Zingiber officinale: CHEMICAL COMPOSITION, IN VITRO ANTIoxidANT AND CYTOTOXIC ACTIVITIES OF LEAF ESSENTIAL OIL


Zingiber officinale Roscoe is widely used in folk medicine due to its antimicrobial, antioxidant, anti-inflammatory and analgesic activities. Although essential oils constitute a complex matrix of bioactive compounds and Brazil is a producer and exporter of ginger, there are few data on essential oil obtained from leaves of Z. officinale. The aim of this work was to evaluate the chemical composition and in vitro antioxidant and cytotoxic activities of the leaf essential oil of ginger cultivated in Rio Grande do Sul.

INTRODUCTION

Zingiber officinale Roscoe is widely used in folk medicine due to its antimicrobial, antioxidant, anti-inflammatory and analgesic activities. Although essential oils constitute a complex matrix of bioactive compounds and Brazil is a producer and exporter of ginger, there are few data on essential oil obtained from leaves of Z. officinale. The aim of this work was to evaluate the chemical composition and in vitro antioxidant and cytotoxic activities of the leaf essential oil of ginger cultivated in Rio Grande do Sul.

MATERIAL AND METHODS

Ginger leaves (Z. officinale) were collected in Dois Irmãos, Rio Grande do Sul (29.5821 S, 51.0944 W) in August 2018. The essential oil (EO) was obtained by hydrodistillation in a clevenger apparatus and stored at - 4 °C until analysis. The chemical composition was investigated by gas chromatography coupled with mass spectrometry (GC-MS, Shimadzu GCMS-QP2010Ultra) and determined by NIST-11 database and Kovats index. The in vitro antioxidant activity was evaluated spectroscopically by free radical-scavenging methods (ABTS**- and DPPH*) and the radical-scavenging capacity was calculated as inhibition concentration 50% (IC50 values). In vitro cytotoxic activity was evaluated by the colorimetric method of MTT (3-[4,5-dimethylthiazol-2-ol]-2,5-diphenyl-tetrazolium bromide) in colorectal adenocarcinoma HT-29 cell line (ATCC HTB-38).

RESULTS

In the EO of Z. officinale were identified fifteen components. The major components were beta-pipene (67.948%), eucalyptol (9.903%) and beta-phellandrene (9.506%). The in vitro antioxidant analyses showed IC50 490.0 µg.mL⁻¹ and 2512.6 µg.mL⁻¹ in DPPH* and ABTS**, respectively. The essential oil demonstrated cytotoxic activity in HT-29 cells at the concentrations evaluated (100.0 to 600.0 µg.mL⁻¹) after 24 h incubation, with cell death of 35.4% in 100.0 and 39.3% in 600.0 µg.mL⁻¹. In addition, the concentrations of 400.0, 500.0 and 600.0 µg.mL⁻¹ showed no statistical difference.

CONCLUSIONS

The EO of Z. officinale leaves showed promising results for the investigated activities, indicating potential for its application as a natural source ingredient in formulations and matrix of bioactive compounds in management of inflammatory diseases and as a prototype for new pharmaceuticals.

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