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Anti-adherence activity of Sericin: Inhibition of Streptococcus mutans biofilm

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Bacterial biofilms is an exo-polysaccharide rich matrix, where the residing bacteria are known to be protected from the outside environment by the matrix. Bacteria residing within biofilms are found to be 1000 fold more resistant to antibiotics and are essentially insensitive to the host immune response. Biofilm provides structural stability and protection to the bacteria, such that the entrapped bacteria become resistant against extreme environmental conditions (pH, temperature and presence of antibiotics). In order to get rid of bacteria covered with biofilm, strong antibiotics need to be administered resulting in high resistance. For more effective treatment, biofilm should be eliminated before bactericidal agents were used. However, it is complicated to remove biofilm, especially with eco-friendly agent. Sericin, a gumming protein from silk cocoon, has been found to have several biological activities such as antioxidant, anticancer, anti-tyrosinase and collagen-promoting activity. Sericin is also considered as a waste in textile industry. Recently, we have found that sericin exhibited anti-adherence activity of biofilm generated from Streptococcus mutans without antibacterial activity. Higher sericin concentration showed stronger anti-adherence or biofilm inhibition activity but, at the same time, no effect on bacterial viability. Sericin solution at 50 mg/mL exhibited same level of anti-biofilm activity as 1.2% w/v chlorhexidine (standard solution used for eliminating biofilm in medical applications) but still expressed 90% bacterial viability. This finding indicated that sericin can be used as anti-biofilm agent without causing any bacterial resistance. Moreover, sericin is considered as safe agent and causes no allergic reaction when administered in human. These results showed that sericin, a natural and green material, can be used as an alternative for anti-biofilm formation agent in medical and dental application without resistance and toxicity.

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Biography

Supamas Napavichayanun is a PhD student, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Thailand. She earned a BSc from Faculty of Pharmaceutical Sciences, Chulalongkorn University in 2010. Her research experience has ranged from protein including silk proteins and biomaterials. She also did clinical researches in the area of Dermatology especially materials for wound healing application.

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