

# A Three-year (2011–2013) Surveillance on Animal Bites and Victims Vaccination in the South of Khorasan-e-Razavi Province, Iran

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## ABSTRACT

**Introduction:** Rabies is acute encephalitis caused by rabies virus and is transmissible between humans and warm blooded animals. The virus is belong to the family of *Rabdoviridae* and, of *Lissavirus* genus.

**Aim:** To find out the success of rabies surveillance system to prevent victims of this deadly disease and to identify its risk factors in the community.

**Materials and Methods:** This research is a cross-sectional analysis and the information pertaining to bite incidents was obtained from documents of the Centers for Disease Control of Rabies from 2011 to 2013. A questionnaire was used which included questions on demographics information (sex and age) of the victims, and the others.

**Results:** A total of 616 cases (animal rabies) were brought to rabies treatment center during 2011- 2013 of which 81.2% of the cases were males and 18.8% were females.

Most animal bites (37.5%) reported in 2011. The difference between the months and the number of biting were statistically significant ( $p = 0.001$ ). Animal biting was more frequent among people of age group 21–30 years than other age groups which constituted roughly 27.2% of the cases. There was no significant relationship between the variables of gender and site of the bites victims, ( $p > 0.05$ ). Domestic dog bite was most frequent, found in 66.7% cases. 83.9% victims had been uncompleted vaccinated and 16.1% were completed.

**Conclusion:** Since, the cost of conservation was high for the health system after biting, preventive programs should be concentrated on public health instructions, particularly in villagers, free occupation and emphasis to ranchers that have collar dogs during the day.

**Keywords:** Human, Infection disease, Rabies, Treatment

## INTRODUCTION

Rabies is a fatal viral disease and is transmissible between humans and warm blooded animals. Causative agent is a virus of the family of *Rabdoviridae* and, of *Lissavirus* genus. Transmission usually occurs through biting by rabid animals and rarely in other ways, such as mucosal tissues, breathing polluted air, human placenta, contaminated instruments and organ transplantation is transferable [1-3]. Dogs as reservoirs of diseases and play a major role in transmission of rabies to humans [1].

In spite of the fact that rabies is preventable with safe and effective vaccines, the disease is still a public health problem in many countries, as in Asian countries such as China, Pakistan, the Philippines, India and Thailand with severe pollution, Africa (Countries in southern Africa with high contamination) and parts of central America (Mexico) is the most common [4]. However, some countries such as Australia, New Zealand, England and Japan, with appropriate control measures, have been successful in eradicating the disease [5].

The World Health Organization (WHO) has estimated the annual reported number of human rabies deaths globally to be at least 55000 cases. Most deaths occur in developing countries, particularly in Africa and South East Asia. Visitors, workers and travelers to these areas are at particular risk [3]. The diagnosis can be done based on clinical and laboratory methods. The disease is so important because of caused lethality, increasing the bite humans, causing the death of livestock, and economic losses [1-2].

Rabies among wildlife of Iran is endemic and infection frequently occurs in domestic animals [2]. In the north of Iran, dogs, foxes and jackals are the most important vectors of the disease and in the west and northwest wolves are the main vectors. In Iran, the most cases of animal rabies have been reported in the counties of

the north, northeast and northwest, as well as Fars and Kerman provinces [6].

Considering that a large part of Gonabad city is located in the desert and successive droughts by reduced rainfall has caused people to be engaged in the farming profession, then this has led to increased rearing of dogs in the farms and subsequently animal bites. As a result, for the prevention of rabies and to have disease control, we need to have demographic information of the victims.

In this study, we reported the results of the animal bites survey conducted in the Center Treatment Rabies (CTR). The aim of the study was to estimate the incidence of human bites, describe characteristics of bites and to identify risk factors for bites in some areas of Gonabad and to understand the level of general knowledge and practice about rabies among bite victims; and the findings from this study will be used for designing a guide for control of animal bites and rabies prevention and programs control in Gonabad.

## MATERIALS AND METHODS

Gonabad city with an area of 10,000 km<sup>2</sup> is located at 34.35° North latitude, 58.68° east longitude in southeast Khorasan-e-Razavi and about 1098 meters altitude above the sea level with a hot and dry climate in Iran and prone to zoonotic diseases including animal bites rabies [Table/Fig-1].

This research was a cross-sectional analysis of information pertaining to bite incidents that was obtained from documents of the Center Control Health Rabies, from 2011 to 2013. All animal bites victims who visited the injection section of the rabies treatment center to receive anti rabies vaccine injections were interviewed using a pretested structured questionnaire designed to obtain information about animals bite and bite victims knowledge about rabies [3]. The

questionnaire, in fact, was the standard form of recording animal bite Center of Control Disease of Iran [CDC], which has already been studied in some centers as a pilot for rabies treatment, and after the validity and reliability tests, it has been used in rabies treatment centers. This questionnaire included to close questions about demographic (gender and age) of the victims, circumstances of bite incidents, body parts injured and the degree of injury, ownership of biting animals, nature of work, times between injury and vaccination, number term of vaccination, months and biting date and victims habitat.

### STATISTICAL ANALYSIS

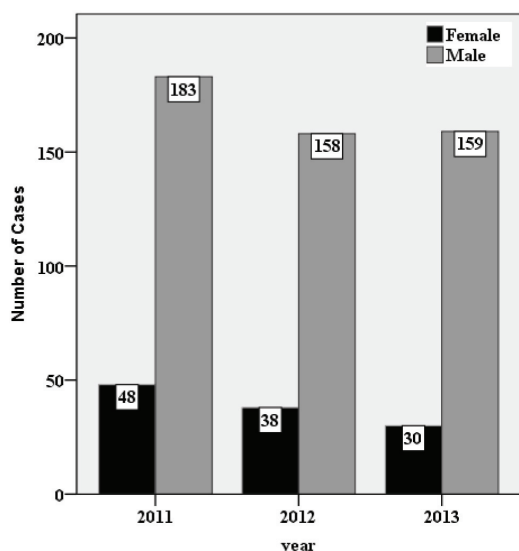
The questionnaire data were entered into Excel software and for data analysis, using software SPSS 20 and descriptive statistics, t-test and non parametric analysis was also performed.



[Table/Fig-1]: The map of Gonabad city located in Khorasan-e-Razavi, Iran

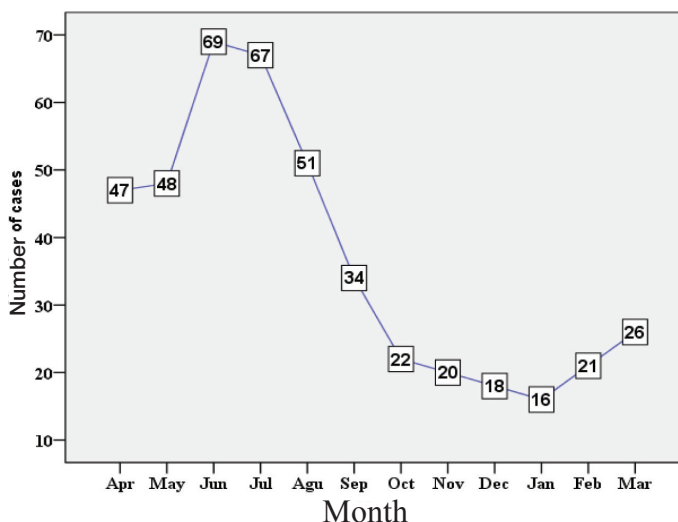
### RESULTS

In total, 616 cases of animal rabies were referred to rabies treatment center, during the years 2011, 2013; 81.2% were males and 18.8% were females [Table/Fig-2]. Most animal bites (37.5%) were reported in 2011. The incidence rate of animal bites during 2011-2013 was respectively 204, 173 and 166 per 100,000 people.



[Table/Fig-2]: The frequency of animal bites according to victims' sex during (2011-2013)

The average incidence rate was 181 cases per 100,000 people per month. Most animal bites (16%) was in October in 2011, 14% in April in 2012 and 13% in May of 2013 [Table/Fig-3]. The difference between the months of bites and biting incidences were statistically significant ( $p = 0.001$ ).



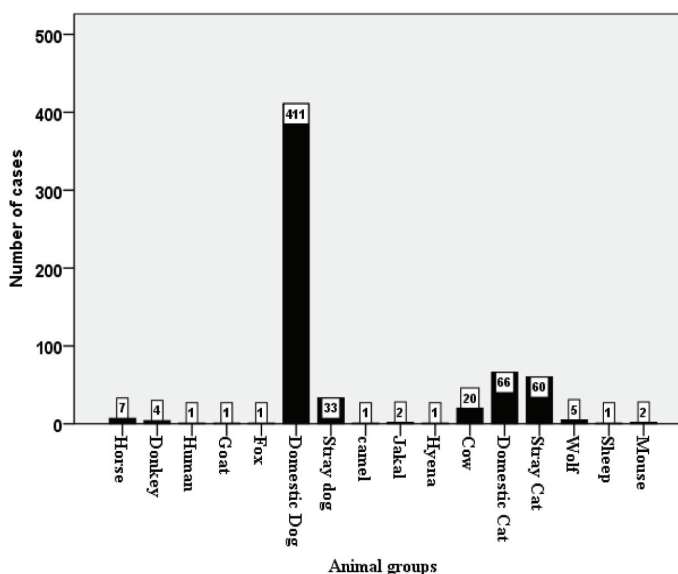
[Table/Fig-3]: The monthly trend frequency of animal bites

[Table/Fig-4] shows the age distribution of 616 cases recorded; animal bites were more frequent among children age group of 21–30 years than other age groups which constituted roughly 27.2% of the cases. The frequency of animal bites gradually decreased in young age groups among children.

Age (years) %						Total
1-10	11-20	21-30	31-40	41-50	>50	
8	13.3	27.3	14.1	11.4	26.0	
49	82	168	87	70	160	616

[Table/Fig-4]: Age distribution of victims with animals bites

The mean age  $\pm$ SD in males was  $19.0 \pm 34.7$  and it was  $24.7 \pm 44.14$  years in females. Considering the biting rate, domestic dogs were the most frequent with 411 cases (66.7%) in biting, domestic cat with 66 cases (10.7%), stray cat with 60 cases (9.7%), stray dog with 33 cases (5.4%) and other animals were with 145 cases (23.5%) [Table/Fig-5]. There was no a significant difference between the variables of gender and site of the bite victims, ( $p > 0.05$ ).

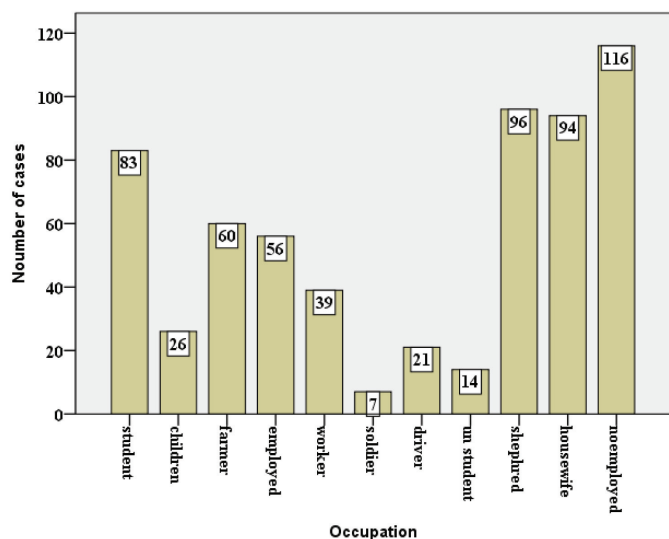


[Table/Fig-5]: Frequency distribution of human animals' bites based on animal type

Animal bites distribution, based on the nature of job showed that 19% were unemployed, 15.3% were housewives, 15% were shepherd, 13.3% were students and 36.8% had other jobs [Table/Fig-6], and there was no significant difference between the type of animal and the number of bites ( $p > 0.05$ ) as well as the domestic dogs bite in the city (24%) and the stray dogs (42.6%) caused most number of bitings than the other animals [Table/Fig-7]. Injury from domestic dogs in males was more (70.6%) and less (50%) in females and the injuries resulting from domestic cat were recorded as 8.8% in males and 19% in females.

Variables/ categories	Scale	Frequency	SE	95% CI	p-value
Gender	Male	485	0.08	23-0.10	0.426
	Female	112			
Habitant	Urban	367	0.06	0.74-0.19	0.373
	Rural	230			

[Table/Fig-6]: Assessing the variables of gender and place of residence with the number of bites



[Table/Fig-7]: Frequency distribution of animal bites cases based on occupation

The frequency of animal bites was 9.7% for stray cats, 5.4% in dogs, 3.2% in cattle, 1.1% in horses, and 4.2% were for the other animals. The frequency of bites according to site of bite were in the hand with 49%, foot 37%, hip 3.7%, hands and feet 3.6%, and for the other sites it was 5%. Time of bite was also considered in the study, which were mainly due to domestic dogs 35.8% in the evening and 11.6% bites in the afternoon [Table/Fig-8].

A statistically significant difference was showed considering the time of referring for vaccination and victims habitat distance ( $p < 0.05$ ). Most vaccination had been in the first hours of biting (25.3%). The average lapse time between animal bite and rabies vaccination was 8.5 hours in the city, and it was 13.02 hours in the village (statistically significant,  $p < 0.05$ ). 83.9% victims received incomplete vaccination (day 0-3-7) and 16.1% received complete vaccination course (day 0-3-7-14-30). A 99.2% had superficial wounds and 0.8% showed deep wounds that complete vaccinations were needed for them to be injected.

Another factor that was considered in this study was the time of the day when animal were biting which occurred more in the afternoon, probably because the people were off or not being at work, as a result they were more exposed to animals' bites.

In terms of getting the rabies virus, they were healthy after 10 days; therefore, the treatment was stopped after being diagnosed to be healthy.

Between the time of presentation for rabies vaccination, there was a significant difference in urban and rural residents ( $p < 0.001$ ),

which was due to villages distance being far from rabies treatment center.

Variables/ categories	Scale	Number (%)	df	p-value
Site of bite	Hand	302(49)	75	0.107
	Foot	228(37)		
	Hands and feet	22(3.6)		
	Legs and buttocks	3(0.5)		
	Hips	23(3.7)		
	Arm	3(0.5)		
	Side	6(1.0)		
	Neck	2(0.3)		
	Back	5(0.8)		
	Face	10(1.6)		
	Hands and face	1(0.2)		
	Abdomen	3(0.5)		
	Testis	1(0.2)		
	Head	2(0.3)		
	Thigh	1(0.2)		
	Leg and waist	1(0.2)		
Unknown	3(0.5)			
Job	Employed	56(9.1)	50	0.015
	Unemployed	117(19)		
	Worker	39(6.3)		
	Housewife	94(15.3)		
	University Student	14(2.3)		
	Shepherd	96(15.6)		
	Farmer	60(9.7)		
	Driver	21(3.4)		
	Soldier	7(1.1)		
	Student	82(13.3)		
	Children	26(4.2)		
	Unknown	4(0.6)		

[Table/Fig-8]: Correlation analysis between the number of bites with the site of bites and victims' occupation

## DISCUSSION

Animal bites are a significant cause of morbidity and mortality worldwide and a major health problem in our country. The purpose of surveillance of rabies in Iran is the prevention of animal bite cases that cause fatal disease of rabies since millions of dollars are allocated annually to buy the rabies virus vaccine [7]. Gonabad city has industry livestock and a huge number of domesticated dogs, thus has the most reported animal bites from these dogs as compared to other animals. Animal bites during the last 3 years (2011-2013) showed a declining trend, that this was due to public education, especially knowing the dangers of playing with animals, especially canines.

As our observation showed, most bites occurred in June and July; because during spring and summer, people travel more to villages for a good climatic experience for recreation. In Kasser's study (2014), the amount of animal bites in spring, summer [8], autumn and winter was determined to be 21.7%, 20%, 29% and 29.3%, respectively. In Dadypour's study, the highest percentage of the bites (29.8%) was during spring [9]. In Majidpour's study, animals' bites was more in the summer and the seasonal distribution were 28.3%, 29.6%, 20.8%, and 21.2% in spring, summer, autumn and winter, respectively [9].

In the present study based on gender, males were more bitten in comparison to females, due to their job and more other activities

that they do outside home. Dog owners reported such incidences of bites probably due to more interaction with animals; playing and feeding them, too. In this regard, to prevent animal bites, it was necessary to transfer dogs to safer places, and keep in mind to be sure of the presence of animals in the area before entering unfamiliar places as far as possible.

Considering the type of animal bites, hands were more bitten compared to other parts of the body; and the majority of people bitten by animals were males than females, mainly because males were more in contact with dogs inside home. Biting of the victims' foot was more due to running in front of the dog without a collar, or with a motorcycle passing through the middle of the road where sheep were passing through and then, they were attacked by sheepdog, as well as kicking a dog and or separating dogs from themselves by their feet.

Most bites occurred in teens and young adults (21-30 years), which may be due to the recklessness of the group, most vibrant, unique experience, professionalism and passion of the dog maintenance at home and at work. In the village since there is more livestock and livestock barn and dogs are more needed for protection in that place, as a result the owned dog bites are more in compare to the city, and because, noncompliance of collar for dog during the day, animal bites increased in the village dwellers.

Considering other animals, the stray dogs which caused less bites than domestic dogs, but because of their likelihood to cause rabies, it was needed to consider them with more sensitivity.

Considering site of the bites, the most cases were in hands (41%), and then the legs (52.4%), but the findings were not consistent with the results of the other studies. In similar studies in other areas such as Aqqala, Shahrood, Ilam, Kerman and Kalaleh, provinces bordering the Caspian Sea, the incidence of bites on the legs was more than from other parts of the body [9].

In the study of Rabies in endemic areas of Korea (2005-2009), most patients were bitten on the hand or leg (44.2% and 33.9%, respectively), followed by the arm (9.6%), foot (4.0%), face (2.5%), and hip (1.1%). Some patients (2.8%) were bitten on more than two body's sites. The numbers of cases were higher in men (62.4%) than women (37.6%) and there was no significant difference in patients' sex between the two provinces or among different ages. The cases of animal bites were higher in July and gradually increased from winter and spring to summer. Dogs were the predominant biting animals and were responsible for 86.0% of the animal bites [10].

In another study in Alabama, animal bites reported during 4 years showed 7,075 cases (88 %) that were attributed to dogs. Most incidences were in males (62%) and in the spring time in age group of <10 [11].

In the study of Charkazi, from 13142 cases of animal rabies, 72.1% were males and 27.9% were females. The patients were aged 1 to 92 years with a mean±SD of 17.8±25.0 years. Most bites were in age group of 11-15 years with 2320 cases (17.7%), respectively. Considering the geographical area, 84% were rural and 16% occurred in urban areas, and the most animal bites was by dogs with 98.8%, then cow with 1.6% bite, cat with 3%, and camels, horses and donkeys together constituting 1%. By frequency of bites per year, 28.8% of the bites were in the spring, 26.5% were in winter, 24.3% in summer, and 20.4% occurred in the fall, respectively. The correlation was significant based on changing of seasons and the number of the bites. Based on organs, most bites were on the leg, with the frequency of 69.9%. 71.2% had the vaccination for 3 courses. The superficial bites were 11.7%, and 3% were deep, and 97% were uncertain [12].

In terms of occupation, most of the bites occurred on students (28.9%), and then, housewives with 18%, farmers with 16.8%, and children less than 6 years of age with 10.1% [13].

The incidence of animal rabies in the population of 100,000 was reported in the study of Amiri and Khosravi with 246 cases in Shahrood city [13], and in other studies in the city of Rafsanjan between 180 – 241 [14], Uganda 36.6, and in the study of fever about 773 people [15].

Sarani in a study in Iranshahr city showed that 54.4% of the cases occurred in the cities and 54.6% of the cases happened in the villages [16]. Also, in a study in Khuzestan, 82.1% and 45.9% of the bites had taken place in the urban and villages, respectively [17].

Based on the studies conducted in Kalaleh County, Ardabil, Thailand, India and Zeinali's study, the most amount of bite cases were belonged to the age group of 5-30 years [8,18-20].

To consider domestic cat bites, females had more bites, due to playing with cats, the cat indoors, crossing on sleep animals on their hand or feet, and feeding the animals, which in these cases; it is needed by people who keep cats at home to be more careful with animal behaviour and vaccinating them seriously.

A study was conducted in the city of Yazd and showed that rabies vaccination coverage was 97.1% in 3 courses and only 2.9% had complete vaccination [20]. The record rabies control unit of Kalaleh city reported that 91.5% of the victims had received incomplete vaccination while the others had a complete vaccination. The injuries were superficial in 76.3%, and deep in 23.7% of the cases [9].

In a study conducted in northern country had shown that 72% had vaccination against rabies for 3 courses, but Amiri and Khosravi claimed in their studies on 100% of vaccination coverage for 5 courses [13].

## LIMITATIONS OF THE STUDY

Being the only rabies treatment center in the Gonabad city and situated far from the villages, the time for vaccination receipt that was delayed for more than 24 hours.

## CONCLUSION

The results of the study showed that domestic dog and owned dogs in this city caused the most bites cases in aged adolescent and youths. It is necessary to educate people to prevent animal bites in schools and owners of domestic animals. Centers for animal cares should be emphasized to propagate animals' vaccination in urban and rural areas.

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