

Antimicrobial properties and action of galangal (*Alpinia galanga* Linn.) on *Staphylococcus aureus*

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Abstract

The ethanol extracts of the Zingiberaceae family (galangal, ginger, turmeric and krachai) were evaluated for antimicrobial action on *Staphylococcus aureus* 209P and *Escherichia coli* NIHJ JC-2 by using an agar disc diffusion assay. The galangal extract had the strongest inhibitory effect against *S. aureus*. The minimum inhibitory concentration (MIC) of the galangal extract was 0.325 mg/ml and the minimum bactericidal concentration (MBC) at 1.3 mg/ml using the broth dilution method. Transmission electron microscopy clearly demonstrated that the galangal extract caused both outer and inner membrane damage, and cytoplasm coagulation. The disruption of the cytoplasmic membrane properties was determined by the releasing of cell materials including nucleic acid which absorbed UV/VIS spectrophotometer at 260 nm. The major compound of the extract was D,L-1'-acetoxychavicol acetate which was identified by GC-MS and NMR.

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1. Introduction

At present, food safety is a fundamental concern to both consumers and food industries in particular as there are an increasing number of reported cases of food associated infections. Most consumers prefer high quality, nutritious and long shelf-life food products with no preservative agents. Food preservation, however, is the basis of some of the largest and the most modern food industries in the world. Spices and their essential oils have been widely used as natural food preservatives to make the processed foodstuff safe for consumers.

Rhizomes of some members of the Zingiberaceae family such as galangal [*Alpinia galanga* (Linn.) Stuntz], ginger (*Zingiber officinalis* Roscoe), turmeric (*Curcuma*

longa Linn.) and krachai [*Boesenbergia pandurata* (Roxb.) Schltr] have been extensively used as condiment for flavoring and local medicines for the stomachache, carminative and treating diarrhea. They are known to contain various antimicrobial agents. Galangal has characteristic fragrance as well as pungency; hence, its rhizomes are widely used as a condiment for foods in Thailand. Galangal is also used as a medicine for curing stomachache in China and Thailand (Yang & Eilerman, 1999). It has been shown that essential oils from both fresh and dried rhizomes of galangal have antimicrobial activities against bacteria, fungi, yeast and parasite (Farnsworth & Bunyapraphatsara, 1992). Janssen and Scheffer (1985) have reported that terpinen-4-ol, one of the monoterpenes in the essential oil from fresh galangal rhizomes, contains an antimicrobial activity against *Trichophyton mentagrophytes*. Acetoxychavicol acetate (ACA), a compound isolated from an *n*-pentane/diethyl ether-soluble extract of dried rhizomes, is active against

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