



ORIGINAL ARTICLE

Factors Influencing Animal Bites in Iran: A Descriptive Study

Rouhollah Dehghani^a, Alireza Sharif^b, Mahla Madani^c, Hamed H. Kashani^d,
Mohammad R. Sharif^{e,*}

^aDepartment of Environmental Health, Kashan University of Medical Sciences, Kashan, Iran.

^bDepartment of Infection Diseases, Kashan University of Medical Sciences, Kashan, Iran.

^cStudent Research Committee, Kashan University of Medical Sciences, Kashan, Iran.

^dAnatomical Sciences Research Center, Kashan University of Medical Sciences, Kashan, Iran.

^eDepartment of Pediatrics, Kashan University of Medical Sciences, Kashan, Iran.

Received: May 14, 2016
Accepted: June 20,
2016

KEYWORDS:

animal bite,
dogs,
health,
Iran,
victim

Abstract

Objectives: Animal bite is a significant health economic challenge worldwide. In Iran, there has been an increase in the number of animal bites in recent years. This study was performed to investigate the epidemiology of animal bites and their influencing factors in Semirrom, Iran, from 2008 to 2012.

Methods: This was a descriptive study conducted for 5 years. The data were based on the information sheets presented in health-care centers concerning how to combat against rabies caused by animal bites. The data obtained were classified and analyzed statistically.

Results: During the 5-year study period, 1,246 animal bite cases were reported; 60% of the victims belonged to rural areas and the remaining 40% to urban areas. Among various aggressive animals, dogs had the highest rate of attacks (63.4%). The highest rate of animal bite (23.19%) was reported in the age group of 10–19 years and the lowest one (2.32%) was reported in the age group of 0–4 years. The animal bite rates among men and women were 76% and 24%; respectively. The highest and lowest rates were found among students (23.5%) and employees (5.5%), respectively. Regarding the commonly injured organ, the highest (67%) and lowest rates (23%) were for lower extremities and head and face, respectively. Regarding the nationality of the victims, 98% were Iranians and the rest were Afghan.

Conclusion: Given the increasing number of animal bites reported, there is a need to implement strategies to prevent bite-related complications, which may have health and financial burden on the country. It is also necessary to increase awareness among target groups and to formulate preventive strategies with the help of various authorities to control animal bites.

*Corresponding author.

E-mail: msharifmd@yahoo.com (M.R. Sharif).

1. Introduction

Besides having serious health consequences, animal bite and animal bite-related diseases can cause serious financial burden on countries; therefore, they are of serious concern for the authorities concerned [1]. The increase in the number of animal bites forces the government to purchase and stock more vaccines and drugs for preventing and treating the bite and its related diseases, which can subsequently increase the expenses of the government [2]. In general, animals bite as a natural, instinctive behavior, especially when they feel threatened or try to get food. An animal bite can cause infection in victims (in both humans and other animals [3]). Reports estimate that more than 10 million victims receive treatment annually due to animal bites [4]. Most animal bites reported from Asia and Africa are dog bites [4]. In the United States, on an average, dog bites are responsible for the death of 15–20 persons, mostly children. The bite force of large dog breeds can be more than 450 psi, and therefore the injuries caused by these dogs are more severe [5]. In Europe and the United States, in addition to dog bites, victims are also bitten by bats and wild animals. Humans, in comparison with other animals, are more prone to bites induced by domestic animals such as dogs and cats and also by carnivorous animals such as foxes, wolves, raccoons, ferrets, and jackals [4,6]. In fact, cats and dogs are responsible for more than 90% of all animal bites reported worldwide [7]. Among animal bites, snake bites have induced serious health consequences in the rural areas of tropical and semitropical regions located in Africa, Latin America, and Australasia. A recent study estimated that at least 421,000 animal bites and 20,000 animal bite-associated mortalities occur annually [8]. Animal bite and associated diseases are considered to be one of the serious health and economic obstacles. In Iran, reports of animal bites are reported from almost all cities. According to the data released by the Center for Disease Management, the highest rates of animal bites (450 in 100,000) are in Ardabil and Golestan provinces [9], followed by Chaharmahal and Bakhtiari province (300–450 in 100,000) and then Booshehr, South Azarbayejan, Isfahan, Fars, Gilan, Kermanshah, Hamedan, Hormozgan, East Azarbayejan, Khorasan, Khoozestan, Kohkilooye va boyerahmmad, Lorestan, Markazi, Mazandaran, Semnan, and Zanjan provinces (100–300 in 100,000). The lowest rates are reported in Tehran, Qom, Kordestan, Ilam, Sistan-baloochestan, and Yazd provinces (< 100 in 100,000). Recent statistics indicate that there has been an increase in animal bites in the past 20 years. During this period, 37,523 cases of animal bites (without considering snake and scorpion bites) have been reported and the victims received care and treatment from more than 180 health centers in Iran [1,10–13]. A majority of these victims were bitten by

dogs. The total number of reported cases up to 2011 was 128,874, with an annual prevalence of 5,939/100,000. This number increased to 135,611 the following year, with an annual prevalence of 6,115/100,000, which clearly suggests an increase in the rate of animal bites [11,14,15]. Given the importance of animal bites and the associated diseases, particularly rabies, that the victim may suffer, vaccination is a useful option to prevent the spread of diseases [16–18]. Semirom has a moderate climate and is one of the largest cities in Isfahan province. This city has a high prevalence of animal bites and bite-associated infections, especially rabies, a serious infection that is endemic in animals in this area. Moreover, a rabies epidemic was reported from this area. Considering the geographical extent and ecological features of Semirom, this study was performed to investigate animal bite epidemiology and its influencing factors.

2. Materials and methods

This is a cross-sectional descriptive study that investigated all cases of animal bite in humans from 2008 to 2012 in Semirom, Iran. All victims admitted to health-care and treatment centers were investigated. A questionnaire was used for data collection and the study population included animal bite victims settled in Semirom. The questionnaire was devised by the Ministry of Health, Treatment, and Medical Training of Iran. It encompassed the documents, fulfilled interviews with victims, and reported animal bite cases. The following data were obtained from the questionnaire: special cases of animal bite (if any), the injured organ, geographical status (urban or rural region), age, sex, profession, history of animal bite, and prior vaccination. All data obtained were recorded and then extracted. The data obtained were classified and analyzed statistically.

3. Results

During the 5-year study period (from 2008 to 2012), a total of 1,246 animal bite cases were reported, including 245 cases in 2008 (77 and 168 cases in urban and rural areas, respectively), 258 cases in 2009 (87 and 171 cases in urban and rural areas, respectively), 270 cases in 2010 (111 and 159 cases in urban and rural areas, respectively), 281 cases in 2011 (113 and 168 cases in urban and rural areas, respectively), and 192 cases in 2012 (79 and 113 cases in urban and rural areas, respectively). As much as 60% of victims belonged to rural areas and 40% to urban areas. The victims received treatment in health-care centers. Among aggressive animals, dogs (77.7%), cats (8.7%), jackals (0.56%), foxes (0.88%), wolves (1.6%), boars (1.6%), bears (1%), cows

(3.37%), sheep (2.88%), other domestic animals (0.96%), and other animals (0.56%) were identified as responsible agents (Table 1).

The highest rate of animal bite (23.19%) was reported in the age group of 10–19 years and the lowest rate (2.32%) was reported in the age group of 0–4 years (Table 2). Other cases were reported in the age group of 30–39 years (13.8%), 40–49 years (9.3%), and 5–9 years (8.4%).

The bite rates in men and women were 76% and 24%, respectively. Among the various professionals, students had at the highest bite rate (23.5%), followed by farmers (18.1%), cattlemen (8.6%), housekeepers (14.5%), workers (5.7%), private businessmen (11.7%), public officers (5.5%), and other professionals (12.4%; Table 3). The highest rate of injury was on feet (67%), followed by hands (22%), torso (8%), and head and face (3%; Table 4).

Regarding the nationality of the victims, 98% were Iranians and the rest were Afghans. In most cases, domestic dogs were responsible for 80% of attacks and only 20% were attributed to stray dogs.

4. Discussion

Animal bite is considered a major public health challenge affecting humans because it can cause various infections [2]. The results of our study show that 1,246 individuals suffered animal attacks in Semrom; additionally, our data show that there is an increase in the number of animal bites during the study period. Among the victims, the highest bite rate was found for those in rural areas (e.g., farmers and cattlemen who had to have contacts with domestic animals). Iran is a country rich in natural wildlife, which includes a wide range of animals, including carnivores,

and there have been reports of wild animal attacks as well. Among the aggressive animals, dogs had the highest bite rate (77.59%), of which 80% of bites were caused by domestic dogs and only 20% by stray dogs. Because rural populations use guard dogs to protect their properties, there was a high prevalence rate of dog bites. Despite the high prevalence rate of dog bites, no case of rabies had been reported. Given that rabies is the most important disease transmitted by animal bites, increased animal vaccinations from 2007 to 2011 have had a positive impact on minimizing the spread of the disease from animals to humans. In a study performed by Amiri and Khosravi [16] in Shahrood, 79.1% of animal bites were caused by dogs, most of which were kept by their owners. This finding was compatible with that from our study. Unfortunately, because the owners did not have sufficient supervision of their dogs, especially during daytime, there was a high prevalence of dog bites. Our study results show that the highest rate of animal bites occurred in the age group of 10–19 years (23.19%), followed by the 20–29-year age group (23.11%). Dadipour et al [19] also reported a similar prevalence rate in this age group. Thus, we can assume that teenagers are more vulnerable to animal bites, especially by dogs having more aggressive behaviors that can be provoked by teenagers. We also found that men had the highest prevalence of animal bites (76%), and this finding is similar to that reported by Charkazi et al [20] in Aq-Qala. This may be because men are mostly involved in outdoor activities, and thus are at an increased risk of animal bites. Among various professionals, students had the highest rate of animal bites (23.5%), and this finding was compatible with that reported by Fayaz et al [21] in Tehran. In a study by Ranjbar and Esmaili [22], however, the highest rate of animal bite was found among farmers and cattlemen. Students from rural areas also participate in agricultural

Table 1. Frequency of animal bites, depending on the type of animal.

| Years | Animals | | | | | | | | | | |
|-------|----------------|----------------|-------------------|-----------------|------------------|-----------------|-----------------|----------------|-----------------|----------------------------------|-------------------------|
| | Dogs, <i>n</i> | Cats, <i>n</i> | Jackals, <i>n</i> | Foxes, <i>n</i> | Wolves, <i>n</i> | Boars, <i>n</i> | Bears, <i>n</i> | Cows, <i>n</i> | Sheep, <i>n</i> | Other domestic animals, <i>n</i> | Other animals, <i>n</i> |
| 2008 | 142 | 35 | 2 | 1 | 3 | 2 | 1 | 5 | 2 | 2 | 2 |
| 2009 | 216 | 28 | 2 | 3 | 5 | 10 | 6 | 3 | 3 | 0 | 2 |
| 2010 | 215 | 24 | 0 | 3 | 4 | 3 | 1 | 8 | 9 | 3 | 1 |
| 2011 | 193 | 9 | 2 | 3 | 5 | 3 | 3 | 18 | 15 | 4 | 2 |
| 2012 | 203 | 13 | 1 | 1 | 3 | 2 | 2 | 8 | 9 | 3 | 0 |

Table 2. Frequency of animal bites by age group.

| Age | +50 y | 40–49 y | 30–39 y | 20–29 y | 10–19 y | 5–9 y | 0–4 y |
|---------------------|-------|---------|---------|---------|---------|-------|-------|
| Frequency, <i>n</i> | 247 | 116 | 172 | 288 | 289 | 105 | 29 |

Table 3. Frequency of animal bites in various professionals.

| Jobs | Students | Farmers | Cattlemen | Housekeepers | Workers | Private businessmen | Public officers | Other professionals |
|-------------------------|------------|----------|-----------|--------------|----------|---------------------|-----------------|---------------------|
| Frequency, <i>n</i> (%) | 293 (23.5) | 224 (18) | 106 (8.5) | 181 (14.5) | 68 (5.5) | 150 (12) | 68 (5.5) | 156 (12.5) |

Table 4. The frequency of animal bites in terms of organ bite.

| Organ bitten | Feet | Hands | Torso | Head and face | Neck |
|-------------------------|----------|----------|---------|---------------|-------|
| Frequency, <i>n</i> (%) | 789 (67) | 315 (22) | 124 (8) | 23 (3) | 0 (0) |

and farming activities, and thus, they can be considered a subgroup of farmers and cattlemen. The regions of the human body more vulnerable to animal bites are torsos and feet. However, in the study by Riahi et al [23], upper organs such as hands, forearms, arms, and shoulders had more injuries, which is in contrast to our finding. In Iran, dogs are kept for guarding livestock and houses. However, Riahi et al [23] suggested that dogs kept as pets also attack humans, especially on the arms and hands. Our data do not show any mortality resulting from animal bites in Semirrom from 2008 to 2012. This may be attributed to the immediate treatment and careful follow-up, as well as to the fight against stray animals.

Our study findings show that it is important to adopt appropriate strategies to decrease the risk of animal bites and associated disease and infections, such as by increasing awareness among public, especially students. One of the best ways to fight and eradicate animal bite-related diseases is through vaccination. Another way to minimize the risk of bite is to create an awareness about protecting oneself from animals living in coexistence with humans. Stray animals should be vaccinated and isolated. One of the most important interventions to manage animal bites and the associated disease or infection is to exterminate stray dogs, which interrupts the epidemiologic chain of the disease. This plan can be carried out successfully with the integrated cooperation of health centers and other related authorities. It is worth mentioning that for these strategies to be successful, collection and disposal of wastes should be performed properly. For example, slaughtering animals in unsuitable places and their improper disposal methods can cause aggregation of dogs and cats. This may increase their feeding areas and eventually their breeding activities; hence, it is important to slaughter animals only in a slaughterhouse. Because rabies can threaten the life of victims, it is necessary to prevent the bite-related diseases. To treat the disease, it is important to establish health-care centers with skillful specialists. In addition, vaccinating those at the increased risk of these diseases may help prevent the spread of infection.

Conflicts of interest

The authors declare that they have no conflicts of interest to declare.

References

1. Rezaeinasab M, Rad I, Bahonar A, et al. The prevalence of rabies and animal bites during 1994 to 2003 in Kerman province, southeast of Iran. *Iran J Vet Res* 2007;8(4):343–50.
2. Sharifeian J, Simani S, Shirzadi M, et al. Guideline state rabies disease. Tehran (Iran): Seda Publication; 2003 [In Persian].
3. Manning A, Dawkins MS. An introduction to animal behaviour. Cambridge (UK): Cambridge University Press; 1998.
4. World Health Organization (WHO). WHO Expert consultation on rabies. Second report (WHO technical report series; no. 982). Geneva (Switzerland): WHO; 2013.
5. Talan DA, Citron DM, Abrahamian FM, et al. Bacteriologic analysis of infected dog and cat bites. *Emergency Medicine Animal Bite Infection Study Group. N Engl J Med* 1999 Jan 14; 340(2):85–92.
6. Rupprecht CE, Briggs D, Brown CM, et al. Use of a reduced (4-dose) vaccine schedule for postexposure prophylaxis to prevent human rabies: recommendations of the advisory committee on immunization practices. Atlanta (GA): Department of Health and Human Services, Centers for Disease Control and Prevention; 2010.
7. Shariati A. Epidemiology of rabies in Khorasan state during Q5 1994–2003. In: prevention of veterinary diseases. Teheran (Iran): Tehran University Publication; 2004. p. 90 [In Persian].
8. Kasturiratne A, Wickremasinghe AR, de Silva N, et al. The global burden of snakebite: a literature analysis and modelling based on regional estimates of envenoming and deaths. *PLoS Med* 2008 Nov 4;5(11):e218.
9. Mazaheri V, Holakoiee NK, Simani S, et al. Geographical distribution of animal bite and rabies in the Caspian Sea littoral provinces during 2002–2007. *J Sch Public Health Institute Public Health Res* 2010;8(3):37–46.
10. Alavi SM, Alavi L. Epidemiology of animal bites and stings in Khuzestan, Iran, 1997–2006. *J Infect Public Health* 2008;1(1): 51–5.
11. Eslamifard A, Ramezani A, Razzaghi-Abyaneh M, et al. Animal bites in Tehran, Iran. *Arch Iran Med* 2008 Mar;11(2):200–2.
12. Moshfe A, Mohebbi M, Edrissian G, et al. Seroepidemiological study on canine visceral leishmaniasis in Meshkin-Shahr district, Ardabil province, northwest of Iran during 2006–2007. *Iran J Parasitol* 2008;3(3):1–10.
13. Sheikholeslami NZ, Rezaeian M, Salem Z. Epidemiology of animal bites in Rafsanjan, southeast of Islamic Republic of Iran, 2003–05. *East Mediterr Health J* 2009 Mar–Apr;15(2):455–7.

14. Sabouri Ghannad M, Roshanaei G, Rostampour F, et al. An epidemiologic study of animal bites in Ilam Province, Iran. *Arch Iran Med* 2012 Jun;15(6):356–60.
15. Pourmarzi D, Razi M. Activities leading to dog bite incidence in Guilan province, north of Iran. *Razi J Med Sci* 2014;20(116): 9–17.
16. Amiri M, Khosravi A. Animal bites epidemiology in Shahroud city. *J Knowl Health* 2009;4(3):41–4 [In Persian].
17. Simani S. Rabies situation in Iran. *J Veter Fac* 2003;58(3):275–8.
18. Zeynali M, Fayaz A, Nadim A. Animal bites and rabies: situation in Iran. *Arch Iran Med* 1999;2(3):120–4.
19. Dadipour M, Salahi R, Ghezsofla F. Animal bite epidemiology of stigma in the city during 2003–2005 (short report). *J Gorgan Univ Med Sci* 2009;11(1–29):76–9.
20. Charkazi A, Behnampour N, Fathi M, et al. Epidemiology of animal bite in Aq Qala city, northern of Iran. *J Educ Health Promot* 2013 Mar 31;2:13.
21. Fayaz A, Fallahian V, Simani S, et al. Epidemiological characteristics of persons exposed to rabies in Tehran referred to Pasteur Institute of Iran during the years of 1993–1994 and 2008–2009. *Res Med* 2011;35(3):168–73.
22. Ranjbar H, Esmaili H. Survey of epidemiology rabies in Torbat Heydariyeh in 2003. *Sci J Hamadan Nurs Midwifery Fac* 2003; 13(2):37–47.
23. Riahi M, Latifi A, Bakhtiyari M, et al. Epidemiologic survey of animal bites and causes of delay in getting preventive treatment in Tabas during 2005–2010. *Toloe Behdasht J* 2012;11(1): 20–31.