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CHARACTERISATION OF CRUDE AND PARTIALLY PURIFIED PEPTIDES WITH ANTIMICROBIAL ACTIVITY FROM THE SKIN OF BORNEAN FROGS

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Abstract: Antimicrobial peptides are one of the most promising antibiotic candidates with the effectiveness in killing the microorganisms, can be found largely in the frog skin. In this study, the antimicrobial properties of the crude and partially purified peptides from the frog skin of Bornean frogs; *Chalcorana raniceps, Limnonectes kuhlii, Meristogenys jerboa, Odorrana hosii, Staurois guttatus* and *Limnonectes leporinus* were determined. Crude peptides from the skins of these frogs were partially purified using C18 Sep Pak columns. The antimicrobial activities tested were disc diffusion, minimum inhibitory concentration and minimum bactericidal concentration test. *L. leporinus* and *L. kuhlii* peptides displayed the lowest MIC value against *P. aeruginosa* (62.5 µg/mL) and *S. typhimurium* (125 µg/mL). Moreover, *L. leporinus* peptide showed the lowest MIC value against *S. aureus* (31.25 µg/mL). Both *L. kuhlii* and *L. leporinus* peptides share the lowest MBC value of 125 µg/mL against *S. aureus* and *P. aeruginosa.* Peptides from *L. kuhlii* exhibited the lowest MBC values against MRSA (125 µg/mL), *E. coli* (62.5 µg/mL) and *S. typhimurium* (125 µg/mL). It can be concluded that all extracted skin peptides have antimicrobial activity against the selected bacteria, with the skin peptides from *L. kuhlii* and *L. leporinus* frogs being more potent than other species studied. The antimicrobial characteristics of peptide samples imply that there is a potential of novel AMPs from the frog species of Borneo. For future study, the peptides of frog skin extracts should be further purified.

Keywords: antimicrobial peptides, antimicrobial activities, anuran, bacteria, partially purify

Introduction

Extensive research has been conducted in order to find new antimicrobial agents with novel modes of action and effective in killing target microorganisms (Maróti *et al.,* 2011). Among all, antimicrobial peptides (AMPs) are the new drug candidates with promising structure and variety of function (Mahlapuu *et al.,* 2016). The AMPs are unlikely to promote the emergence of the resistant microorganisms when the peptides have several different mode of actions in affecting prokaryotic cell death (Maróti *et al.,* 2011). In contrast, traditional antimicrobials normally focus on metabolic enzymes thus resulting in resistance among the microorganisms (Sang & Blecha, 2008). Moreover, traditional antimicrobials are normally targeted against bacteria and fungi, in contrast to AMPs which have more usage against many types of microorganisms such as bacteria, fungi, parasites, viruses and even a few types of cancer cells (Sang & Blecha, 2008). Many studies have been conducted globally to find new AMP molecules from frogs (Zhang *et al.,* 2013; Kim *et al.,* 2000; Mashreghi *et al.,* 2013; Dourado *et al.,* 2007). Generally, frog AMPs are relatively small (<10 kDa) (Zare-Zardini *et al.,* 2013) with typically 15−40 amino acid residues in length (Kang & Park, 2014). The AMPs possess amphipathic structure with hydrophobic and hydrophilic residues. Furthermore, the AMPs have an overall charge of +2 and +9, characterized by lysine and arginine positively charged amino acids (Pushpanathan *et al.,* 2013). The peptide consists at least 50% hydrophobic amino acids with a large number of leucine and isoleucine (Conlon & Sonnevend, 2011).