

Assessment of 200 pediatric patients exposed to rabies risk

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ABSTRACT

Background/Purpose: Rabies is still an important health problem particularly in underdeveloped or developing countries. In this study, the aim was to investigate demographic characteristics and vaccination schedules of cases suspected of having rabies and admitted to the Pediatric Emergency Clinic of our hospital, which serves as one of the Rabies Vaccination Centers in our province.

Methods: In our study, medical records of 200 patients admitted to the Pediatric Emergency Clinic with suspicion of risk of contact with the rabies virus were retrospectively analyzed.

Results: Of those 200 cases, rabies risk was found to be greater in the 5-9 year old group. There was a history of having been bitten by dogs in 68.5% of cases, cat scratch in 29.5%, and contact with other animals in 2%. While 76% of animals were stray animals, only 11% of them had an owner and had been vaccinated, and were under supervision. Rabies vaccination only had been administered to 42.5% of admitted patients, tetanus and rabies vaccination to 51.5%, tetanus; rabies vaccination and human rabies immune globulin were administered to 6%. Post-exposure prophylaxis was found to have been given as recommended to 83.5% of cases.

Conclusion: Rabies remains an important public health problem in developing countries like ours. We consider that public awareness should be raised; local authorities should devote efforts to control stray animals and supervise such services, and updated guidance and training should be provided to the concerned health staff to reduce the risk of rabies.

Key words: child; developing countries; prophylaxis; rabies; vaccination.

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INTRODUCTION

Rabies is an acute and fatal viral infection that affects the central nervous system. The causative agent of rabies is a neurotropic RNA virus from the Lyssavirus genus and Rhabdoviridae family.¹ The virus has the ability to infect all warm-blooded animals and the infection results in fatal encephalitis in almost all cases. Infections result from animal bites; however, it has been reported that

transmission might occur from organ transplantation, or through broken skin and mucous membranes.²

According to the 2010 data of the World Health Organization (WHO); rabies is prevalent in over 150 countries worldwide and 55 000 individuals die due to rabies every year. Forty percent of humans bitten by an animal with suspected rabies are children under 15 years old. Each year, post-exposure prophylaxis is administered to more than 15 million individuals, and this procedure is known to prevent 327 000 rabies-related deaths yearly.³ Rabies, which is an important public health problem also in our country, is a notifiable disease. In addition, our country is one of the three European countries having the highest rate of rabies in domestic animals.⁴

In this study, the aim was to investigate demographic characteristics and vaccination schedules of cases exposed to the risk of contact with rabid animals or the rabies virus and admitted to the Pediatric Emergency Clinic of our hospital, which serves as one of the Rabies Vaccination Centers in our province.

METHODS

In our study, medical records of patients admitted to the Pediatric Emergency Unit of our hospital between January 2012 and December 2012 due to risk of contact with rabid animals or the rabies virus were retrospectively analyzed. The inclusion criteria of our analysis were risk of contact with rabid animals such as cats, dogs, and others. Data were obtained by analyzing the type of contact with animals suspected of being rabid as reported in the Rabies

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Prevention and Control Standard. Demographic characteristics of cases, season when the event occurred, time interval until admission to the health center following contact with the animal, type of injury, injury location, kind of animal, whether it was a stray animal or had an owner or was under supervision, vaccination status of the animal, whether rabies prophylaxis had been administered, treatment methods, and whether they were appropriate or not were evaluated. Cases were allocated to age groups as follows: 1-12 months old, 1-4 years old, 5-9 years old, 10-14 years old and 15-18 years old. Statistical analysis of data was done using SPSS 16.0 software. Descriptive data were expressed as frequency and percentage. Differences between groups, such as age, gender, residential location, season, kind of animal, animal status, and contact type were evaluated using a chi-square test. A p level of <0.05 was accepted as statistically significant.

Appropriateness for rabies prophylaxis was evaluated based on the Rabies Prevention and Control Standard, which was published by the Ministry of Health, Basic Health Services General Management (date 09.05.2001, number B100TSH110002/7755) and reviewed in 2005.⁵ In the past year, if the animal had not received the rabies vaccine (confirmation with vaccination card), all suspected cases were administered the rabies vaccine. We administered rabies immune globulin to patients with deep and/or dirty wounds and administered the rabies vaccine based on the above criteria. Rabies immune globulin was injected to all patients into and around the wound.

RESULTS

A total of 200 patients aged between 0-18 years were admitted to the Pediatric Emergency Clinic in 2012 due to risk of contact with rabid animals or the rabies virus. All cases were included in this study. Of these, 63% (126) were boys and 37% (74) were girls. Their mean age was 9.52 ± 4.38 years old. When evaluated according to age groups, risk of contact with rabid animals or the rabies virus was found to be the greatest (32%) in the 5-9 year old group. Demographic characteristics are detailed in *Table 1*. A statistically significant difference was found between groups with regard to age and gender ($p < 0.05$). Among cases, 196 (98%) were from urban areas and 4 (2%) from rural areas. While winter was the season during which the rate of admission was the lowest (13%), it was highest in summer (34.5%), and this

difference was statistically significant ($p < 0.05$). Of these cases, 116 (58%) were injured by a bite, 80 (40%) by a scratch and 4 (2%) through contact with an open wound.

When cases were evaluated for injury location, 106 (53%) were seen to have an upper limb injury. Injury of lower limbs, trunk, and head and neck corresponded to 53 (26.5%), 28 (14%), and 13 (6.5%) cases, respectively. An animal bite as the type of injury and upper limb injuries as injury location were statistically ($p < 0.05$) different from the other type of injuries or injury location.

There was a history of a dog bite in 68.5% of cases, a cat scratch in 29.5%, and contact with other animals in 2%. There was no history of having been injured by wild animals. While 76% were stray animals, only 11% had an owner and were vaccinated and under supervision. In addition, while 12% of the animals had an owner, were not vaccinated and were under supervision, 1% was dead or killed. A statistically significant difference was found in suspected contact with regard to the kind of animal ($p < 0.05$).

TABLE 1. Demographic characteristics of the cases.

Characteristics	n	%
Age groups		
1-12 months	2	1
1-4 years	25	12.5
5-9 years	64	32
10-14 years	63	31.5
15-19 years	46	23
Gender		
Female	74	37
Male	126	63
Residential location		
Urban	196	98
Rural	4	2
Season		
Spring	50	25
Summer	69	34.5
Autumn	55	27.5
Winter	26	13
Kind of animal		
Dog	137	68.5
Cat	59	29.5
Others	4	2
Animal status		
Stray/unknown	152	76
Ownership/vaccinated	22	11
Ownership/unvaccinated	24	12
Dead/killed	2	1
Contact type		
Bite	116	58
Scratch	80	40
Contact with an open wound	4	2

Admission time to the emergency ward following contact was within the first 24 hours in 61.5% of cases, in 24-48 hours in 13%, between 2-5 days in 14.5%, and after day 5 in 11% (Table 2). A statistically significant correlation could not be found between age and time interval until admission ($p > 0.05$).

Rabies vaccine only was administered to 42.5% of cases, tetanus and rabies vaccine to 51.5%, tetanus, rabies vaccine and human rabies immune globulin were administered to 6%. Five doses of vaccination were administered to 85% of the cases, and 3 doses to 15%. Post-exposure prophylaxis was found to be adequate in 83.5% of cases. Anaphylaxis developed in no cases. No cases developed illness and none died due to rabies.

DISCUSSION

Unlike previous studies conducted in our country, this study is important as it is the first one in which cases of risk for rabies exposure were examined only in the pediatric age group. Özsoy et al. found that rabies was more frequent in the 5-14 year old group; however, each age group was susceptible to animal bites; on the other hand, exposure was lower in the 0-5 year old group.⁶ In our study, exposure was most frequent at 5-9 years old and least at 0-12 months old. We consider that this result has arisen from the psychosocial development of children and their preference to play outdoors in that age group, thereby have an increased risk of being in contact with stray animals.

In the literature, it has been reported that the risk for rabies exposure was less in rural than in urban areas.⁷⁻⁹ Similarly, 98% of cases admitted came from urban areas and, in our study, this difference was statistically significant. The fact that there are more cases from urban areas suggests that control of stray animals is more difficult in provinces, measures by local authorities are insufficient, and people who live

in rural areas have not developed the behavior of seeking care in a rabies vaccination center after a bite.

When contact with a rabid animal or rabies virus was studied in relation to seasons, cases reported were more frequent in summer in two separate studies conducted in Istanbul.^{10,11} Cases with risk of exposure to rabies increase in summer as children play outdoors because they do not go to school and they are on holiday. This study has also showed that contact with rabid animals or the rabies virus was more frequent in the summer. Taking measures against contact with rabid animals or the rabies virus more strictly in the summer would enable to reduce the number of cases. For this purpose, regular public guidance and training should be provided, and stray animals should be controlled, particularly in the summer. In addition, vaccination studies may be prioritized.

While rabies infection occurs through a bite by stray animals in developing countries, sources of rabies for humans are reported to be wild animals in developed countries, where dogs are regularly vaccinated.¹² Animals considered as the source of rabies worldwide are reported to be dogs (91%), cats (2%), other pets (3%), bats (2%), other wild animals (<1%).¹³ Biting cases were reported to be related to dogs (68%) and cats (25%) in a study conducted in Ankara.⁵ Contact with dogs was most frequent in humans were diagnosed with rabies in Turkey between 1992-2007.¹⁴ Results of our study were found to be consistent with the literature. Contact with dogs was detected to be significantly more frequent compared to contact with other animals. In addition, considering that two thirds of our cases have been caused by stray animals and that 98% of all admissions are from urban areas, it may be concluded that local authorities are incapable of controlling stray animals adequately and do not make strenuous efforts in this regard, and supervision mechanisms are not complied with.

Small rodents like squirrels, hamsters, guinea pigs, chipmunks, rats and mice, and animals like rabbits and hares were detected not to cause human rabies. Positive results for rabies were not detected in more than 1000 house mice in studies conducted in the past 20 years. Therefore rabies prophylaxis is unnecessary in contact with these animals.¹⁵ In our study, we consider that no prophylaxis was performed in that type of contacts as the level of knowledge of health staff was sufficient.

TABLE 2. Admission time to emergency service following contact.

Admission time	n	%
First 24 hours	123	61.5
24-48 hours	26	13
2-5 days	29	14.5
After 5 days	22	11

Only 16.8% of animals with owners were reported to have been vaccinated in a study in Istanbul.⁹ Engöz et al. detected that 30% of animals had an owner and 6% were vaccinated.¹⁰ Similarly in our study, 23% of animals were detected to have an owner and the ratio of animals which had an owner and were vaccinated was low (11%). A low ratio of vaccination in animals with an owner was deemed to be an indicator of insufficient knowledge on this issue by the owners of animals in our country. Increasing vaccination rates of animals with owners through public guidance and training and national audiovisual media campaigns would enable to reduce the workload and costs related to rabies prophylaxis.

Humans may become infected by rabies through bites, scratching, contact of infected materials, such as saliva and brain tissue, with an open wound, laceration or mucous membrane, inhalation or organ transplantation (cornea, etc.).¹⁶⁻¹⁸ The results of our study are similar to those in the literature, and 58% of the cases were admitted with a bite, 40% with a scratch, 2% with contact with an open wound, and having been bitten was found to be statistically and significantly higher compared to other contact types.

The wounded body site due to a dog or cat bite varies depending on the kind of animal and the age of the subject. However, limbs are reported as the most frequently wounded body site. Injuries were detected in the head and neck region in 9.5% of cases, lower limbs in 36.1%, upper limbs in 30.4%.¹⁹ In our study, upper limb injuries were observed in half of the cases. It is considered that animals can reach the upper limbs of children due to their shorter stature compared to adults.

When admission time was analyzed, 64% of our cases were detected to be admitted to the emergency ward within the first 24 hours. Although our study sample is composed of urban area resident, this result is important for indicating that sensitivity of the community against suspected contact and rabies has increased.

Local wound treatment in the early period after exposure carries vital importance. Washing the wound with soap and water immediately is the most effective method for protection against rabies.²⁰ The wound site was washed with soap and water in all of our cases to prevent the entrance of the virus into neural tissue.

Immunization is the second most important step.¹³ Five vaccine doses were administered to 85% of patients as the animal could not be followed-up, and three vaccine doses were administered to 15% of patients. Administering human rabies immune globulin is of vital importance.²¹ The ratio of human rabies immune globulin administration was found to be low in the studies performed in our country.^{7,8,10} Human rabies immune globulin was administered in the ratio of 6% in our study, and it is consistent with literature data. Such low ratio may arise from the fact that most injuries are superficial and administration errors in post-exposure prophylaxis.

Appropriateness ratio of prophylaxis was reported as 60-98% in the studies conducted in other countries.^{23,24} In our study, appropriate post-exposure prophylaxis was performed in 85.5% of cases, and was found to be inappropriate in 14.5% of cases. These errors were as follows: beginning vaccination before the observation time is completed in the vaccinated animal (41.4%), beginning vaccination before observation time is completed in the unvaccinated animal which is not suspected of having rabies (51.7%) and not administering human rabies immune globulin although the animal has escaped or been killed (6.9%). This result suggests that knowledge of health staff should continuously be improved through in-service training.

Allergic reactions are the most common side effects of rabies vaccine.¹⁹ No side effects related with rabies vaccine or human rabies immune globulin were reported in our study.

A case was reported in the literature,²⁵ the survival of a 15-year-old girl in whom clinical rabies developed one month after she was bitten by a bat. Treatment included induction of coma while a native immune response matured; rabies vaccine was not administered. But, survival of a single patient does not change the overwhelming statistics on rabies, which has the highest case fatality ratio among any infectious disease.

The major limitation of this study is that analysis was retrospective in rabies vaccination center.

CONCLUSION

Our study has indicated that unfortunately our country is still among the developing countries in terms of protection and control of rabies. The fact that rabies remains a severe health problem for our country is only the tip of the iceberg, and economic burden of increased

vaccination rates as the result of insufficient animal control is a considerable point. In conclusion, we consider that public awareness about rabies should be raised, the number of rabies vaccination centers should be increased for easy access to people from rural areas, local authorities should devote efforts to control stray animals, and such services should be supervised, and updated guidance and in-service training should be provided to health staff. ■

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