

TITLE: ANTIMICROBIAL ACTIVITY OF BIOMOLECULE ZERUMBONE FROM *ZINGIBER ZERUMBET* (L.) SMITH AGAINST THE CARIOGENIC AGENT *STREPTOCOCCUS MUTANS*

AUTHORS: SILVA, T.M.; PINHEIRO, C.D.F.; PINHEIRO, C.C.S.; PONTES, G.S.

INSTITUTION: INSTITUTO NACIONAL DE PESQUISAS DA AMAZÔNIA – INPA, MANAUS, AM (AVENIDA ANDRÉ ARAÚJO, 2936, COORDENAÇÃO DE SOCIEDADE, AMBIENTE E SAÚDE, PETRÓPOLIS, CEP 69067-375, MANAUS, AMAZONAS, BRASIL)

ABSTRACT:

Essential oil obtained from rhizomes of the *Zingiber zerumbet* (L.) Smith (popularly known in Brazil as bitter ginger) is mainly constituted by the biomolecule zerumbone, a monocyclic sesquiterpene which exhibit untapped antimicrobial potential. Previous reports demonstrated the antimicrobial activity of the zerumbone against gram negative bacteria, such as *Escherichia coli* and *Helicobacter pylori*, and gram-positive bacteria, such as *Staphylococcus epidermidis* and *aureus*, showing more antibacterial effectiveness on gram positive microorganisms. Besides that, more studies are needed to determine the potential of the zerumbone as antibacterial agent against gram positive microorganism, like the *Streptococcus mutans*, the main agent of tooth decay, the oral infectious disease most prevalent in the world that affects over 90% of school-aged children and about 100% of the world population. The aim of this study was to investigate the antimicrobial activity of the zerumbone from bitter ginger rhizomes against the cariogenic agent *Streptococcus mutans*. Different concentrations of zerumbone were tested against the standard strain *Streptococcus mutans* (ATCC 35668) by using microdilution method. The speed of cidal activity was determined through a time kill-curve assay and the cytotoxicity of zerumbone was determined using the MTT (3-(4, 5-dimethyl thiazol-2-yl)-2, 5-diphenyl tetrazolium bromide) assay. The zerumbone showed a minimum inhibitory concentration (MIC) of $\geq 250 \mu\text{g/mL}$ and a minimum bactericidal concentration (MBC) of $\geq 500 \mu\text{g/mL}$ against *S. mutans*. After six hours of bacteria-zerumbone interaction, all concentrations tested starts to kill the bacteria and all bacteria were killed between 48 and 72 hours period at the concentration of $500 \mu\text{g/mL}$ (99,99% of bacteria were killed in comparison with original inoculum). In addition, zerumbone showed no cytotoxicity activity on mammalian continuous cells line. This study demonstrated strong antimicrobial activity of zerumbone against the cariogenic agent *Streptococcus mutans* according to the classification of antimicrobial action present in literature. These results draw attention to the great potential of zerumbone as antimicrobial agent against *S. mutans* infection, indicating its possible use in the phyto-pharmaceutical formulations as new approach to prevent and treat tooth decay disease.

Keywords: tooth decay, zerumbone, bioprospecting, antimicrobial, phytotherapy

Development Agency: Fundação de Amparo à Pesquisa do Estado do Amazonas