Variations in neurotoxicity and proteome profile of Malayan krait (Bungarus candidus) venoms

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Abstract

Malayan krait (Bungarus candidus) is a medically important snake species found in Southeast Asia. The neurotoxic effects of envenoming present as flaccid paralysis of skeletal muscles. It is unclear whether geographical variation in venom composition plays a significant role in the degree of clinical neurotoxicity. In this study, the effects of geographical variation on neurotoxicity and venom composition of B. candidus venoms from Indonesia, Malaysia and Thailand were examined. In the chick biventer cervicis nerve-muscle preparation, all venoms abolished indirect twitches and attenuated contractile responses to nicotinic receptor agonists, with venom from Indonesia displaying the most rapid neurotoxicity. A proteomic analysis indicated that three finger toxins (3FTx), phospholipase A(2) (PLA(2)) and Kunitz-type serine protease inhibitors were common toxin groups in the venoms. In addition, venom from Thailand contained L-amino acid oxidase (LAAO), cysteine rich secretory protein (CRISP), thrombin-like enzyme (TLE) and snake venom metalloproteinase (SVMP). Short-chain post-synaptic neurotoxins were not detected in any of the venoms. The largest quantity of long-chain post-synaptic neurotoxins and non-conventional toxins was found in the venom from Thailand. Analysis of PLA(2) activity did not show any correlation between the amount of PLA(2) and the degree of neurotoxicity of the venoms. Our study shows that variation in venom composition is not limited to the degree of neurotoxicity. This investigation provides additional insights into the geographical differences in venom composition and provides information that could be used to improve the management of Malayan krait envenoming in Southeast Asia.

Keywords

KeyWords Plus: TAIPAN OXYURANUS-SCUTELLATUS; IN-VITRO NEUROTOXICITY; PRESYNAPTIC NEUROTOXIN; FASCIATUS; ANTIVENOM; TOXINS; COBRA; INDIA; PHOSPHOLIPASES; NEUTRALIZATION

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