Effect of matrine on reducing damage to bovine mammary epithelial cells induced by \textit{Staphylococcus aureus} alpha-hemolysin

F. Feng\textsuperscript{1}, W.W. Ma\textsuperscript{1}, H.X. Luo, C.P. Guan, X.Z. Zhou

Key lab of Ministry of Education for Protection and Utilization of Special Biological Resources in Western China, Department of College of Life Science, Ningxia University, Helanshan Road No. 539, Yinchuan, Ningxia, 750021, P. R. China

Abstract

Taking bacterial virulence factors as targets is a new therapy for treating host bacterial infection. The aim of this study was to investigate the effect of matrine on \(\alpha\)-hemolysin production of \textit{Staphylococcus aureus} (\textit{S. aureus}) and reducing the damage to bovine mammary epithelial cells (BMECs) induced by \textit{S. aureus} \(\alpha\)-hemolysin. Subinhibitory concentrations of matrine decreased the production of \(\alpha\)-hemolysin in a none dose-dependent manner and matrine exhibited a protective effect on \textit{S. aureus}-induced BMECs injury. The results indicated that the structure of matrine may potentially be used as a basic structure for development of drugs aimed at curing and preventing dairy bovine mastitis.

Key words: \(\alpha\)-hemolysin, BMECs, matrine, cell damage

Introduction

Bovine mastitis caused by strains of \textit{Staphylococcus aureus} is the most economically important disease affecting the dairy industry worldwide (Perez-Casal et al. 2006). It is known that milk contains multiple types of immune cells and bovine mammary epithelial cells (Sordillo. 2005). Infections with \textit{S. aureus} which secrete \(\alpha\)-hemolysin often result in tissue damage and a depletion of immune cells, including macrophages and T cells. Immune cell death helps \textit{S. aureus} to evade the bovine’s innate immunity and adhere to BMECs. The co-action of \textit{S. aureus} and \(\alpha\)-hemolysin leads to the mass death of BMECs. The prevalence of methicillin-resistant \textit{S. aureus}, which can tolerate multiple antibiotics is able to withstand the effect and presence of the antibiotic that previously killed them (Kumar et al. 2010). The term antibiotic resistance refers to situations where antibiotics that normally inhibit certain types of bacteria no longer have the desired effect. Antibiotic residues in milk can affect consumers health and also cause financial losses in the dairy industry (Pogurschi et al. 2015). Thus taking bacterial virulence factors as targets is a new therapy for the development of antimicrobial.

In past years, several studies investigated whether effective antibacterial ingredients extracted from traditional Chinese medicine could eliminate the virulence factors secreted by \textit{S. aureus} (Qiu et al. 2011, Liu et al. 2015). It has been reported in preliminary rease-