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Lethal dose (LD50) of the big four snakes-a mini review

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Snake envenoming is a common medical emergency throughout the world. According to WHO estimates of 2017 approximately 5.4 million people receive snake bites every year with up to 2.7 million cases of envenoming, and about 81, 000 to 138, 000 deaths occur due to these bites. Snake bite incidence is most common in Asia and Africa with an incidence of about 2 million and 580,000 annual victims respectively (WHO, 2017). The four most common venomous snakes that cause the highest number of deaths in the South Asian countries collectively called as 'big four' are the cobra (*Najanaja*), Common krait (*Bungaruscaeruleus*), Russell's viper (*Viperarusselii*), Saw-scaled viper (*Echiscarinatus*). The big four accounts for 40,000 bites and almost 8000 annual deaths in Pakistan,[1] about 50,000 annual deaths in India,[2] 1000 annual deaths in Nepal[3] and 33,000 bites in Sri Lanka annually.[4] The only available cure to snake envenoming is the anti-snake venom serum (ASVS) that is acquired by hyperimmunization of animals. Raising antisera is a long and laborious task. So correct determination of LD_{50} becomes need of hour for efficient production of ASVS.

Several studies have been devised to study the LD_{50} of big four snakes. The toxicity and lethality of the snake venom varies from species to species and even within the species depending upon geographical location, route of venom injection, age, size, locality, health, body temperature and even mood of the snake. Parveen et al.[5] determined the LD_{50} of big four snakes as LD_{50} of cobra (*NajaNaja*) about 6 to 7 µg/dose, Saw Scaled Viper (*Echiscarinatus*) 11 to 12 µg/dose, Russelviper (*Viperarusselli*) 5 to 6 µg/dose and Krait (*Bungarescaeruleus*) 4 to 5 µg/dose when injected intravenously (Figure 1).

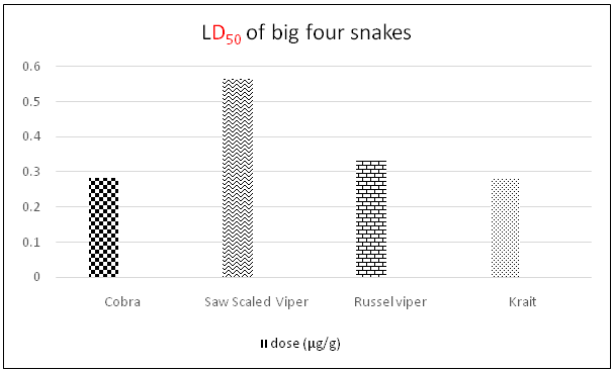

Figure 1 LD_{50} of big four snakes estimated by Perveen et al.[5]

Different researcher conducted studies to investigate the LD_{50} of big four snakes at various institutes. And it is found to be varying in different geographical locations. This study presents the overview of the LD_{50}as estimated by various researchers on mice. The LD_{50} of *Echiscarinatus* (Saw-scaled viper) estimated by Parveen et al.[5] was 0.5655µg/g and by[6] was 22 µg/mouse of mice through intravenous route. LD_{50} of *Echiscarinatus multisquamatus* which is found in Iran was calculated as 11.1 µg/mouse.[7]According to Australian online biodata of snake venom LD_{50} of *Echiscarinatus multisquamatus* is 3.26 µg/g.[8] In case of Russell viper (*Viperarusselii*) the LD_{50} was 0.3321 µg/g estimated by Parveen et al.[5] and 0.3 µg/g as calculated by Meier and Theakston (1986).

Forkrait (*Bungaruscaeruleus*) LD_{50} calculated by Perveen et al.[5] is 0.2828 µg/g for intravenous route. Engelmann and Obst et al.[9] obtained LD_{50} value is 0.169µg/g and Mirajkar & More et al.[10] reported LD_{50} of 0.16 µg/g. Australian Venom and Toxin database depicts the LD_{50} value 0.169µg/g for Krait.[8] The LD_{50} of cobra (*Najanaja*) estimated by Perveen et al.[5] was 0.2828 µg/g. Riaz & Zaman[11] estimated LD_{50} of cobra about 1.2µg/g. The lethality of snake venom varies from species to species and even among the individuals of the same species. This is because of multiple factors such as ecological variables, biophysical environment, physical and physiological status, genetic variation (either adaptive or incidental) and various other molecular and ecological evolutionary factors. The influence of such factors in the controlled laboratory settings is although minimal but it cannot be completely eliminated. However, to minimize the variability comprehensive studies covering a range of factors needs to be conducted to determine snake venom lethality or potency.

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Conflict of interest

The author declares no conflict of interest.

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