25TH NATIONAL & 11TH INTERNATIONAL ANNUAL CONGRESS
ON RESEARCH AND TECHNOLOGY OF IRANIAN MEDICAL SCIENCES STUDENTS
URMIA UNIVERSITY OF MEDICAL SCIENCES, URMIA, IRAN

Inhibitors of Alpha-Type Phospholipase A2 Derived from Snake Blood and Their Potential Role to the Treatment of Snakebites: A Systematic Review

Maryam Dalvand[1], Toomaj Sabooteh[2*], Simin Babaei[3], Peyman Astaraki[2]

[1]Department of Educational Sciences, School of Literature and Human Sciences, Lorestan University, Khorramabad, Iran
[2]School of Medicine, Lorestan University of Medical Sciences, Khorramabad, Iran
[3]Department of Otorhinolaryngology, School of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

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***Corresponding Author:**
School of Medicine, Lorestan University of Medical Sciences, Khorramabad, Iran

Citation:
Dalvand M, Sabooteh T, Babaei S, Astaraki P. Inhibitors of Alpha-Type Phospholipase A2 Derived from Snake Blood and Their Potential Role to the Treatment of Snakebites: A Systematic Review. *Iranian biomedical journal* 2024; 28(7): 392.

ABSTRACT

Introduction: Snake envenoming is a significant public health issue, particularly in poor regions with limited access to effective treatment. Phospholipase A2 (PLA2) is a key component of snake venom, contributing to its toxic effects. In response to this threat, non-venomous snakes have developed alpha-type PLA2 inhibitors (PLIs) in their blood, which may serve as a natural defense mechanism. Understanding the functions of these inhibitors and potential therapeutic applications is crucial for advancing snakebite therapy.

Methods and Materials: A systematic literature search was conducted to identify relevant studies investigating the current knowledge on PLIs from snake blood, focusing on their purification, characterization, and mechanisms of action. Databases, including PubMed, Web of Science, and Scopus, were searched using specific keywords related to alpha-type PLA2, snake blood, treatment, and snakebite. Studies published from 1 Jan 1990 to 1 June 2024 were included to ensure the review encompassed the most recent advancements in the field. Literature from various studies on PLIs from different snake species, including *Trimeresurus flavoviridis*, *Agkistrodon blomhoffii siniticus*, and others, was analyzed to overview the subject comprehensively.

Results: Among 742 articles retrieved, nine articles were identified as relevant to the scope of our study following abstract and title screening. These nine articles were subsequently included in the review. PLIs from snake blood were identified as glycoproteins with molecular weights ranging from 75,000 to 100,000 Da, consisting of non-homologous subunits. These inhibitors exhibited specificity towards venom PLA2 from the same species and other related enzymes. Furthermore, the inhibitors were found to interact with venom PLA2 and porcine pancreatic phospholipase C, indicating a broad inhibitory activity against these toxic components.

Conclusion and Discussion: The findings underscore the potential of PLIs from snake blood as valuable tools in developing novel snakebite therapies. Their ability to neutralize venom PLA2 and myotoxins suggests promising applications in antivenom development and other therapeutic interventions. Further research into the structural and functional aspects of these inhibitors is warranted to harness their full potential for mitigating the impact of snake envenoming on human health.

Keywords: Snake bites, Systematic review, Theraputics