

## ORIGINAL

# Clinico-Haematological Characteristics of Snakebites in Inland Saudi Arabia

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## ABSTRACT

**Snakebite victims who were seen at King Khalid University Hospital in Riyadh over a five-year period were reviewed. Thirty adult patients were identified but only twenty-two patients were evaluable. The most common symptoms were local pain and swelling. The most common physical signs were fang marks with edema and discoloration. There were no deaths or neurological toxicities. Coagulation abnormalities were detected in seven patients. These were detected as early as two hours after the bite and took as long as nine days to resolve. All patients were given antivenom. Four patients received blood products transfusions. Three patients developed local complications at the site of the antivenom injection. We conclude that coagulation abnormalities secondary to snakebites are relatively common and should be carefully looked for. Other characteristics of snakebites in the region are also discussed.**

Among more than 3000 species of snakes found in the world, around 300 are known to be poisonous to man<sup>1</sup>. Fifty

one species have been identified in the Arabian Peninsula<sup>2</sup>. In inland Saudi Arabia, forty three species of snakebites have been found to exist, of which nine species are poisonous<sup>3</sup>. Most of the snakes found in the region belong to the *Viperidae* family namely *Cerastes cerastes gasperetti* (horned viper, hayya umm jnaeb) and *Echis coloratus* (Burton's carpet viper, Al-ragta)<sup>3</sup>. Although the prevalence of different types of snakes in Saudi Arabia has been well characterised, there is no detailed data on the epidemiology of snakebites or the clinical effect of envenomation in this region apart from few case reports<sup>4-7</sup>. This report summarises the experience with snakebite victims seen at our center over a five-year period.

## METHODS

### Patients

Case records of all adult patients coded for snakebites who were admitted to King Khalid University Hospital (KKUH) over a five-year period from 1985 to 1990 were reviewed. Geographic and demographic parameters and the temporal relation between the clinico-haematological

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abnormalities and the occurrence of complications were recorded. Patients were considered evaluable if they gave an unequivocal history of a recent bite by a snake, had undergone a well-documented clinical evaluation and in whom adequate initial and follow-up laboratory evaluations were available.

### Laboratory Studies

All evaluable patients had undergone serial monitoring of their Prothrombin Time (PT), Activated Partial Thromboplastin Time (APTT), Fibrinogen (Fib) and Fibrinogen Degradation Products (FDPs), PT, APTT and Fibrinogen were determined using Automated Coagulation Laboratory Analyzer. IL-PT Fibrinogen Kit (Instrumentation Laboratory Sud-Italy) was used for PT and Fibrinogen measurement while APTT reagent (Organon Technica B.V. Boxtel) was used for APTT determination. FDPs were measured using the Rapid Latex Test (Wellcome Diagnostica, England). Complete blood counting, liver and renal functions were checked according to the standard techniques using the Coulter Counter and the Automated Bio-analyzer, respectively. Dip-stick and microscopic urinalysis were done in all patients.

### RESULTS

Thirty adult patients with history of snakebites were identified. Eight patients were excluded from the study because of insufficient data. Positive identification of the snake, through confirmation by a zoologist was available in only two cases. These two snakes are *Attractaspis microlepidota engaddensis* and *Cerastes cerastes*.

Of the twenty two evaluable patient, twelve were inhabitants of Dirriyah village, which is the biggest

catchment area for KKUH emergency room. Twenty one of the bites occurred outdoor, either in farms or footpaths. The majority of the bites (16 out of 22) occurred in the evening and seventeen of the patients were males.

The most common symptoms were local pain and swelling whereas the most common physical signs were the presence of fang marks with edema and discoloration. Other symptoms and signs are shown in Tables 1 and 2 respectively. Coagulation abnormalities were detected in seven patients (Table 3). Local bleeding was noticeable in two patients (Nos. 5 and 7 in table 3). The coagulation abnormalities were detected as early as two hours after the bite and took one to nine days to resolve. One patient (No. 4) had severe thrombocytopenia which resolved three days later. Transient mild leukocytosis was noticed in nine patients. Neurological toxicity was not seen and there had been no deaths.

### Treatment

Specific treatment in the form of polyvalent antivenom (AV) (*Pasteur anti-Bitis-Echis-Naja venom serum*) was administered to all patients. Ten patients received AV injection subcutaneously around the site of the bite and twelve patients received intravenous or intramuscular AV. Four patients received blood products transfusion in the form of fresh frozen plasma or cryoprecipitate in addition to AV. All patients were given booster doses of tetanus toxoid.

### Complications

One patient (No.5) developed mild reversible renal insufficiency. Another patient developed *E.coli septicaemia* three days after the snakebite and was

**Table 1**  
Symptoms at presentation of 22 snakebite victims

Symptoms	Number	Percentage
Local pain	20	91
Local swelling	20	91
Paraesthesia	4	18
Dyspnea	3	14
Palpitations	2	9
Vomiting	2	9
Fainting	2	9
Weakness	1	5

**Table 2**  
Signs at presentation of 22 snakebite victims

Signs	Number	Percentage
Fang marks	18	82
Local edema	18	82
Skin discoloration	15	68
Local tenderness	12	55
Ecchymosis	4	18
Hyperaesthesia	3	14
Tachycardia	3	14
Tachypnea	1	5

**Table 3**  
**Coagulation parameters in seven snakebite victims**

Patient	Age & Sex	Time elapsed since bite	Coagulation profile at presentation					Coagulation profile 24 hrs after presentation					Time required for coagulation to normalise
			PT <sup>(1)</sup>	APTT <sup>(2)</sup>	Fib <sup>(3)</sup>	FDPs <sup>(4)</sup>	Plt <sup>(5)</sup>	PT	APTT	Fib	FDPs	Plt	
1	17 - M	2 hrs	>2 min	>2 min	UD <sup>(6)</sup>	>0.64	419	15	22	1.30	>0.64	349	24 hrs
2	15 - M	24 hrs	29.5	25	NA <sup>(7)</sup>	NA	312	24	39	NA	0.02	283	NA
3	18 - F	3 hrs	13.6	40	0.84	>0.32	236	13	33	1.27	0.32	192	72 hrs
4 <sup>(8)</sup>	30 - M	2 hrs	>2 min	>2 min	UD	>0.64	29	27	30	0.76	0.32	85	9 days
5	17 - M	18 hrs	>2 min	>2 min	UD	>0.32	245	>2 min	>2 min	ND	>0.32	177	4 days
6	33 - M	6 hrs	20	31.2	NA	NA	136	16	29	2.30	NA	155	48 hrs
7	45 - M	4 hrs	15.7	23	NA	>0.32	244	28	33	0.10	>0.32	119	72 hrs

(1) PT normal range: 11-14 sec

(2) APTT normal range: 23-32 sec.

(3) Fibrinogen normal range: 1.50-3.50 g/L

(4) FDPs normal range: Less than 0.01 g/L

(5) Platelets normal range: 150-400 x 10<sup>9</sup>/L

(6) UD = Undetectable level by technique used

(7) NA = not done or result is not available

(8) This patient also had evidence of haemolysis and is considered to have DIC

successfully treated with antibiotics. Three patients developed massive edema, ulceration and delayed healing of the wound at the site of the bite. All the three had been given local subcutaneous injections of AV. Untoward reaction to AV was seen in only one patient who developed bradycardia and hypotension immediately after the AV injection. These were promptly reversed with intravenous fluids and hydrocortisone.

## DISCUSSION

Our results indicate that coagulation abnormalities are relatively common among patients hospitalised for bites by indigenous snakes occurring in 32% of patients in this series. Thrombocytopenia was infrequent and occurred in only one patient who is thought to have subclinical disseminated intravascular coagulation (DIC). The incidence of thrombocytopenia following snakebites has been variable ranging from zero to 26% in different series<sup>8,9</sup>. Most of the coagulation abnormalities are thought to be secondary to the activation of the clotting factors II, V and X or the fibrinolytic system<sup>8</sup>. DIC may also occur following bites by snakes of certain species<sup>8,10</sup>. Abnormalities in platelets function have also been reported<sup>6,11,12</sup>.

Although no deaths occurred in this series, fatalities secondary to snakebites have been described in the

Kingdom. The first reported death in Saudi Arabia was that of an adult patient bitten by *Echis carinatus*, his coagulation tests were similar to most of our patients with disturbed coagulation<sup>4</sup>. A second death<sup>5</sup> was that of a two year old girl who was bitten by *Atractaspis microlepidota engaddensis*. Her coagulation profile could not be obtained because of her rapid death.

Systemic toxicity of snake venoms differs according to the type of snake. Neurotoxicity, which was not observed in our series, may occur in the form of sensory or autonomic disturbances. Muscular paralysis ranging from ptosis to respiratory paralysis may also occur especially with *Elapidae* snakes<sup>11</sup>. Cardiac infarction as a neurotoxicity of snake venoms has been previously reported from Saudi Arabia in a 13 year old girl bitten by *Echis carinatus*<sup>7</sup>. The authors, however, postulated that DIC or direct vascular toxicity was the likely explanation for cerebral infarction in this patient.

The local effects of the bite, predominantly swelling, and pain were particularly common among our patients. These effects are thought to be secondary to the release of chemical mediators causing increased vascular permeability. Tissue necrosis may also occur as a result of local ischemia or direct cytotoxic effect of the venom<sup>8</sup>.

Severe local complications were seen in three of our patients who received local AV injection. Although a role could have been played by the local administration of AV in producing an exaggerated local reaction, we feel that making such a presumption cannot be verified due to the small number of patients and the lack of proper snake identification in these cases.

Reversible mild renal insufficiency was seen in only one of our patients. Acute renal failure following bites by various snakes has been associated with glomerular, tubular, interstitial and vascular lesions but occasionally with cortical necrosis<sup>6,13,14</sup>. Although the exact pathophysiology of these renal abnormalities is not well characterised, they are thought to result from DIC, myoglobinuria or secondary to a direct nephrotic effect of the venom.

Positive identification of the snake was possible in two cases only as snake identification based on victim's description is not always reliable. In addition, emergency room physicians may not be familiar with the snake species prevalent in the Region. As proper snake identification is of paramount important in patient's management and to overcome the problem of poor snake identification, color atlas of different snakes found in the Region should be made available in every hospital emergency department to facilitate overcoming this challenging task. Venom identification by the recently described ELISA technique could provide very valuable information in respect to snake identification<sup>15</sup>. The use of such technique is, however, still limited as it is largely restricted not only by its general unavailability but rather kits may have to be developed specifically for snakes known to be prevalent in the Region of concern.

Management of snakebites remains to be a controversial issue. Due to the relatively small number of patients in this study, no firm conclusion and recommendations could be made as to the relative merits of AV use and blood component therapy. Although the optimal time for AV administration is not well defined, most authorities recommend its use only in the first few hours after the bite whereas beneficial effects of AV have been reported as late as eight days after the bite<sup>16</sup>. The indications for the use of blood components and drugs acting on the clotting system are not very clear at present and often based on personal experience rather than solid data. Steroids and heparin have not been found useful<sup>10,17</sup>. Although the importance of first aid has been repeatedly emphasised, overzealous use of tourniquets, wound incision and local application of

traditional medicines have been reported to result in significant morbidity and should be cautioned against<sup>11</sup>.

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