Saudi Journal of Biological Sciences (2015) **22**, 198–203

King Saud University

**Saudi Journal of Biological Sciences**

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ORIGINAL ARTICLE

# Snake bite envenomation in Riyadh province of Saudi Arabia over the period (2005–2010)

**Mohammed K. Al-Sadoon** *

*Department of Zoology, College of Science, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia*

Received 27 August 2014; revised 14 September 2014; accepted 15 September 2014
Available online 22 September 2014

**KEYWORDS**

Snake bites;
Antivenom;
*Cerastes cerastes gasperettii*

**Abstract** The present investigation is a retrospective review of snake bites in Riyadh province over the period (2005–2010). A total of 1019 cases of bites admitted to the Ministry of Health medical centers in Riyadh province were analyzed on the basis of age, sex, time of bite and its site on the body, outcome of treatment, antiserum dose and type of snake. Bites occurred throughout the six years with the highest frequency in 2005 and least in 2006 where most of the bite cases were mild and all evolved to cure except four patients who died following the administration of antivenom during 24 h after snake bite. Most of the patients were males (81.7%) and the most attacked age was within the range of 11–30 years (51.5%). All the bites were mainly in the exposed limbs and the most frequently bitten anatomical regions were the lower limbs (427 cases, 41.9%), principally the feet. The study incriminates *Cerastes cerastes gasperettii* in most of the bites indicating it as the snake of medical importance in Riyadh province. Also, the study indicates low degree of threat in spite of high rate of snake bites as a result of the availability of the medical facilities and the antivenin use in medical centers in Riyadh province.



## 1. Introduction

Snake bite envenomation is a world problem that represents a threat to many countries including Saudi Arabia. It is estimated that globally at least 421,000 envenomation's and 20,000 deaths occur each year due to snake bites (Kasturiratne et al., 2008). Each year there are over 8000 and 3000 poisonous bites in the U.S.A. and Australia respectively. Considerable studies on snake bites have been undertaken in several countries such as South-East Asia (Sawai et al.,1972), Nigeria (Pugh and Theakston, 1980; Paramonte, 2007), Papua New Guinea (Currie et al., 1991), South East of the Arabian Peninsula (Alkaabi et al., 2011), Central Iran (Dehghani et al., 2012, 2014a,b) Senegal (Trape et al., 2001), Brazil (Franco et al., 2001), India (Mohapatra et al., 2011), Nepal (Sharma et al., 2004), Malaysia (Chew et al., 2011) and Morocco (Arfaoui et al., 2009). Approximately 30% of the 3000 snakes across the globe are venomous and considered dangerous to humans (Hider et al., 1991). Fifty-one species of snakes have been recorded in Saudi Arabia, nine of these are venomous with four (*Walterinnesia aegyptia, Atractaspis microlepidota*, *Cerastes cerastes gasperettii*, and

* Tel.: +966 01 4675755; fax: +966 01 4675781.
E-mail address: msadoon@ksu.edu.sa

Peer review under responsibility of King Saud University.

Production and hosting by Elsevier

http://dx.doi.org/10.1016/j.sjbs.2014.09.008
1319-562X 

*Echis coloratus*) of which have been recorded in Riyadh province (Al-Sadoon, 1989; Gasperetti, 1988). The information concerning snake bites in Saudi Arabia is scarce and fragmentary (Kingston,1981; Tilbury et al., 1987; Al-Sadoon and Abdo, 1990; Al-Sadoon and Jarrar, 1994; Al-Mohareb and Al-Sadoon, 1994; Al-Durihim et al., 2010; Malik, 1995) with no reliable statistical studies on this issue and very little is known about the rate of snake bites in Riyadh province (Al-Sadoon and Jarrar, 1994). Snake bite envenomation leads to various clinical features, depending on the involved snake species. Hematological toxicity caused by family Viperidae (*C. c. gasperettii* and *E. coloratus*) can be manifested through bleeding that may develop into disseminated intravascular coagulopathy. The neurotoxicity caused by family Elapidae (*W. aegyptia*) and family Atractaspididae (*A. microlepidota*) may develop respiratory distress (Pantanowitz and Andrzejewski, 2006).

The present study is an attempt to evaluate the snake envenoming in Riyadh province over a six year period extending from 2005 to 2010.

## 2. Materials and methods

The incidence and frequency of snake bites in Riyadh province were reviewed for a 6-year period beginning from 2005. This study was based on 1019 cases of snake bites submitted to the emergency department at the hospitals and Medical centers of Riyadh province, Saudi Arabia. Data were extracted from the records of the Ministry of Health medical centers in Riyadh province and analyzed according to the following bases: age, sex, time of bite and submission (month and time of day), bite details including anatomic site, clinical finding at the site noted during hospitalization, laboratory results, presenting complaint, systemic symptoms, details of antivenom use including type and doses given, period of observation, outcome of each bite and snake species (if known) (Ministry of Health Riyadh, Saudi Arabia). Identification of the incriminated snakes was generally reported by patient report with assistance of Zoological photographs of Saudi Arabian venomous snakes which were available in some medical centers of Riyadh province. Data were analyzed by using ANOVA for each individual character.

## 3. Results

### 3.1. Rate and distribution of bites

The total number of snake bites in Riyadh province over the period (2005–2010) was 1019 with an average of 169.8/year.

**Table 1** Rate and relative frequency of snake bites in Riyadh province over the period (2005–2010).

| Years | Number of cases | Relative frequency (%) |
|---|---|---|
| 2005 | 183 | 17.90 |
| 2006 | 160 | 15.70 |
| 2007 | 168 | 16.40 |
| 2008 | 172 | 16.80 |
| 2009 | 170 | 16.60 |
| 2010 | 166 | 16.20 |
| Total | 1019 | 100 |

As seen in Table 1, the highest rate ($P < 0.05$) of snake bites was in 2005 with 183 cases (17.90%) while 160 cases (15.70%) were recorded in 2006.

### 3.2. Distribution of bites according to age

As seen in Table 2, ninety-eight bite cases (9.6%) were recorded with age category below 10 years. 13 bite cases were over 61 years old (1.2%) while most patients were males in their twenties (282.5 cases, 27.7%).

### 3.3. Distribution of bites according to sex

Male–female biting rate was 833 and 186 cases with a percentage of 81.70% and 18.20% respectively and males exceeded that of the females ($P < 0.05$) in all years of the study period. The highest rate of bites among males was recorded in 2005 (148 cases) while the lowest rate was recorded in 2006 (131 cases). The highest and lowest female rates were recorded in 2005 and 2006 (35 and 29 cases), respectively (Fig. 1).

### 3.4. Distribution of bites through the year

No snake bites were recorded in December, January and February in any year of the study period. Monthly incidence of bites showed peak incidence from March to November. The majority of the envenoming occurred during the hotter months of the year. The highest rate of snake bites was in August while the lowest rate was in March ($P < 0.05$). As it is seen in Fig. 2 and Table 5, March, April, October and November showed relatively low rate of snake bites while May through September account a high rate of snake bites.

### 3.5. Time of bites

The highest rate of bite cases occurred at night during all the years. The nocturnal bites counted 505.9 cases (49.60%) and the diurnal ones were 284 cases (27.80%) while the undecided time cases counted 229 (22.49%). The analysis of the data showed that the highest nocturnal bites ($P < 0.05$) were recorded in 2005 (Fig. 3).

### 3.6. Bite site on the body

All bites occurred on the exposed areas of the limbs. The number of bites on the lower limbs was 427 cases (41.90%) and that on the upper limbs was 313 cases (30.70%). The bites on the lower extremities were 427 cases of which 230 (22.59%) were on the right foot and 197 (19.50%) on the left foot. No bites were recorded on the neck, head or rest of the body. The incidence of bites on different parts of the hand were as follows: Thumb 56.20 cases (6.30%), index finger 107 cases (10.50%), middle finger 59.10 cases (5.70%), and little finger 47.3 cases (4.60%) while no bites were recorded in the ring finger (Table 3).

### 3.7. Treatment outcome

The number of deaths caused by snake bites in the current study was 4 out of the total of 1019, which makes 0.3%. Other