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Animal Bites in Borujerd: An Overview of Animal Bites in Iran

Masoud Sabouri Ghannad [1,*]; Ghodratollah Roshanaei [2]; Mohammad Yousef Alikhani [3]; Pegah Alijani [1]; Mahdi Ghanbari Sardari [1]

[1]Department of Microbiology, Research Center for Molecular Medicine, Faculty of Medicine, Hamadan University of Medical Sciences, Hamadan, IR Iran
[2]Department of Biostatistics and Epidemiology, Modeling of Noncommunicable Diseases Research center, School of Public Health, Hamadan University of Medical Sciences, Hamadan, IR Iran
[3]Department of Microbiology, Faculty of Medicine, Hamadan University of Medical Sciences, Hamadan, IR Iran

*Corresponding author: Masoud Sabouri Ghannad, Department of Microbiology, Research Center for Molecular Medicine, Faculty of Medicine, Hamadan University of Medical Sciences, Hamadan, IR Iran. Tel: +98-8118276295, Fax: +98-8118276299, E-mail: sabouri@umsha.ac.ir

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Background: Rabies has been reported as the most important endemic zoonotic disease in Iran and still remains as a major public health problem.
Objectives: The main objective of the current research was to study the epidemiology of animal bites in Borujerd County in Iran and to compare its prevalence to other parts of Iran from April 2006 to September 2011.
Patients and Methods: The data were recorded in questionnaires and analyzed by SPSS version 16. Chi-square test was performed to evaluate the relationship among variables and P value was set as 0.05.
Results: Dog bites were the most common (69.8%), followed by cat (17.2%), fox and wolf (1.4%), sheep and cow (2.8%), monkey and donkey (5%), mouse and squirrel (2.2%) and other animals (1.6%). Leg was the most common bite site forming 46.6% of cases, followed by hands (41.8%), buttocks (4.6%), head (4%) and body (2.9%). Most of the subjects belonged to the age group < 10 (175.2 per 100000 populations). The injury location was associated significantly with sex and the residential status.
Conclusions: This study strongly highlights a high priority goal for health authorities to develop educational programs, recommended for the general population to inform them about the benefits of continuing the medication. Vaccination of domestic dogs and also eradication of stray ones, in addition to educational programs should be prioritized by health authorities.

Keywords: Epidemiology; Incidence; Rabies; Vaccination

1. Background

Nowadays, animal bites are assumed to cause the highest risk of secondary infection development and afflicting rabies. Rabies still remains as a major public health problem (1). The 33rd World Survey of Rabies in 1997 showed that the highest incidence of the disease in the world belonged to Asia, including Philippines and Thailand with the highest number of rabies cases , correspondingly (2). Rabies kills 33000 humans worldwide annually, of which near to 30000 thousand occurs in India (3, 4). The results of the researches indicate that eight countries have been reported as rabies free in Asia, as follows: Japan (in 1950), Malaysia (in 1967) (5-7), Hong Kong, Singapore, Taiwan, Qatar, Bahrain and the United Arab Emirates (8). The data pointed out that prevention programs have been probably, completely or partially successful in rabies eradication in these countries. However, it became apparent that main countries of the Middle East including Iran, Turkey, Saudi Arabia, Yemen and Oman are still at the front line of rising problems due to the rabies (9). Rabies has been reported as the most important endemic zoonotic disease in Iran (10). Iran Ministry of Health and Medical Education covers a broad range of environmental and family health services, including family planning and health education for the population (11). It has also been reported that more than 130000 people have received post-exposure prophylaxis in 2006. Similar records are also valid regarding preventive vaccination in animals (10). There are two reports that confirm the increasing rate of prophylaxis regimen receiving in Iran. The number of persons treated for rabies was 29860 in 1990, increased to 93216 cases in 2003 (12). In contrast, a report indicates that between 1993 and 2002, the number of canine and human rabies in the Americas region countries decreased about 80% (13). Moreover, the number of patients under prophylaxis treatment in Iran was 57070 persons in 1996, which has increased to 65632 in 1998 (14). Nevertheless, a study in Ilam province indicated that 81.3% of patients had in-

Implication for health policy/practice/research/medical education:
Sufficient attention is needed to find out the role of animal bite in Iran. The results approved the need of the substantial aspects like public education, prevention strategies and also vaccination of all domestic animals to evade the threat of rabies. Therefore it is essential to vaccinate all domestic and stray dogs and cats.

complete rabies prophylaxis while the rate of completed rabies prophylaxis was 18.7% (15). Similar results were reported in Kerman with 79.36% non-completed vaccination and 20.64% completed rabies vaccination (16), as the most rational therapeutic strategy. In Rafsanjan 85% of injured patients received rabies vaccine, 15% received both rabies vaccine plus rabies immunoglobulin, and 66% received tetanus toxoid vaccine in addition (17). The main objective of the current research was to study the epidemiology of animal bites in Borujerd county, located in Lorestan, a western Province in Iran (11, 18) to compare its prevalence to other regions of Iran. Based on the 2006 census, the Borujerd county population was 320547 (18).

2. Objectives

Since the epidemiologic study of animal bite in this part of Iran is far from complete or clear, this article investigated the epidemiology of animal bite in west part of the country, in comparison with other parts of Iran.

3. Patients and Methods

This was a cross-sectional descriptive study on patients, attacked by animals, in Borujerd, from April 2006 to September 2011. The data were recorded in questionnaires and analyzed by SPSS version 16. Chi-square test was used to evaluate the relationship among variables and P-value was set as 0.05.

4. Results

During the period of the current research (April 2006 to September 2011), 2783 patients referred to public health centers for animal bites were enrolled into the study. Out of the injured patients 67.8% were rural residents, while 32.2% resided in urban areas. Among subjects of the study 77.1% were males and 22.9% were females. Dog bites were the most common kind (69.8%), followed by cat (17.2%), fox and wolf (1.4%), sheep and cow (2.8%), monkey and donkey (5%), mouse and squirrel (2.2%) and other animals (1.6%) (Figure 1). As seen in Figure 2, leg was the most common site for animal bites (46.6%) followed by hands (41.8%), buttocks (4.6%), head (4%) and body (2.9%). Most of the subjects belonged to the age group < 10 (175.2 per 100000 population) (Figure 3). All the patients referred to public health centers received vaccination against rabies. Based on the results, we can conclude that the injury location was significantly associated with sex ($P < 0.02$) and the residential status ($P < 0.001$) ; the animal bite location in women was mostly on buttocks and legs, while in men the injury locations were mostly on body and hands. Moreover, regarding the residential status, in urban areas the rate of animal bites was almost as twice as rural inhabitants. In terms of distribution of animal bites reported in Borujerd, regarding animal specious, rate of the animal bite by dog in rural areas was statistically higher than urban inhabitants ($P < 0.001$), while

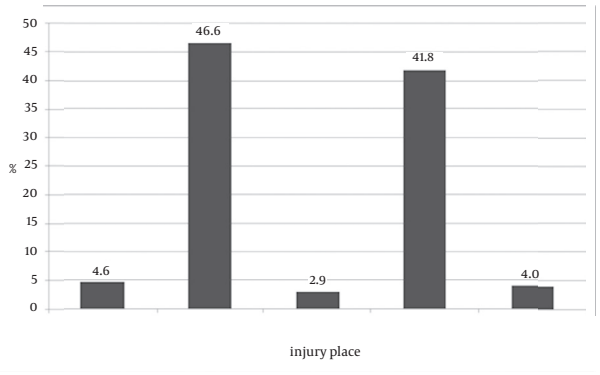

Figure 1. Distribution of Animal Bites Reported in Borujerd, From April 2006 to September 2011, According to Animal Specious

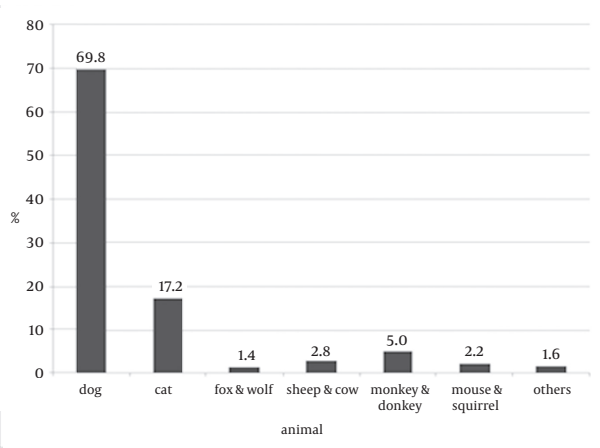

Figure 2. Distribution of Animal Bites Reported in Borujerd, From April 2006 to September 2011, According to Location

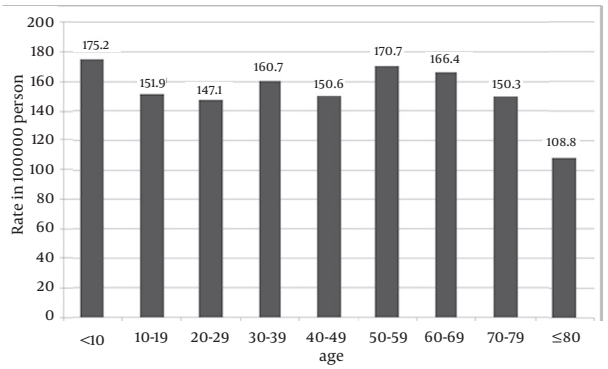

Figure 3. Distribution of Animal Bites Reportedin Borujerd, form April 2006 to September 2011, According to Age Groups

in urban areas animal bites by other animals were more than three times higher, which was significantly meaningful ($P < 0.001$). Also, the rate of animal bites in men was significantly higher than women ($P < 0.001$).

Table 1. Distribution of Animal bites Reported in Different Cities of Iran, According to Animal Specious and the Rate of Animal Bites in Percentage

City/Animal	Dog	Cat	Scorpion	Fox, Wolf and Jackal	Sheep and Cow	Monkey and Donkey	Mouse and Squirrel	Hamster	Snake	Others	Total
Borujerd	69.8	17.2	0	1.4	2.8	5	2.2	0	0	1.6	100
Rafsanjan	74	23	-	-	-	-	-	3	-	-	100
Tehran	65.9	25.44	0	0	0	1.52	3.89	1.41	0	1.84	100
Ilam	89.2	5	0	1.6	0	0	0	0	0	4.2	100
Ahvaz	69	0	12.5	-	-	-	8.8	0	4.4	5.3	100
Kerman	50	0	-	50	0	-	0	0	0	0	100
Amol	63.6	0	0	4.55	18.18	0	4.55	0	0	0	100

5. Discussion

Animal bite is still a major problem for the public health, worldwide. Rabies is known with urban and sylvatic epidemiological characteristics. The maintenance host is dominantly a domestic dog or a wild animal species (19). Several cases of animal bite are reported in Iran (11) and its frequency has been rising in recent years (17). Out of 2783 exposed cases referred to public health centers for animal bites, from April 2006 to September 2011 in Borujerd, the biting animals were mostly dogs, cats, fox and wolf, sheep and cow, monkey and donkey, mouse and squirrel and also other animals with 69.8%, 17.2%, 1.4%, 2.8%, 5%, 2.2% and 1.6% respectively (Figure 1).

Additionally in terms of distribution of animal bites reported in Borujerd, regarding the animal specious, it was concluded that the rate of animal bite by dog in rural areas was higher than urban inhabitants, with a statistically significant difference ($P < 0.001$), while in urban areas, the frequency of other animals being the cause of animal bites, was three times higher ($P < 0.001$). Also, the rate of animal bites in men was higher than women with a statistically significant P value ($P < 0.001$), which is due to the cultural behaviors of men having more responsibilities in farms and the rural lifestyle in Iran. In a study carried out on 1542 patients in Rafsanjan city, the rates of animal bite occurrence were 180, 195 and 241 per 100000, in 2003, 2004 and 2005, correspondingly (17). Among patients in Rafsanjan, 74% were bitten by dogs, 23% by cats and 3% by other animals including foxes, bats, donkeys, monkeys and rats. A research in Tehran, the capital of Iran, showed that the most involved animal species were dogs, cats, squirrels, monkeys, hamsters and other animals in 65.9%, 25.44%, 3.89%, 1.52%, 1.41% and 1.84% of cases, respectively (11). Another study in Ilam, a southwestern province of Iran, indicated that the biting animals were mostly dogs (89.2%), followed by cats (% 5), wolves (% 0.7), jackals (% 0.6), foxes (% 0.3) and other animals (% 4.2) (15). Moreover, a research carried out from 1997 to 2006, in teaching hospitals in Ahvaz, the capital city of Khuzestan province in south west of Iran, indicated that dogs, scorpions, mice and snakes were the mostly the biting animals, causing injuries with an incidence of 69%, 12.5%, 8.8% and 4.4%, respectively (20). A report from Kerman, a southeast province of Iran indicated that 50% of reported cases were bitten by foxes and 50% by dogs (16). In a research performed in Amol city in north of Iran, it was demonstrated that dogs (63.63%), cows (18.18%), jackals (4.55%) and squirrels (4.55%) were the cause of the animal bite occurrence (21). Another study in Birjand city showed that 86.3% of patients were bitten by domestic animals and the majority of cases were attacked by dogs (80.3%) (22) (Table 1).

In conclusion, animal bite is considered as a major public health problem in many provinces in Iran, causing a high frequency of hospitalization and huge morbidity (20). Moreover, official reports in Iran have confirmed that the main human exposures been occurred by dog biting (10). This is in consistent with other reports worldwide, demonstrating that in between 90%-99% of the total number of laboratory proven animal rabies cases, dogs were the biting animals (3, 4, 9, 10), while cats and other animals like monkeys, bats and rabbits, were the cause of 10% and 5%-10% of the reported bites, respectively (23). This is in agreement with WHO report, which declared that in most African and Asian countries dogs are the major causes of human death, due to rabies (24). In terms of residency, among the injured patients in Borujerd, 67.8% were rural residents and 32.2% resided in urban areas. Based on the results obtained in this research it can be concluded that the injury location is significantly associated with sex ($P < 0.02$) and the residential status ($P < 0.001$), as the animal bite location in women were mostly on buttocks and legs, while in men the injury locations were mostly on body and hands. Moreover, regarding the residential status, in urban areas the animal bites happened almost twice more than in rural regions. The reason remains unclear. A research in Tehran showed that among 8806 patients treated for animal bites, 94% were from Tehran city and 6% from the suburbs (11). In Rafsabjan, 45% of animal bites occurred in urban areas, while 55% were reported in rural areas (17). However, in Ilam 77.3% of patients were rural inhabitants, while 22.7% were living in the city (15). Additionally a report from Ker-

man showed that 55.57% and 44.43% of cases bitten by animals lived in rural and urban areas, respectively (16). In Birjand city, rural residents (64.2%) were bitten more than urban residents (35.8%) (22). Based upon the data reported, it could be concluded that in Iran, animal bites affect rural populations more frequently than urban residents, which seems logical in terms of the epidemiologic features of the condition in Iran. In view of distribution of animal bites, based on the site of injury, in Borujerd, leg was the most common bite location (46.6%), followed by hands (41.8%), buttocks (4.6%), head (4%) and body (2.9%) (Figure 2). In contrast, in Tehran, upper extremities were the most common attacked parts (53.8%), followed by lower extremities (38.11%), head and neck (3.48%), and trunk (4.61%) (11). Moreover, in Rafsanjan 48% of injuries happened on hands, feet (34%), head (5%), trunk (4%) and the rest occurred on mixed sites. However, in Ilam, feet were the most frequent bite site, which were reported in 71.8% of cases, followed by hands (% 20), body (% 6), hand and feet (% 2) and neck (% 0.4) (15). In Ahvaz, animal bites mostly occurred on feet (58.1%), hands (30.6%), face (5.9%) and other parts of the body (5.4%) (20). In Kerman 40% of animal bites happened to involve head, 40% involved face, hands, legs and nose and 20% happened on other body parts, including neck, shoulder and trunk (16). In Amol, most injuries were observed on hands (45.45%), followed by legs (18.18%), face (4.54%), abdomen (9.09%) and both hand and leg (22.74%) (21) (Table 2).

To sum up it can be concluded that in Iran the upper extremities are the most common attacked organs by animals. The study group of ours consisted of 77.1% males and 22.9% females, which was in consistent with other parts of Iran. In Tehran, Ahvaz, Ilam, Kerman and Birjand studies 79.16%, 62.0%, 80%, 68.3%, 80% 63.63% and 78.3% of reported cases were males. This indicated that in Iran males are generally more frequently exposed to animal bite. This can be attributed to the role of men in rural areas, as the patriarch, who plays a major role in each family economy and also as a result of their activities in open areas. Regarding the age groups, in Borujerd most cases bitten by animals belonged to the age group < 10 years old (175.2 per 100000 populations) (Figure 3).

In Tehran, the age group 20-29 years (11) was the group most frequently attacked by animals (30.1%), while the least incidence was reported in the age group < 9 years old (8.4%) (11). In contrast, in Ilam animal bites occurred mostly in the age group 10-19 years old (26%), which is similar to the data reported from Kerman province. (16). In Ahvaz the age groups most frequently bitten were 16-25 years old (28.1%) and the least frequently attacked age group were 66 years old (3.1%). In Amol, the mostly affected individuals were in the age group 21-40 (45.45%) and the lowest rate was seen in the age group < 20 years old (22.72%) (21). In Birjand, most of the attacked subjects were in the age group of 20-29 years old (23.9%) and the patients least frequently attacked were > 70 years old. (22). In Rafsabjan the mean age of patients bitten by animals was 27.0 years (26.6 in men and 31.2 in women) (17) (Table 3).

The above mentioned results indicate that the pattern

Table 2. Distribution of Animal Bites Reported in Different Cities of Iran, According to the Site of Animal Bite

City	Site of Animal Bite and the Percentage of Animal Bites
Brujerd	legs (46.6%), hands (41.8%), buttock (4.6%), head (4%), body (2.9%)
Rafsanjan	hands (48%), feet (34%), head (5%), trunk (4%) and mixed sites (9%)
Tehran	upper extremities (53.8%), lower extremities (38.11%), head and neck (3.48%) and trunk (4.61%)
Ilam	feet (71.8%), hand (20%), body (6%), hand and feet (2%) and neck (0.4%)
Ahvaz	feet (58.1%), hands (30.6%), face (5.9%) and other parts of the body (5.4%)
Kerman	head (40%), face, hands, legs and nose (40%), other parts of body including neck, shoulder and trunk (20%)
Amol	hand (45.45%), legs (18.18%), face (4.54%), abdomen (9.09%) and both hand and leg (22.74%)

Table 3. Distribution of Animal Bites Reported in Different Cities of Iran, Regarding Age Groups

City	Mostly Affected Age Groups and Percentage of Animal Bites
Borujerd	< 10 years old (10.5%)
Rafsanjan	26-31 years old (?)
Tehran	20-29 years (30.1%)
Ilam	10-19 years old (26%)
Ahvaz	16-25 years old (28.1%)
Kerman	10-19 years old (26%)
Amol	21- 40 years old (45.45%)

of animal bite distribution is different in different parts of the country: in Tehran and Amol the most frequently age group to be bitten by animals were under 20 years old, while in the west and southwest of the country, they were older than 20 years old. The reason seems obscure but remains to be elucidated. In terms of occupation, essential data were not available in our study, but other studies showed that in Tehran and suburbs most patients with animal bites were self-employed (25.82%) or students (16.18%) (11), while in Kerman 60% of cases were workers and farmers and the remaining (40%) had different jobs, including students and housewives (16). In Birjand, among identifiable jobs students, farmers and workers have been reported to be most frequently the victims of animal biting. (22). Also a study in Ilam (15) showed that the highest rates of animal bites occurred in students (29.7%), farmers (12.42%) and housewives (15.97%) respectively (unpublished). Therefore, another finding to emerge from the current study is a correlation between job and animal bite: students, farmers, and housewives were demonstrated to be most frequently the victim of animal biting which referrers to public houses or hospitals in different provinces of Iran. The dialectics behind this is that in rural areas most students also work on agricultural duties to help their fathers. Also in those areas, the majority of the students' mothers are housewives. Altogether with the observations discussed earlier, it should be noted that there are limitations to this study: the present research results could not be compared to data from many regions of Iran, due to unavailability of reports in many provinces. This makes it difficult to make a firm conclusion. Nevertheless, the advantage of our research was providing all the existing data of animal bites in Iran, which has negative impacts on the public health and social life. Although the results were not uniform, our study tried to describe those topics important to have an understanding from the patterns of rabies epidemiology in different parts of Iran. Further works is clearly required to illuminate the epidemiologic feature of rabies in other parts of Iran, which may show different epidemiologic patterns by geographical zones.

Based on studies undertaken during the past few decades and also the promising results of the current investigation, it can be concluded that rabies should be considered one of the most important priorities for Iranian health authorities. Importantly, the substantial aspects like public education, prevention strategies and also vaccination of all domestic animals to evade the threat of rabies should be given more attention. Therefore it is essential to vaccinate all domestic and stray dogs and cats. A report from the US indicated the efficacy of mass vaccination of dogs and prophylactic treatments in decreasing the number of canine and human rabies about (80%) (13). Therefore, vaccination of domestic dogs and also eradication of stray ones, in addition to educational programs should be prioritized by the health authorities. It has to be emphasized that international collaboration in vaccination can support the effective control of rabies as a sanitation problem in Middle East. This study strongly highlights a high priority goal for hygiene authorities including educational programs, recommended for to the general population, to inform them of the benefits of continuing the medication, in order to prevent the risks posed by incomplete rabies vaccination. Further studies should be carried out to evaluate the distribution of animal bite and rabies infection in the country, which has been implicated in causing public health issues and to fulfill the wide gap of the animal bite information in the geographical region of Middle East. Further goals setting should also include developing central rabies diagnosis laboratories in different provinces, having trained staff in order to increase the diagnosis reliability of the laboratories.

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Authors' Contribution

All authors read and approved the submission of this manuscript and contributed equally to this research.

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