

Review

Snake bites in the Arabian Peninsula, a review article



Nasser Ali Haidar*, Eric Deitch

University of Science and Technology Hospital, 60 Street, P.O. Box 13061, Sanaa, Republic of Yemen

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ABSTRACT

Snake bites are an environmental hazard with significant morbidity and mortalities. The majority of snakes are non-poisonous and not all bites from poisonous snakes are associated with envenomation. There are variations in the types of snakes in different countries, and even within the same country, particularly across the different geographical regions with differences in climate. This variation is the case in the Arabian Peninsula. The most commonly reported snakes in this region are those that commonly cause death or severe disability by either shock, due to hemotoxins that exist in the majority of snake bites in this review, or respiratory failure due to neurotoxins. The types of poisonous snakes in the Arabian Peninsula and their effect are reviewed. Unlike land snakes, all sea snakes in the Gulf (consisting of approximately 11 species) are venomous and cause neuromuscular abnormalities leading to death from respiratory failure if they are not treated promptly. The incidence of death in the reviewed studies from the Arabian Peninsula showed great variation, from one patient a year, to 46 patients per year. The clinical features ranged from mild local manifestations to acute renal failure, cerebrovascular accidents (CVA), and death. Coagulopathy, leukocytosis, thrombocytopenia, and anemia are the main laboratory findings. The toxicity, pathophysiology, specific treatment with the supportive management, complications, and outcomes are discussed.

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1. Introduction

Snake bites represent a serious health risk in the Arabian Peninsula particularly in rural communities. The majority of cases reported were published from the southwest areas of Saudi Arabia, with scarce reports from other countries in the region (Fig. 1). The studies focused on the clinical aspects of snake bites and the majority was retrospective. Few studies were prospective discussing the specific therapy employed. The incidence varies from one patient a year in Riyadh (Al-Durhim et al., 2010), to 46 patients per year reported in Yemen (Haidar et al., 2012); however, all were hospital-based studies. In Oman, 6.8% of the acute poisoning was due to snake bites (Lall et al., 2003). Snake bites and the adverse consequences are more common among the poor communities primarily due to a more pronounced association with agricultural work (Haidar et al., 2012; Harrison et al., 2009). Rural communities also have comparatively less education concerning preventive precautions and proper first aid measures making the consequences of snake bites more severe. The limited financial status, the

long distance to the nearest hospital, the road difficulties (especially in the mountainous part of the peninsula) all contribute greatly to the delay in patients receiving appropriate treatment (Haidar et al., 2012). Treatment includes specific therapy (antivenom) and the supportive treatment of the symptoms. Since these factors have features specific to the region, a review may be helpful to practitioners and academics interested in desert regions.

The objective of this review is to delineate variations in the magnitude of this important hazard, the types of snakes, and the outcome of management practice in the Arabian Peninsula.

2. Methods

All publications in the Pubmed database related to snakes in the Arabian Peninsula were identified and the data extracted relative to the following information: type of snakes and toxins produced; clinical presentation; laboratory data; incidence, pattern of pre-hospital first aid and in hospital management; the types and rate of complications; and mortality rate. The review has incorporated the underlying pathophysiological mechanisms for the occurrence of clinical manifestations and complications. All articles that describe the clinical pattern and related aspects were included with no limits placed on publication date. Articles whose focus was biological and geographical aspects were excluded.

* Corresponding author. Tel.: +967 500000x2225/2224, +967 711198500 (mobile); fax: +967 471121.

E-mail address: haidarnaa@yahoo.com (N.A. Haidar).

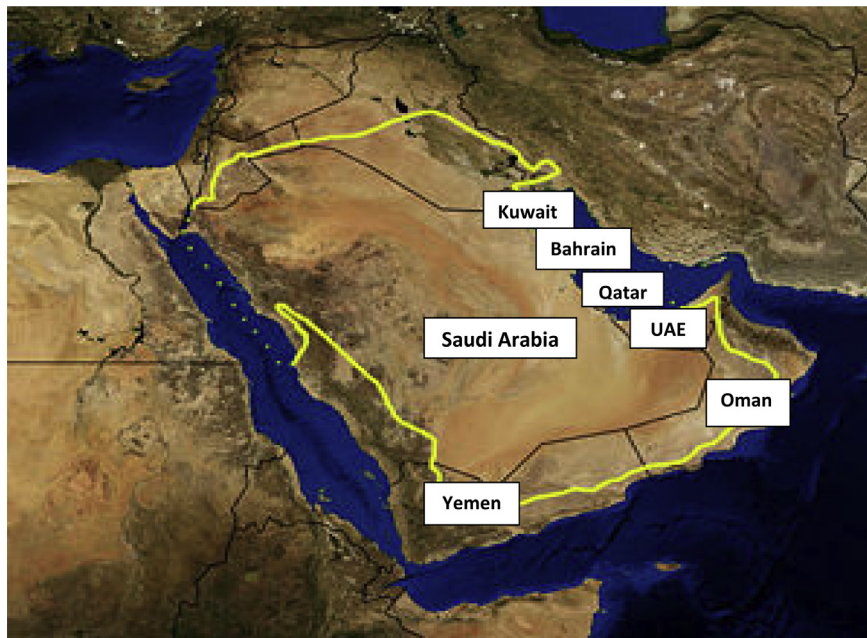


Fig. 1. Map of the Arabian Peninsula and desert ecoregions as delineated by the World Wide Fund for Nature. Satellite image from NASA. The yellow line “Arabian desert” and “Arabian National boundaries” are shown in black. http://www.newworldencyclopedia.org/entry/Arabian_Desert, 5th of December 2013. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

3. Results and discussion

Thirty five papers were identified as relevant and included in this review.

3.1. Types of snakes

Medically important snakes have one or more pairs of fangs in the upper jaw that contain a groove through which it injects venom. Approximately 55 species of snakes are found in the Arabian Peninsula (Al-Sadoon, 1989; Gasperetti, 1988). *Echis coloratus* is the most common in the Asir region of Saudi Arabia (Malik, 1995). In the southern part of Saudi Arabia 36 snake species across eight families were identified (Mostafa, 2012). Family Typhlopidae was represented by two species, while families Leptotyphlopidae, Boidae, and Atractaspidae were represented by only one species, respectively. Family Colubridae, in this region, had the greatest number of species ($n = 12$), while family Elapidae was represented by three species. Family Viperidae was represented by six species and family Hydrophiidae was represented by ten species (Mostafa, 2012).

The poisonous snakes in the Arabian Peninsula (Table 1) fit only in the first and second class of the Pakistan Medical Research Council classification of poisonous snakes (www.pmr.org.pk/index_2.htm): Class I: commonly cause death or serious disability; Class II: uncommonly cause bites but are recorded to cause serious effects (death or local necrosis); Class III: commonly cause bites but serious effects are very uncommon. The most common venomous snakes for this region are the vipers: *Echis carinatus*, *E. coloratus*, *Cerastes gasparetti*, and *Pseudocerastes persicus* (Annobil, 1993; Ismail and Memish, 2003). Non-vipers include: colubridae, Elapidae, and Atractaspidae (Al-Homrany, 2003; Gardner, 2009), however, few species of Atractaspidae were reported to be lethal (Table 1). Indian Cobras have also been recorded in Qatar (<http://www.qatarliving.com/node/84472>, 17th of March

2013). Of the fifty-three species of sea snake worldwide nine occur in the waters of the Arabian Gulf, and of these, five have been identified in the coastal waters of Qatar (<http://www.qatarvisitor.com/qatar-nature/sea-snakes>, 17th of March 2013). Even though sea snakes are poisonous they rarely affect humans because they generally have less contact with humans, small mouths, less aggressive interactions compared to the terrestrial snakes, and predominantly deliver dry bites where envenomation does not occur.

3.2. Types of toxins

The snake toxins are formed of different components with different physiological effects. Because of the limited specific information in published reports about the specific types of snakes, the following toxins were identified based on previous knowledge about the geographical distribution of the snakes and the pattern of clinical manifestations.

3.2.1. Hematotoxin

Causes coagulation defects and affects vascular integrity resulting in disseminated intravascular coagulation that is manifested by bleeding due to prolonged prothrombin and partial thromboplastin time, hypofibrinogenemia, and thrombocytopenia. It may be followed by shock, and if there is inadequate supportive care with blood and/or blood products, it might lead to death. These parameters are used to monitor the need for further doses of antivenom.

3.2.2. Neurotoxin

The usual effect of neurotoxin is the blocking of the neuromuscular junction transmission pre-or-postsynaptic, leading to skeletal muscle flaccid paralysis. If there is a delay in supporting breathing, respiratory failure can be the cause of death.

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