infections, respiratory pneumonia, surgical site wound infections, bacteraemia, gastrointestinal and skin infections; caused by *B. cereus*, *E. coli* and *C. albicans*. The *B. cereus* was the less sensitive to the camellia oils' effect (MIC: 52.0 ± 18.0 mg/mL). B. cereus is a widely distributed foodborne pathogen that causes vomiting and diarrhoea in mammals including humans. Antimicrobial activity of the tested camellia oils against C. *albicans* was found to be 20.8 ± 7.2 mg / ml. The *E. coli* was the most sensitive to the camellia oil´s effect. The standard gentamicin presented higher MIC (4.2) than the CO (MIC = 3.9) oils. *E. coli* is a highly adapted pathogen capable of causing a range of diseases, from gastroenteritis to extraintestinal infections of the urinary tract, bloodstream and central nervous system. Generally it is showed that the Gram (-) bacteria are more resistant to plant based antimicrobials than Gram (+) bacteria. This may be explained by the structural differences of the bacterial cell wall. Gram (-) bacteria, apart from the cell membrane, possess an additional outer layer membrane, which consists of phospholipids, proteins and lipopolysaccharides, and this membrane is

impermeable to most molecules. However, our results indicate that the tested *Camellia* oil acted best in relation to Gram (-) bacteria than Gram (+).

4. Conclusions

The data obtained clearly establish the antimicrobial potency of CO oil, being the *E. coli* the most sensitive to the camellia oil´s effect. This is an important finding since it can open doors into future therapeutic applications of this product. However, further studies are needed to evaluate the *in vivo* potential of the analyzed *Camellia* oils, and to test other camellia oils from different origin.

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