



UNIVERSITY OF GOTHENBURG  
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**Abstract** - Master Thesis Project, the Pharmacy Programme

**Antibacterial activity of allicin and ajoene, two garlic compounds, against methicillin resistant *Staphylococcus aureus* (MRSA) and chemical toxicity of allicin against Zebrafish as a vertebrate model**

**Hashem Ebrahimzadeh, 2009**

The emergence of multidrug resistance among methicillin resistant *Staphylococcus aureus* has promoted a search for novel antimicrobials. Ajoene and allicin are known historically to be antibacterial; however natural products are available only in a crude unstable form. The aims of this study are to find out whether chemically synthesised allicin and ajoene are as active as natural allicin against *Staphylococcus aureus* including MRSA.

Minimum inhibitory and bactericidal concentrations (MIC/MBC) were determined using standard methods. The toxicity of allicin against Zebrafish was used as a model of toxicity for the first time using lethal dose to kill all (LD100) and malformation.

Synthesis of allicin was successful (60%); however synthesis of ajoene gave impure product (30%). Concentrations between 1000 and 62.5µg/ml produced average zones sizes against *Staphylococcus aureus*; 41-13mm for synthetic allicin, 38-9mm for natural allicin and 0mm for ajoene. The average zone sizes produced, at the same range of concentrations, against MRSA were; 40-12mm, 38-9mm and 0mm for synthetic, natural allicin respectively ajoene. The MIC for synthetic and natural allicin against both strains was 16µg/ml and MBC was 63µg/ml. Both strains showed resistance to ajoene. The LD100 of synthetic and natural allicin was 20µg/ml respectively 39µg/ml, no malformations was observed.

This study shows that synthetic allicin is as active as natural allicin against *Staphylococcus aureus* and MRSA; however this wasn't the case for ajoene. It also shows that allicin is cytotoxic against Zebrafish at almost same concentration that it is antibacterial. Zebrafish were not a good model for measuring toxicity in this instance.