Role of some vasoactive mediators in scorpion envenomed children: Possible relation to envenoming outcome

Sahar E.M. El-DeeK a, Ayat A. Sayed a, Ahmed Y. Nassar a, Zeynab M. Mohey-Eldeen b, Hussein M. Eldeeb c, Abdel-Raheim M.A. Meki a, *

Abstract:

Scorpion envenomation causes an autonomic storm resulting in changes in the vasoactive mediators' levels which lead to myocardial damage, cardiovascular disturbances, peripheral circulatory failure, pulmonary edema, multi-system-organ-failure and death. The study aimed to determine the circulating levels of adrenaline, noradrenaline, angiotensin converting enzyme (ACE), Angiotensin II (Ang II), kallikrein enzyme, nitric oxide (NO), aldosterone, and electrolytes Na⁺, K⁺ and Ca²⁺ in scorpion envenomed children and to evaluate the potential relation between these vasoactive mediators, the severity of scorpion envenoming and the clinical outcome of envenomed children. Forty envenomed children (22 mild and 18 severe cases) along with 10 healthy control children were enrolled in the study. The circulating levels of adrenaline, noradrenaline, Ang II, ACE, kallikrein enzyme, and NO were determined by ELISA, and spectrophotometric assays on admission and 24 h later. On admission, serum aldosterone, and electrolytes; Na⁺, K⁺ and Ca²⁺ were determined by RIA, Flame photometer and Flame atomic absorption respectively. All envenomed children showed significant surge of adrenaline, noradrenaline, ACE, Ang II, aldosterone, NO and Na⁺, that concomitantly faced by significant reduction in kallikrein, K⁺ and Ca²⁺ on admission. Twenty four hours later, all envenomed children continued to show significant elevation of ACE, Ang II and NO. The severely envenomed children showed considerable reduction in circulating levels of adrenaline, noradrenaline, ACE, Ang II, aldosterone, NO and Na⁺, that concomitantly faced by significant reduction in kallikrein, K⁺ and Ca²⁺ on admission. Also, NO exhibited considerable accumulation in non survivors, on admission, that was persistent for the subsequent 24 h and was accompanied by high kallikrein, low catecholamines and Ang II levels compared to survivors. Finally, the hypertensive cases showed substantial higher levels of catecholamine, ACE and Ang II, 24 h after admission. These findings indicated that, disturbances of the studied vasoactive mediators were common in scorpion envenomed children and may account for several inflammatory manifestations and clinical outcome. ACE inhibitors could be considered as possible therapeutic agent in victims with prominent increase in ACE and Ang II while kallikrein inhibitor and antioxidants may be effective in the treatment of late hypotensive ones.

Keywords:

Scorpion-envenomation Catecholamines ACE Kallikrein NO Aldosterone

Published In:

Toxicon , Vol. 127 , pp. 77 - 84