



ISSN Print: 2394-7500  
ISSN Online: 2394-5869  
Impact Factor: 5.2  
IJAR 2017; 3(12): 208-213  
www.allresearchjournal.com  
Received: 04-10-2017  
Accepted: 05-11-2017

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## Study on animal and venomous and non-venomous bites/stings in Tayma, Saudi Arabia

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### Abstract

**Background:** Millions of bites happen every ever from different species which leads to different kinds of health sequences and sometimes leads to death. We have attempted to profile of venomous and non-venomous bites/stings in Tayma General Hospital, Tabuk, Saudi Arabia.

**Methods:** Retrospective descriptive study. The data of various animal bites details were collected from emergency Department for four years up to now. All animal bite, snake bite, scorpion sting and other venomous/non-venomous bites and unknown bite data were enumerated. Also date of incident, age, sex, resident status, type of incident, site of bite, treatment pattern, outcome of treatment were collected for the study.

**Results:** Among total 351 bites, 270(76.9%) occurred in males, 81(23.1%) in females. Saudi nationals were 254(72.4%). The mean age of victims was 28.88 years (SD: 16.534). Scorpion sting alone encountered in 291(82.91%) individuals followed by Snake bite 23(6.55%), Dog bite 10 (2.85%), Cat bite 10 (2.85%), Camel bite 4(1.14%) and unknown bite 10(2.85%). Among animal bites, dog and cat bite shares 41.67% each and camel bite 16.66%. The overall incidence of bite in Tayma region was 3.30 /1000 population per year. Bites were predominant in summer and spring months. Bite commonly happens during night time (45.87%). Extremities were more commonly affected in the bite.

**Conclusion:** Venomous and non- venomous bites were not uncommon in Tayma. Occupation based bite awareness, hygienic living environment, knowledge about first aid procedures; precautions during summer are helpful to minimize bite related injuries. There also seems to be a male predominance among bite victims.

**Keywords:** Animal bite, Snake bite, scorpion sting, Dog bite, Saudi Arabia, venom

### Introduction

Millions of bites happen every ever from different species. Over 66 thousand vertebrate and over 1.3 million invertebrate species currently exist [1]. Bite is one of the survival mechanisms for most of the species. Getting bitten by an animal can happen to anyone. Animal bites are a significant cause of morbidity and mortality worldwide which pose major public health problem in children and adults worldwide [2]. Bite injuries were mostly produced by dog, cat, camel, monkey, rat, human, snake, insects and scorpion sting. The effect of animal bites varies from mild pain, swelling, mild abrasion, laceration, deep injuries, drainage from wound, discoloration of skin, infections, difficult in mobility, hematological manifestation, cytotoxic, neuromuscular effects, systemic involvement like fever, dyspnea, shock, giddiness, unconsciousness, and sometimes leads to deaths [3, 4, 5]. In the US, animal bites account for approximately 1% to 2% of emergency room visits annually [6].

Dog bites account for tens of millions of injuries annually in the world. Many bites result in injuries and cause many infections like Rabies, Toxoplasma, Chlamydia, Tinea, Salmonella etc. that leads to various clinical manifestations and in some cases, death [7]. Cat bites account for 2–50% of injuries related to animal-bites globally and its incidence is next to dog bites.

Cats may become harmful in the absence of care and vaccination. Cats also cause many health problems especially in immune compromised individuals [8]. The estimated majority of cat bites in the UK involve stray, female cats and one in five cat bites from pet cats. One in three people bitten by cats need medical care, and those two-thirds of those people need surgery [9].

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Scorpion envenomation is a medical and public problem and a real threat in many parts of the world with annual number of scorpion stings exceeding 1.2million and resulting in more than 3250 deaths [10]. The total number of scorpion stings in the eleven selected areas of Saudi Arabia between 1993 and 1997 was 72,168 with an average of 9 cases/10,000 inhabitants annually [11]. The effects of scorpion venom are due to stimulation of hypothalamus, leading to hypothalamic discharges, and causing profound effects on the sympathetic and parasympathetic systems with variety of symptoms and even death especially in children [12].

Snake venoms are either poisonous or non poisonous which is made up complex mixtures of proteins, many with enzymatic activity. About 50% of venomous snakebites do not result in envenoming (Dry Bite), because they may be mistaken for venomous species, resulting in unnecessary, expensive, risky and wasteful anti-venom treatment [13]. Worldwide, up to five million people are bitten by poisonous snakes every year which results in 2.5 million envenomations, at least 100000 deaths, and 300000 amputations [14].

Camel Bite also carries risk as like other animal bites. An outbreak of Rabies in camels in Sudan was reported in 2001 [15]. Certain countries of the Middle East region are facing increasing problems due to wildlife Rabies apart from domestic animal, including Saudi Arabia, Oman, Yemen, Israel, Iran and Turkey [16].

One can remember rabies when heard of animal bite. Rabies is a preventable infectious viral zoonotic disease which reported from 150 countries [17]. The global target of "zero human rabies deaths by 2030" is set. Dogs are the important source of human rabies deaths. Preventive immunization can be administered either as pre-exposure in high risk individuals or as post-exposure prophylaxis [18]. The approach of dog vaccination will minimize the disease-attributable deaths and necessity to administer post-exposure prophylaxis (PEP) after dog-bite [19]. The ultimate need is to expand the reach of preventive measures in the benefit of public [20].

We have attempted to study the profile of animal bites, venomous and non-venomous bites/sting cases attending Emergency Room in Tayma General Hospital, Tabuk, Saudi Arabia.

## Methods

**Study Design:** The study was a cross sectional retrospective study. It was conducted in emergency Department of Tayma General Hospital, Tabuk, Saudi Arabia with all clients visited with complaints of animal bite.

**Method of data collection:** Consecutive sampling methodology used to collect the data. Three years data from April 2014 to September 2017 was collected from the animal bite register at Emergency Department.

**Operational definition of Animal bite:** An animal bite is an injury caused by the mouth and teeth of an animal (including humans), resulting in direct tissue damage, deep anatomical structure disruption, introduction of infectious agents, and envenomation (injection of toxin by a bite or sting) [21].

**Information Collected:** All animal bites, snake bites, scorpion stings and other venomous/non-venomous bites and unknown bite data were enumerated. Also date of

incident, age, sex, resident status, type of incident, site of bite, treatment pattern, outcome of treatment were collected for the study.

**Data management:** Data entry was done using Microsoft excel and analyzed using STATA version 15, Stata Corp LLC. Frequency, mean, proportions and chi-square test were performed depending upon the type of data.

## Results

Among registered cases of different animal bites and poisonous, non-poisonous bites, males were predominant 270(76.9%) than females 81(23.1%). Also Saudi nationals were more 254(72.4%) than non-Saudi nationals 97(27.6%). Among males, 173(64.1%) were Saudi nationalities and 97(35.9%) non-Saudi nationalities. All females were from Saudi only. The mean age of victims was 28.88 years (SD: 16.534). In this mean age of males was 29.87 years and females was 25.56 years.

Scorpion sting was the most common type of bite in Tayma region. This sting alone encountered in 291(82.91%) individuals followed snake bite 23 (6.55%), dog 10 (2.85%), and cat bite 10 (2.85%) and Camel bite 4(1.14%). Among all, 10(2.85%) found to be unknown bite. Among animal bites, dog and cat bite shares 41.67% each and camel bite 16.66%. And snake bite was higher than all animal bite. The overall incidence of bite in Tayma region was 3.30 /per 1000 population per year in which scorpion sting incidence was very high (2.73 per 1000 population per year). The incidence snake bite was 0.22, dog bite 0.09, cat bite 0.09 /per 1000 population per year in Tayma. (Table 1)

Most of the victims were in the age group of 16-30 years (n=139, 39.6%) followed by 31-45 years (82, 23.4%), <15years (79, 22.5%) and 46-60 years (36, 10.3%) and >60 years (15, 4.3%). Scorpion sting was the common bite in both male and female population. Dog bite, camel bite and Mouse bite happened only for males. Most animal bite happened for Saudi nationalities (n=254, 72.36%). And Non-Saudi victims were 97(27.64%). In average 107 bite/sting happened in a year. In 2016 whole year, 108 bites and 2015, 107 bites were encountered. More than 40 bites per month were seen in the months of July, August and September and less than 10 bites seen in December to February. Majority of bites happened in summer season (79.64%). Commonest bite in summer were Scorpion bite (81.44%), followed by snake bite (78.26%). The difference of bite based on seasons was statistically significant (p<0.05%) There was no seasonal pattern observed in Dog or cat bite. (Table 2)

Night time, 10.00pm-6.00am was the commonest time which most of the bite happen (45.87%) followed by evening time (33.05%) and morning time (18.80%). The difference of timing of biting was highly statistically significant (p<0.001) (Figure 1)

The commonest anatomical site of bite was left foot (23.4%), followed by right hand and fingers (21.9%), left hand and fingers (15.6%), left leg (10.9%), right leg (4.7%), other body parts & face (4.7%). The differences between site of bite were also statistically significant<0.05. (Figure 2).

All patients of animal bite kept observation in Emergency Department. Those who need inpatient medical care were sent to respective wards. Only 20 patients of scorpion bite, 6 of snake bite and one unknown bite got admitted in the ward for medical care.

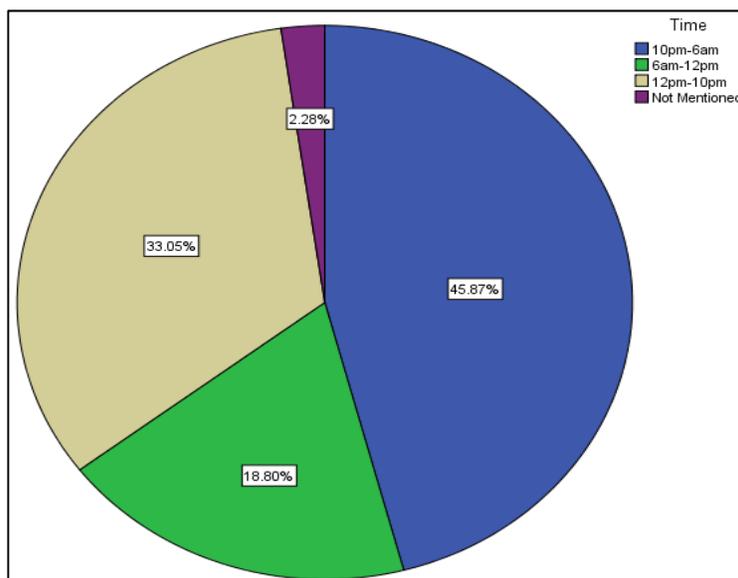
**Table 1:** Profile and incidence of animal bites in Tayma

S. No	Bite/Sting	Frequency	Percent (%)	Incidence per 1000 per year
1	Scorpion Sting	291	82.9	2.73
2	Dog bite	10	2.8	0.09
3	Cat bite	10	2.8	0.09
4	Snake bite	23	6.6	0.22
5	Mouse bite	2	0.6	0.02
6	Camel bite	4	1.1	0.04
7	Unknown bite	10	2.8	0.09
8	Insect bite	1	0.3	0.01
	Total	351	100	3.30

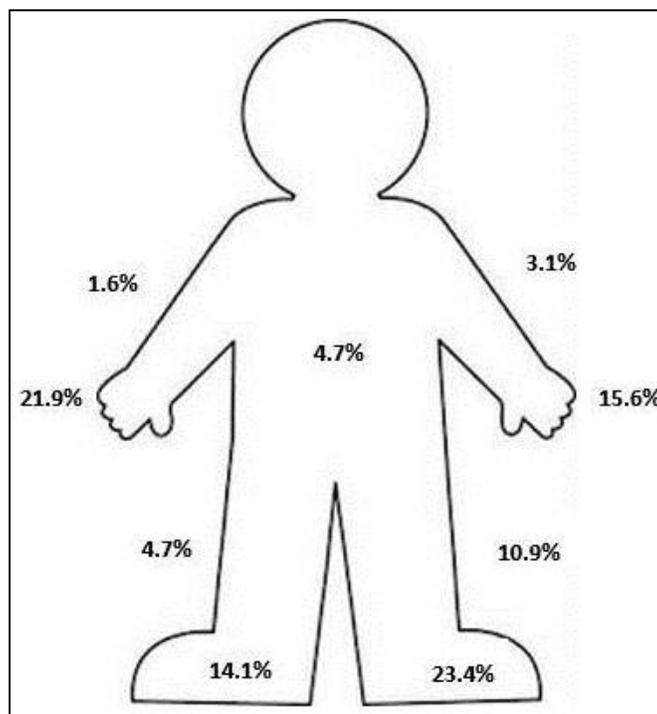
**Table 2:** Characteristics of animal bites in Tayma (n=351)

Variable	Scorpion Sting	Dog bite	Cat bite	Snake bite	Others	Total	P value	
Age group(Years)	<15	65	3	4	5	2	79	p=0.857(NS)
	16-30	113	3	3	11	9	139	
	31-45	70	3	3	4	2	82	
	46-60	31	1	0	2	2	36	
	>60	12	0	0	1	2	15	
Sex	Male	217	10	8	20	15	270	p=0.165(NS)
	Female	74	0	2	3	2	81	
Nationality	Saudi	207	8	7	18	14	254	p=0.775(NS)
	Non-Saudi	84	2	3	5	3	97	
Year	Apr-Dec'14	54	5	2	1	2	64	p=0.052(NS)
	2015	87	3	2	12	3	107	
	2016	93	1	2	4	8	108	
	Jan-Sep'17	57	1	4	6	4	72	
Month	1	6	1	0	0	1	8	p<0.001(S)
	2	1	0	2	0	0	3	
	3	11	0	1	0	1	13	
	4	19	0	0	4	1	24	
	5	24	1	2	3	1	31	
	6	32	1	0	2	2	37	
	7	49	3	1	2	0	55	
	8	59	1	1	3	2	66	
	9	42	0	1	2	1	46	
	10	31	0	0	6	2	39	
	11	12	1	2	1	5	21	
	12	5	2	0	0	1	8	
Season	Winter	54	4	5	5	9	77	p<0.001(S)
	Summer	237	6	5	18	8	274	
Total		291	10	10	23	17	351	

\*mouse, camel, insect and unknown bite



**Fig 1:** Timing of all types of animal bites in Tayma



**Fig 2:** Body Sites of animal bites of the affected persons in Tayma.

## Discussion

This study gives some idea about animal, arthropods and other bites in Tayma. Among all bites scorpion sting was the predominate bite (83%) followed by snake bite (6.6%). Topography, climatic condition, growing condition of species is to be considered apart from living and working condition of the people. Cat, dog and camel bites were common among animal bite. Comparatively cats are mostly seen in public places than dogs. So stray cat bites would be commonest than pet animals here. Economy generated in this region mostly from agriculture, horticulture and animal husbandry, there is enough chance to get close to animals, arthropods etc. that leads to bites.

Saudi Arabia has well networked healthcare system which is capable of handling animal bite peripherally. Health centers supplied with adsorbed tetanus serum, Tetanus Antitoxin 500IU, human rabies immunoglobulin (750IU), rabies vaccine, polyvalent Scorpion Antivenom, polyvalent Snake Antivenom and other vaccines to tackle these bites. Reporting of animal bites under mandatory surveillance has been happening regularly to Ministry of health, Ministry of Agriculture and local administration for action.

Zoonotic diseases cause morbidity, mortality, and productivity losses all over the world including Arabian peninsula. Bite can transmit many zoonotic disease like RVF, CCHF, avian influenza, glanders, brucellosis, mycobacteriosis, leishmaniasis, foot-and-mouth disease and MERS Co-A [22]. Only 10-15 % of animal bites needs treatment in Emergency room, they pose infection risks. Cat bite can happen mainly in extremities and it penetrates easily in tendon sheath and joints and seeds infections [23].

A total of 391 scorpion stings were recorded during the 2 year period in Riyadh region [24] and higher frequencies of scorpion poisonings have been reported from other regions of Saudi Arabia [25]. Incidence of scorpionism is comparatively higher in rural areas and males were predominantly affected [26].

Most animal bites are dog bites (80 - 90%). Cat bites make up approximately 10%, and bites from various animals and rodents likewise participate to these figures. Most animal bites happen on the extremities and the head and neck. The head and neck area is harmed in 6 - 20% by cat bites and 9-36% by dog bites. Most bites happen in the late spring months in the late evening [7]. The incidence of cat-related injuries is 18 per 100 000 population in Italy, while in the United States of America, there are an estimated 400 000 cat bites and 66 000 visits to hospital emergency departments every year [1].

There are certain regulations at Kingdom of Saudi Arabia (KSA) for importing or keeping pet animals. Pet owners must enter on a work or residency visa to import a pet. Puppies and kitten required vaccination certificate of 30 days prior to entry in KSA [27]. Microchipped with an ISO 11784/11785 pet microchip, permit to Import from the Ministry of Agriculture in Saudi Arabia, the Saudi Arabia Veterinary Certificate, Airline Health Certificate and Pet Passport Folder are other requirements [28].

Saudi Arabia has more than 14 species of scorpion and at least 10 species of venomous snakes are of medical importance in the desert. The sea around Saudi Arabia has many other species of snakes [29]. Immediate first aid and hospital treatment is necessary for these bites. Diagnosis of snakebite was established by the ER physicians, administration of antivenom, investigations continues. A study conducted in Riyadh showed only 50% time they were able to identify the snakes from victims. Snakes bites were common in spring and summer, male predominance, rural background and coagulopathy detected in 66% of cases [30].

**Limitations:** Primary health center data of bite were not included. So incidence might not give clear picture of the region. Occupation, treatment progression or follow-up of clients not included in the analysis.

### Conclusion and recommendations

Venomous and non- venomous bites were not uncommon in Tayma. Victims were middle aged persons, male predominance, extremities involvement and common in summer and springs. Awareness and care on refrain from animal or insect dwelling places, keeping hygienic working and sleeping environment, knowing few first aids procedures will helpful to avoid and minimize the sufferings from bites.

### Acknowledgment

The authors acknowledged physicians, Staff nurses from Emergency Department and hospital administration of Tayma General Hospital, Tabuk, Saudi Arabia. Dr. Jayakrishna Kurada, Public health Specialist, Hyderabad, India was also acknowledged for his support in preparing the manuscript.

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