Original Article

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Epidemiological Patterns of Animal Bite Injuries in Victims under 18 Year Old in Babol, Iran (2010-14)

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ABSTRACT

BACKGROUND AND OBJECTIVE: Population of stray dogs, cases of animal bite injuries, and incidence of human rabies have increased in most of the provinces of Iran. Therefore, we call to attention controlling these conditions and investigating their various aspects. In this study, we aimed to evaluate the epidemiological patterns of animal bite injuries in victims aged under 18 years in Babol, Iran, during 2010-14.

METHODS: In this cross-sectional study, data on animal bite injuries occurring in the population aged under 18 years during 2010-14, were extracted from the rabies registration office of Babol health center. The demographics, type of animal, and time and clinical patterns of all the cases were investigated

FINDINGS: The mean age of the victims was 11.24±4.64 years. Male to female ratio was 82:4, 598 (82.8%) of the animal bite victims were male, and 528 (73.1%) cases were bitten in rural areas. In both genders, most of the cases were dog bite victims (521 [87.1%] male, and 100 [80.6%] female). The number of animal bite cases in ages under 18 years has increased from 82.5 to 123.1 cases per one hundred thousand population.

CONCLUSION: The results of this study indicated that most of the cases were victims of dog bite injuries, and animal bite mostly happened in rural areas.

KEY WORDS: Epidemiology, Animal bite, Rabies, Injury, Babol.

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Introduction

Animal bite caused by sting or claw of domestic or wild animals leads to numerous diseases and high rate of mortality, especially in rural areas. Animal bite is considered as a neglected public health issue (1, 2). Animal saliva contains a wide variety of infectious pathogenic bacteria, and any kind of animal bite can cause particular health problems (3). Rabies is a viral zoonotic disease transmitted from warm-blooded animals to human. This disease causes severe and fatal encephalitis in humans and other mammals; thus, it is known as one of the viral reasons of mortality in developing countries (4).

Death is certain with the onset of rabies symptoms in humans or animals; however, if immediate action is taken against this disease, it will not develop (5). Millions of people around the world are vaccinated against rabies every year. According to the World Health Organization, more than 2.5 billion people are at risk of rabies, and this disease has been reported in more than 100 countries (6).

Rabies endemically exists in Iran, and all of its provinces are more or less infected with it. Outbreak of this disease is plausible considering the lack of disease control in domestic and wild animals (7). The most common mode of rabies transmission to humans is reported to be dog bite (8). In addition to the importance of health in humans, the occurrence of this disease in livestock causes considerable amount of economic loss (9).

The growing number of stray dogs and cases of animal bite injuries and the prevalence of rabies in most of the provinces of Iran shows the importance of rabies control and conducting more studies on its various aspects (10).

Surveillance of animal bite injuries can provide beneficial information for planning and evaluating general health interventions (11). It is necessary to implement strategies that are suitable for controlling animal bite injuries with the help of modern modelling methods. Success of animal bite control programs entails provision of broad, deep, and accurate information on epidemiology and transmission dynamics of the diseases in humans and livestock.

Therefore, this study was carried out in Babol, Iran, during a five-year period to describe and analyse the epidemiology of animal bite based on the demographic characteristics of the victims, environment of the injury, and characteristics of the offending biter.

Methods

After obtaining approval of the Ethics Committee of Babol University of Medical Sciences, this cross-sectional study was conducted at the health care center of Babol, Iran, between March 2010 and February 2014, using census sampling approach. The data were extracted from records of the cases of animal bite in animal bite registration office. The information regarding the victims less than 18 years of age, who referred to rabies unit of Babol and underwent preventive, clinical, and follow-up procedures was fully recorded.

Samples of this study were bite victims who referred to Babol health care center due to suspicion of rabies. The demographic characteristics (i.e., age, gender, and job), information on place of residence (urban or rural) and the environment of the injury (urban or rural), type of the biting animal, the characteristics of the animal (domestic, wild, and stray), the animal's condition after biting, characteristics of the anatomic location of the bite such as site of the injury, magnitude of the wound, the type of wound, and the way biting occurred (naked or over clothes), time of the injury (hour, day, month, season, year), health and clinical services provided for the injured such as the number of vaccinations, tetanus vaccine, rabies serum, and time delay, as well as the history of animal bite were evaluated and recorded.

Chi-square test was performed to determine any significant association between the qualitative variables. Independent t-test was performed to compare the mean values of the qualitative variables, and one-way ANOVA was used to compare the equality of mean of qualitative variables. In addition, $p<0.05$ was considered statistically significant.

Results

A total of 722 cases of animal bite under the age of 18 were evaluated during a five-year period (2010-14), and all the associated data were fully recorded. The mean age of the victims was 11.24±4.64 years; the mean age of the male victims was 11.61±.62 years, and that of females was 9.50±4.31 years (p=0.001; table 1). There was a

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statistically significant difference between the type of animal and gender (table 2).

Male to female ratio was 82:4, and 598 (82.8%) of the cases were male. Moreover, 523(72.4%) of the cases were students, 515(71.3%) cases were living in rural areas, and 528 (73.1%) animal bites occurred in rural areas.

Table 1. Distribution of the age groups based on gender of the victims referring to rabies unit of Babol health center (2010-14)

Age groups	Males N(%)	Females N(%)
Under the age of 7	141(36.9)	43(44.3)
7-12 years old	176(46.1)	48(49.5)
12-18 years old	65(17.0)	6(6.2)
total	598(100.0)	124(100.0)

*p=0.02

Table 2. Distribution of animal type based on gender of the victims referring to rabies unit of Babol health center (2010-14)

Animal type	Males N(%)	Females N(%)
Dog	521(87.1)	100(80.6)
Cat	71(11.9)	17(13.7)
Other (wolf, jackal, cow, sheep, etc.)	6(1.0)	7(5.6)

*p=0.001

The most common sites of injury were as follows: shoulder and upper limbs (310 [42.9%] cases), lower limbs (276 [38.2%] cases), and pelvis (58 [8.0%] cases). There was a statistically significant difference between the age of the victims and the site of injury.

The mean age of victims with injury in head and abdomen and chest was lower than that of the cases with injuries in lower limbs and shoulder and upper limbs (7.03±4.24 and 9.52±4.22 vs. 12.32±4.22 and 11.14±4.79; p=0.001; fig 1).

The most cases of animal bite were reported during summer (28.95%) and spring (28.53%), followed by fall and winter. Moreover, most cases of animal bite occurred on the first day of week (Saturday: 119 [16.5%] cases); and the least number of cases of bite injury were observed on Sunday, Monday, and Tuesday (87 [12.0%] cases each). Additionally, the most cases of animal bite happened in the afternoon (between 12 and 6 p.m.; 341 [47.2%]), morning (6 to 12 a.m.; 220 [30.5%], and at midnight (12-6 a.m.; 10 [1.4%]).

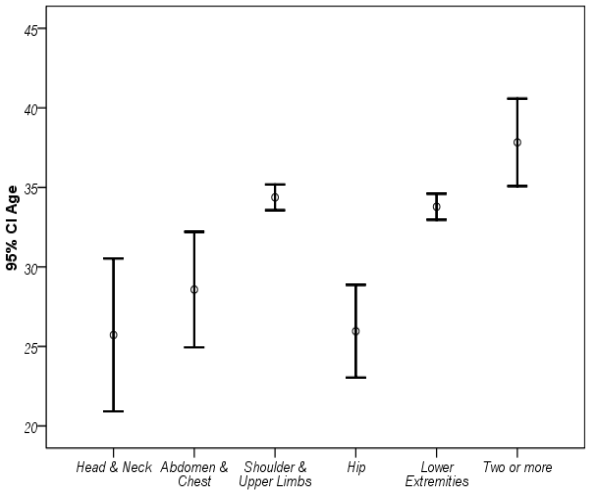


Figure 1. Comparison of the mean age of the victims based on the site of injury in victims aged under 18 years, who referred to rabies unit of Babol health center (2010-14)

The wound in 93.77% of the cases was superficial, and in 66.62% of the victims the site of injury was not naked. Moreover, 683 (94.6%) cases referred to health care centers immidiately, 23 (3.2%) cases referred to health care centers with one day delay, and 16 (2.2%) victims referred with two or more days delay.

Thirteen (1.8%) cases were fully vaccinated after the injury (five doses of vaccine), 639 (88.5%) victims received three doses of rabies vaccine, 34 (4.7%) cases received only one dose, and 29 (4.0%) cases received two doses of rabies vaccine. Additionally, 191 (26.5%) cases received tetanus vaccine, 57 (7.9%) cases received serum if required. Only three (0.4%) cases had previous history of animal bite.

The least number of animal bite injuries in one hundred thousand population aged under 18 was 82.51 in 2011, this number increased to 123.07 in 2014 (fig 2). The results of the trend test also showed increase of animal bite cases in Babol (p=0.001).

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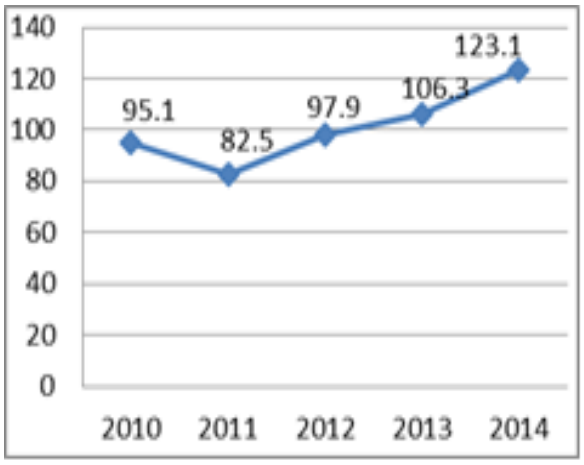


Figure 2. The trend of distribution of animal bite cases per one hundred thousand in victims under the age of 18 in Babol, Iran (2010-14)

Discussion

The results of this study indicated that there has been an increase in the occurrence of animal bite in one hundred thousand people under the age of 18 in Babol, Iran. The mean number of animal bite cases in Babol has increased from 82.5 to 123.1 cases in one hundred thousand population. In a study done in Ilam, Iran, the number of reported cases of animal bite injuries was 457 in 2003 (12).

The growing number of animal bite cases in this and other studies might be due to increased awareness of people regarding referring to the rabies prevention centers; however, there might be a real increase in this trend, which needs to be addressed in future studies. In the present study, the female to male ratio was 4:82, and 598 (82.8%) cases of animal bite were male. According to the statistics and reports, it seems that this difference might be due to boys' engagement in outdoor activities or their higher courage. This result is consistent with the results of previous studies (13, 14).

According to several studies, the population aged under 20 was at higher risk of animal bite. In Ilam, 44% of the animal bite cases were under the age of 20 (12). In a study conducted in Switzerland, most of the bite victims were under the age of 20 (15). In another study done in Virginia, the USA, the possibility of getting bitten in cases aged under 18 was more than adults (16). In a study done in Thailand, 42.3% of cases were in the 10-14 age group, and 39.7% of the cases were aged between 5 and 9 (17). Singh et al. reported that animal bite mostly occurred in ages between 5 and 14 in India (18). In a study performed on 3496 cases of animal bites in Kalale, Iran, the most cases of animal bite (29%) were aged 10-19 years (19).

It seems that the high prevalence of animal bite in adolescents and young adults might be due to touching and evoking aggressive behaviors in animals. According to the present study, the most common sites of bite injuries were shoulder and upper limbs (310 [42.9%] cases), lower limbs (276 [38.2%] cases), and pelvis (58 [8.0%] cases). In a study conducted in Boushehr, Iran, on children aged under 16 years, the most common sites of injury were lower limbs, and a statistically significant difference was observed between the type of animal and the site of injury, so that the site of injuries by cat bite was different, most of which were observed in lower limbs (P=0.001) (20). In a study done by Pandey et al., it was determined that children are at higher risk of being bitten on the head and face (21). The majority of studies in Iran have shown that the most common sites of animal bite injuries were lower limbs (22-25).

It seems that the high prevalence of animal bite injuries in lower limbs might be due to the study population, that is, the age groups. In a study conducted by Hattami et al., it was found that in 41.5% of the cases, the site of injury in children aged under five years was in lower limbs, and in 55.3% of the cases, lower limbs in children aged five years or above were injured (20). In studies by Majidpour et al. conducted in Ardebil, and Oginni et al. performed in Nigeria, head was the most common site of bite injury in children (24, 26).

The results of the present study indicated that age and height of people have an important role in the site of injury, so that the prevalence of injury in lower limbs is higher in adults. Also, 528 (73.1%) of the cases of animal bite were reported in rural areas. In a study by Kassiri et al. conducted in Islam Abad, Kermanshah, Iran, 96.5% of the cases of animal bite occurred in rural areas (22).

Ghannad et al. reported that 77.3% of the cases of animal bite in Ilam were in rural areas (27), which might be due to the need for animals for farming and husbandry. Our results showed that most of the cases were victims of dog bite. In a study done on the epidemiology of rabies in Mazandaran province, Iran, most cases of positive rabies were reported in cows followed by dogs (28). Amiri et al. reported that in Shahrood, dog bite (79.1%) and cat bite

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(12.6%) were the most common types of animal bite (29). Other studies have also shown that dog bite is the most common type of animal bite (9, 30, 31). Considering that most cases of animal bite are related to domestic animals, providing appropriate training on dealing with these animals for high-risk age groups seems to be necessary. In addition, reducing the number of stray dogs and vaccination of pets, especially dogs seems to be mandatory.

According to our study, 93.77% of the injuries were minor. In a study done in Spain, out of 36 patients, 15% sustained deep wounds and others had superficial scratches and small wounds (32). In a study conducted in Mashhad, Iran, more than 90% of the cases had superficial wounds (33).

In our study, 683 (94.6%) animal bite victims had immediately referred to the health care center, 23 (3.2%) cases had referred after one day, and 16 (2.2%) cases had referred to the center two or more days later. In a study by Riahi et al. conducted in Tabas, Iran, the most influential factors affecting delay in referring to heal care centers were suggested to be age, the time of occurrence of the injury, site of injury, history of vaccination, receiving the recommended primary care for wound, and the type of animal (34).

In the present study, 13 (1.8%) of the cases received full vaccination (5 doses) after getting bitten, and 639 (88.5%) cases received three doses of rabies vaccination. In a study performed in Mashhad, Iran, vaccination was performed imperfectly (less than five doses) in the years 2006, 2007, and 2008, and the rate of complete vaccination in the aforementioned years was 16.6%, 15.7%, and 17.3%, respectively (33).

In a study conducted in China, at least 62.5% of the patients did not receive appropriate treatment for their wounds based on the standard protocols, 92.5% of the patients did not receive full vaccination, and 91.25% did not receive anti-rabies immunoglobulin (35). Because rabies does not have any treatment, patients need to take appropriate action to prevent this disease; therefore, raising awareness on referring to clinics for receiving preventive services without any delay is necessary.

In summary, the trend of animal bite accidents in victims under the age of 18 is increasing in Babol, and the consequences of injuries to head, especially in children, are important. In addition, most of the animal bites occurred in rural areas by dogs (domestic animals). Therefore, it is recommended to prevent contact between dogs and humans, especially children, vaccinate cats and dogs, establish committees to keep stray cats and dogs, provide training to increase awareness on the risks of animal bites, especially in rural areas and the possibility of incidence of rabies in case of not receiving vaccination. Due to lack of access to all snakebite records in Babol health center, epidemiology of snakebite was was not accounted for in this study; thus, the percentages and frequencies increase considering snakebites.

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