

Early intervention in viper bites: A potential strategy to mitigate acute kidney injury and its long-term consequences

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Dear Madam, By this letter we intend to highlight the close association between snake bites and acute kidney injury, as the causative snakes are common natives of Tropical regions and a common cause of death because of being poorly managed.

Snake bites are a significant cause of acute kidney injury in tropical regions, particularly in Eastern Pakistan, where Russell's viper, a common cause, is prevalent. The farmlands of Sindh and Balochistan are predisposed to snake bites due to their favourable weather and vast fields. A 2020 study found 454 snakebite cases in Southern Sindh, with 6 deaths. The most common mechanisms are venom-mediated consumption coagulopathy (VMCC) and endothelial damage, leading to systemic bleeding diathesis and decreased perfusion of end organs. Long-term effects of snake bites include worsening renal conditions and progression towards end-stage renal disease.

Eastern Pakistan commonly harbours Russell's viper- a frequent cause of snakebite-associated mortality, which belongs to the Viperidae family and is famously known to produce vasculotoxic venom.¹ The farmlands of Sindh and Balochistan are predisposed to snake bites as the weather of these regions and the vast fields allow the vipers to flourish and thrive well. A study conducted in 2020, representing the population of Southern Sindh, demonstrated a total of 454 cases of snakebite in a span of 1 year, out of which 6 victims died.² Since the prevalence of vipers is common in the district of Sindh, the deaths could be attributable to the haemorrhagic manifestations of vipers' bites.

The most significant mechanisms underlying viper bite presentations are venom-mediated consumption coagulopathy (VMCC) and endothelial damage resulting in systemic bleeding diathesis, which together contribute to decreased perfusion of end organs like the heart, kidneys, brain, or gastrointestinal system.³ VMCC is a major

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contributor to acute kidney injury (AKI), a common outcome of vasculotoxic snake bites, along with enzymatic dissolution of the glomerular basement membrane (BM) by the venom metalloproteinases.⁴ The haemorrhagic deterioration of the vessels leads to ischaemic nephropathy, and the impaired BM allows proteinuria, haemoglobinuria, and increased creatinine, often predisposing the victim to timely dialysis. A study concluded that individuals with co-morbidities are more susceptible to developing long-term effects of snake bites like worsening renal conditions such as new-onset hypertension, dialysis dependence, and end-stage renal disease.⁵

Considering the increased frequency of reported cases of snakebite in Sindh, it is crucial to implement effective measures to manage and administer antivenom instantly. Provision of antivenom kits and education of the initial management protocol of snakebites exclusively in rural areas and farmlands are likely to reduce hospitalization and dialysis dependence. Educating the local population on avoidance of primitive measures such as sucking blood from the bite site, applying tourniquet or squeezing out blood, and instead practicing research-proven snake bite management protocols, are likely to aid in preventing adverse events. Timely administration of antivenom therapy might also prevent extensive bleeding secondary to coagulopathy and, thereby, AKI and its associated deleterious outcomes.

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References

1. Britannica. Viper: snake. [Online] 2023 [Cited 2023 September 18]. Available from URL: <https://www.britannica.com/animal/viper-snake>
2. Kanth N, Neel S, Memon IA, Lohana AC, Advani D. Magnitude of Snakebite in a Rural of Southern Sindh. *Pak J Med Health Sci* 2020;14:1775-8.
3. Gopalakrishnan M, Saurabh S, Sagar P, Bammigatti C, Dutta TK. A simple mortality risk prediction score for viper envenoming in India (VENOMS): A model development and validation study. *PLoS Negl Trop Dis* 2022;16:e0010183. doi: 10.1371/journal.pntd.0010183.
4. Sarkar S, Sinha R, Chaudhury AR, Maduwage K, Abeyagunawardena A, Bose N, et al. Snake bite associated with acute kidney injury. *Pediatr Nephrol* 2021;36:3829-40. doi: 10.1007/s00467-020-04911-x.
5. Waikhom R, Sircar D, Patil K, Bennikal M, Gupta SD, Pandey R. Long-term renal outcome of snake bite and acute kidney injury: a single-center experience. *Ren Fail* 2012;34:271-4. doi: 10.3109/0886022X.2011.647297.

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