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Differential Hematotoxic Activity of Southeast Asian Pit Viper Venoms: The Cross-Neutralizing Effect of Available Antivenoms

By

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Abstract	Background/Objectives: Pit vipers (subfamily Crotalinae) are responsible for a large proportion of snakebite envenoming cases in Southeast Asia. Envenomation by these snakes commonly causes hematotoxic effects, including platelet dysfunction and coagulation disturbances. Although antivenom remains the mainstay of treatment, species-specific antivenoms are not available for several regional pit viper species. This study evaluated the hematotoxic activities of selected Southeast Asian pit viper venoms and the cross-neutralizing capacity of commercially available antivenoms. Methods: Venoms from five medically important pit viper species-<i>Calloselasma rhodostoma</i>, <i>Trimeresurus albolabris</i>, <i>T. hageni</i>, <i>T. purpureomaculatus</i>, and <i>Tropidolaemus wagleri</i>-were tested. Washed platelets and platelet-poor plasma obtained from healthy individuals (n = 10) were used to assess venom-induced platelet aggregation and coagulation, respectively. The neutralizing effects of three antivenoms including hemato polyvalent antivenom (HPAV), <i>T. albolabris</i> antivenom (TAAV), and <i>C. rhodostoma</i> antivenom (CRAV)-were examined in vitro. Results: All tested venoms induced in vitro platelet aggregation (%Max > 50%) and promoted plasma coagulation. At the manufacturer-recommended concentration, TAAV significantly cross-neutralized the hematotoxic effects of <i>T. purpureomaculatus</i> and <i>T. hageni</i> venoms (p < 0.0001) but failed to neutralize coagulation induced by <i>T. wagleri</i>. CRAV showed no cross-neutralization against arboreal pit viper venoms. In contrast, HPAV strongly inhibited platelet aggregation and coagulation induced by all tested venoms (p < 0.0001). Conclusions: These findings highlight the limited cross-neutralization capacity of monovalent antivenoms against arboreal pit viper hematotoxicity. In contrast, HPAV demonstrated broad cross-neutralizing activity and may represent a practical therapeutic option for Southeast Asian pit viper envenoming when species-specific antivenoms are unavailable.

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