



## Epidemiological Study of Animal Bites and Rabies in Lorestan Province in West of Iran During 2004–2014 for Preventive Purposes

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### ABSTRACT

**Background:** Despite the progress made, animal bites and rabies are one of the important health problems in the country. The purpose of this study was to investigate the epidemiology of animal bites and rabies during 2004–2014 in Lorestan Province to prevent them in population of the province for the future prospective aspects.

**Materials and Methods:** In a descriptive cross-sectional study, all those cases bitten in the province, during 2004 and 2014, were studied. The required information about the age, sex, the bitten organ, type of the invasive animal time, and location of the event were collected in questionnaires and then analyzed.

**Results:** The total number of cases of animal rabies during the period of study was 43,892, shown at the rate of 223.23 in 100,000 people. Seventy-eight percent of animal bites in rural areas, 41.42% in the ages 10–29-year-old, 26.8% of cases were students, 56.77% leg bites, and 82.5% of dog bites. Four cases of human rabies were observed during this period.

**Conclusions:** Rate of animal bites and rabies is high in Lorestan Province. Controlling animals such as dogs and cats in the province through training people at risk, especially among the students, rural areas and inter-sectorial coordination to eliminate stray animals should be considered over and over. Preventive actions to avoid bites are a priority.

**Keywords:** Animal bites, epidemiology, Iran, Lorestan, rabies

## INTRODUCTION

Rabies is a dangerous zoonosis that caused by a lyssavirus.<sup>[1]</sup> More than 3.3 billion people are exposed to

the disease.<sup>[2]</sup> The incidence of animal bites in the world is estimated at 250 out of 1000 people. In Iran, 180 people in 100,000, and the incidence of rabies <1 in a million is calculated.<sup>[3]</sup> According to statistics published by the WHO, this disease causes between 1.3 and 2.6 million Dally in a year.<sup>[4]</sup> Although rabies is preventable with safe and effective vaccines, it is still a health problem so that

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approximately 60,000 deaths occur annually in the world, and most cases occur in Asia and Africa.<sup>[4,5]</sup>

Forty percent of those bitten by animals were children under 15.<sup>[4]</sup> Annually, in different parts of the world, more than 15 million people due to animal bites refer to special centers to treat.<sup>[4]</sup> The real number of cases is probably higher than the figures reported due to the lack of advanced care system.<sup>[6]</sup> In addition to the public human health, the incidence of the disease in animals causes significant economic losses.<sup>[7]</sup>

Rabies has always existed in Iran<sup>[5]</sup> and also exists among Iran's endemic wildlife. Domestic animal contamination frequently occurs and its incidence has been increasing.<sup>[8,9]</sup> The occurrence of this disease is reported every year from various provinces of Iran.<sup>[10]</sup> The growing cases of stray dogs and also the increasing number of animal bites and rabies distribution in many provinces has caused massive annual costs to prepare vaccines, serum, and preventive actions.<sup>[11,12]</sup> And that more attention needs to be paid to control the disease and research about its different aspects.

Furthermore, wide geographical distribution, ecological diversity, and dependency of the risk factors of rabies to wildlife species, and also different levels of health knowledge, indicate that separate investigations should be conducted in different regions of the country.

Being aware of the epidemiology, prevalence, and at risk age groups, we can provide the officials with good ways to prevent this health problem in the health systems.

This study aimed to evaluate the incidence of animal bites in the Lorestan Province in the West of Iran, its distribution, and human rabies deaths from the disease over a period of eleven years from 2004 to 2014 to prevent its growing in future planning.

## MATERIALS AND METHODS

This was a descriptive cross-sectional study performed in Lorestan Province, West of Iran. The population of this study were comprised those bitten by animals from the beginning of 2004 to the end of 2014. They had referred to all Medical Science units in province belonging to Lorestan University, to get rabies prevention treatment. The census method was used for all the qualified individuals. In our definition, a "bitten person" is called one bitten by an animal and refers to the rabies prevention centers due to animal bites and fear of rabies. A person is said "rabies case" whose infection is confirmed by the Pasteur Institute. During the study, the required information in all cases of animal bites and human rabies were collected by questionnaire. Questions included age, sex, the bitten organ, place of occurrence, the bite time, and the kind of aggressive animal. The collected data were entered into the SPSS statistical software version 20 (IBM

Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.) and were analyzed by descriptive statistics such as frequency distribution and percentage. To calculate the incidence rate, the population of Lorestan Province was obtained from Management and Planning Organization of the province, and the calculations were conducted based on them.

## RESULTS

During 2004 till 2014, the number of animal bite cases in the province which has received preventive treatment care was 43,892. The incidence of animal bites during this period was an average 223.23 in 100,000 inhabitants [Table 1]. Seventy-eight percent of all cases of animal bites in rural areas and 22% in urban areas, respectively. Totally, 33,230 (76%) were men, and 10,662 (24%) occurred in women, respectively; the incidence of most animal bites 21.1% occurred between the ages of 29 and 20 and 19 and 10 years with a 20.3% of cases. Students were the most cases (26.8%).

Most cases of lower limb for limb bites (feet), with 24,861 (57%) followed by the upper extremities (hands) with 14,716 (33%), trunk with 3079 (7%), and head and neck with 1236 (3%), respectively. The report included dogs with the most bites, 36,222 cases (82.5%), followed by cats with 5894 cases (13.4%), and other animals in 1776 (1.4%) [Table 2]. Distribution of animal bite cases based on month and gender indicated that most cases of animal bites occurred in spring and summer [Table 3].

Human rabies infections which were observed in four of all cases were confirmed by the Pasteur Institute of Iran. All these people were rural. Two of them were females (3 and 18-year-old) who had been affected by a fox, and two were males (16 and 50-year-old). Dog was

**Table 1: Frequency distribution and incidence rate of animal bite cases in Lorestan Province, West of Iran (2004-2014)**

Years	Frequency n (%)	Incidence/100,000
2004	3589 (8.17)	210.83
2005	3618 (8.24)	208.39
2006	4057 (9.24)	234.96
2007	4009 (9.13)	225.62
2008	4001 (9.12)	227.04
2009	3690 (8.41)	208.66
2010	3720 (8.47)	208.26
2011	3738 (8.52)	205.96
2012	4171 (9.50)	226.51
2013	4405 (10.04)	239.34
2014	4894 (11.15)	259.97
Total	43,892 (100)	223.23

**Table 2: Distribution of animal bite cases in Lorestan Province, West of Iran (2004-2014) based on gender, residency, age, bite site, type of biting animal and job**

Variable	Frequency n (%)
Gender	
Male	33,230 (75.7)
Female	10,662 (24.3)
Residency	
Rural	34,281 (78)
Urban	9611 (22)
Age groups (year)	
<10	8190 (18.7)
10–19	8935 (20.3)
20–29	9243 (21.1)
30–39	5981 (13.6)
40–49	4870 (11.1)
≥50	6673 (15.2)
Bite site	
Leg	24,861 (56.7)
Hand	14,716 (33.5)
Body	3079 (7)
Head and face	1236 (2.8)
Type of biting animal	
Dog	36,222 (82.5)
Cat	5894 (13.4)
Other animal	1776 (4.1)
Job group	
Ranch and farmer	7852 (17.8)
Employee	2074 (4.7)
Self-employment	5009 (11.4)
Homemakers	4149 (9.5)
Student	11,765 (26.8)
Military	475 (1.1)
Others	12,568 (28.7)
Total	43,792 (100)

the source of their illness. None of them referred to the centers to receive treatment to prevent rabies. Four cases, respectively, happened in the years 2009, 2010, 2012, and 2013.

## DISCUSSION

Findings of this study showed that 43,892 people in the years 2004–2014 in Lorestan Province had been bitten by the animals. During this time, the animal bite was 223.23 out of 100,000 that in comparison to the same period all over Iran was (an average of 180/10,000) higher. Increasing the incidence can lead to permanent educational programs in urban and rural health centers and health homes to prevent the occurrence of rabies in humans and raising awareness of the risk caused by the biting animals in the province. On the other

**Table 3: Frequency distribution of animal bite cases in Lorestan Province, West of Iran (2004-2014) based on month and gender**

Month	Gender		Total, n (%)
	Male, n (%)	Female, n (%)	
January	2624 (7.90)	816 (7.65)	3440 (7.83)
February	2593 (7.80)	826 (7.75)	3419 (7.79)
March	2705 (8.14)	885 (8.30)	3590 (8.18)
April	2762 (8.31)	841 (7.89)	3603 (8.22)
May	2963 (8.92)	1012 (9.49)	3975 (9.05)
June	3006 (9.05)	918 (8.61)	3924 (8.94)
July	3021 (9.09)	1078 (10.11)	4099 (9.34)
August	2954 (8.89)	899 (8.43)	3853 (8.77)
September	2717 (8.18)	949 (8.90)	3666 (8.35)
October	2440 (7.34)	779 (7.31)	3219 (7.34)
November	2692 (8.10)	821 (7.70)	3513 (8.00)
December	2753 (8.28)	838 (7.86)	3591 (8.19)
Total	33,230 (100)	10,662 (100)	43,892 (100)

hand, inaction and inadequacy of the measures taken by the Animal (stray dogs) Rabies Control Committee, especially in the rural areas in most cities and the lack of widespread implementation of the vaccination of domestic dogs and cattle can increase the incidence of rabies.

The incidence of the disease is higher than the study conducted by Riahi *et al.* in Tabas<sup>[13]</sup> Sabouri Ghannad *et al.* in Ilam,<sup>[14]</sup> Saghafipour *et al.* in Qom,<sup>[15]</sup> and Sadeghi *et al.* in the West of Azarbayejan.<sup>[16]</sup> However, it is nearer to the reports by Kassiri *et al.* in Kermanshah and Khuzestan,<sup>[17,18]</sup> Amiri and Khosravi in Shahrood<sup>[19]</sup> and Sheikholeslami *et al.* in Rafsanjan.<sup>[20]</sup> In studies conducted by Khazaei *et al.* in Hamedan,<sup>[21]</sup> Dadypour *et al.* in Kalaleh,<sup>[22]</sup> and Charkazi *et al.* in Aq Qala in the North of Iran,<sup>[23]</sup> the amount of reported cases, respectively, is 423, 7773 and 1222 in 100,000 people.

Higher incidence of animal rabies in the mentioned areas is due to the climatic conditions where the presence of the main reservoirs of the disease including wolf-likes, and other wild animals are higher than Lorestan Province.

In this study, the result of the observed cases of animal rabies is the same as the results taken in different provinces of Iran.<sup>[13-18,20-40]</sup> It is higher in men in comparison to women, because men have more exposure to animals, and also spend most of their time outside the home environment and also sense of adventure in men is more exposure than women. However, the situation is not the same everywhere for both sexes. Maybe, due to the social and climate conditions, both of them are equally at risk of animal bites. For example, in Ethiopia Ramos' study shows that animal bite is almost equal in both sexes.<sup>[41]</sup>

According to the results of this study, high percentage of people bitten by animals was under 20 years in 17,125 (39%), and most of the observed cases were students in 11,765 (26.8%).

The reason of high percentage of bite among the students is that the students and those who are in the same range are more willing to play with animals, or hurt them.

The results show that on this age and work group, training at schools about rabies, and its transmission should be done more. It can especially be effective in reducing the incidence of animal bites.

In all other reported studies, higher occupational distribution of animal bites is in children.<sup>[7,13,18,19,22-24,27,31,32]</sup> The most cases have occurred in the 10–19 age group,<sup>[14,16,18,21,22,25,27,30,31,34]</sup> at least 23% in Dehghani's study<sup>[26]</sup> and up to 49.3% in Bahonar *et al.*'s study.<sup>[25]</sup>

Anatomically, most of the bites were related to feet (56.7%). In a study conducted by Charkazi *et al.* in AQ qala 69.4%,<sup>[23]</sup> Bahonar *et al.* in Ilam 69.7%,<sup>[25]</sup> Kassiri *et al.* in Kermanshah 75.8% in Shush 81.4%,<sup>[17,31]</sup> Dehghani *et al.* in Semirrom in Isfahan Province 67%,<sup>[26]</sup> Haratynejad and Khanjani in Rashtkhar in Khorasan Province 63.9%,<sup>[30]</sup> Dadypour *et al.* in Kalaleh 67%,<sup>[22]</sup> Khazaei *et al.* in Hamadan 49.4%,<sup>[21]</sup> Sabouri Ghannad *et al.* in Ilam 71.8%,<sup>[14]</sup> Amiri and Khosravi in Shahrood 60%,<sup>[19]</sup> and Alavi and Alavi in Khuzestan 58%<sup>[42]</sup> were cases related to the feet.

Kassiri's study in Khuzestan 61.4%,<sup>[18]</sup> Yalcin *et al.* in Turkey 53%,<sup>[43]</sup> and Erfanian *et al.* in Mashhad 43.4%<sup>[27]</sup> showed that the most bites happened in upper limbs. In Naghibi *et al.*'s study 46.3%,<sup>[32]</sup> Sheikholeslami *et al.* in Rafsanjan 48%,<sup>[20]</sup> Zohrevandi *et al.* in Rasht,<sup>[24]</sup> and Saghafipour *et al.* in Qom 52.4%<sup>[15]</sup> the bites are on the hands.

The differences between the results of studies may be related to the ways of facing the animal.

In taller adults and in cases where an animal attacks a person fleeing, feet are more exposed to bites. However, in cases where a person is playing with or harassing an animal or has shorter stature (like children), it is more likely to bite upper limbs, head, and face.

In this study, most people injured were rural (79%), which is consistent with most of the studies.<sup>[14,18-26,30-34,39]</sup>

Animal bites occur more in rural areas, because in most villages, livestock or agriculture is the main occupation of the people, especially in forests and mountainous areas, it is more likely for the people to face stray dogs and wild animals.

However, studies conducted in the centers of province or city, for instance Saghafipour *et al.* in Qom,<sup>[15]</sup> Kassiri

*et al.* in Khuzestan,<sup>[18]</sup> Riahi *et al.* in Tabas,<sup>[13]</sup> Erfanian *et al.* in Mashhad,<sup>[27]</sup> and Fayaz in Tehran,<sup>[29]</sup> Most people cases were in urban areas.

Most cases of animal bites in the study occurred in spring and summer. Apart from the study conducted by Kassiri *et al.* in which the animal bite has happened more slightly in fall and winter, in other studies, most cases have occurred in spring.<sup>[13,15,18,23-25,27,32]</sup> Higher exposure to animals, especially in rural areas, is due to agricultural activity and contact with the animals and the increase in leisure travels to areas of good weather in spring by travelers.

In terms of species, respectively, 83% was related to dogs and 13% to cats, which shows the same results conducted in Iran or abroad. Most cases have involved dogs.

Dogs face wild animals more, especially wolves and canines, which statistically are the main source of disease. Most observed cases of animal bites and human rabies result from dog and canine bites. Therefore, vaccination, containment of domestic dogs and cattle (at least during the day) and enable the special committee to lose the stray dogs, seem necessary.

During the study, four cases of rabies have occurred in the province. None of these people had referred for preventive services. In Bahonar's study in Ilam Province, where conditions are similar to Lorestan province, four fatal cases were reported. This shows that despite the efforts made, and providing prevention services, lack of awareness of disease risks, and also poor information do not let all the people who are attacked by animals refer to the centers to get services.

## CONCLUSIONS

Due to the rather high rate of human rabies and animal rabies in the province, we can conclude that wildlife of the province is infected with the virus that causes disease in domestic animals, owner dogs or some cases, with human bites carry rabies to people. According to the results of this study and other studies, students and residents of villages are more at risk. Hence, training the people at risk about hurting and mistreatment of dangerous animals, ways of transmitting the disease, convincing the owners of sheep dogs and domestic dogs to go to the veterinary, and vaccination offices to vaccinate and collar their dogs and their dogs can play an important role in reducing the incidence of animal bites and rabies cause death.

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## Conflicts of interest

There are no conflicts of interest.

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