Rabies Suspected Animal Contact Cases in a City with Animal Husbandry and the Appropriateness of Prophylactic Procedures

Seda DAGAR,[1] Sibel SAHIN,[2] Deniz ORAY,[3] Arif AKKAYA,[4] Ahmet KAMA,[1] Gulsah UCAN[1]

[1]Department of Emergency, Kars State Hospital, Kars
[2]Department of Emergency, Artvin State Hospital, Artvin
[3]Department of Emergency Medicine, Izmir University Faculty of Medicine, Izmir
[4]Department of Emergency Medicine, Erzurum Regional Training and Research Hospital, Erzurum, all in Turkey

SUMMARY

Objectives

This study aims to evaluate the features of rabies suspected animal contact cases in the emergency department and the appropriateness of administering post-exposure prophylaxis procedures according to World Health Organization (WHO) instructions.

Methods

Rabies suspected animal contact cases that applied to the emergency department between August 2012 and December 2013 were included in the study. Patients' data were obtained retrospectively from patient files, records of hospital automation system, and the "Rabies Suspected Animal Contact Cases Examination Form". The post-exposure prophylaxis recommended by the WHO were compared to the prophylactic applications administered by the emergency department.

Results

A total of 515 cases were included in the study. According to WHO classification, cases involving category 3 injuries (n=378, 73.4%) were more common than the others (p<0.0001). Compared to post-exposure prophylaxis recommendations by the WHO, 44.7% of all cases (n=230) were administered inappropriate prophylaxis. Thirty-seven percent of cases received less rabies Ig than recommended, despite category 3 contact. Six percent of cases with category 2 contact were given unnecessary rabies Ig and all cases with category 1 contact (1.5% of all cases) were given unnecessary rabies vaccine.

Conclusions

We observed that in 44.7% of cases, post-exposure prophylaxis was applied inappropriately according to WHO instructions. Not only were there unnecessary vaccine and Ig applications, there were also missing prophylaxis procedures. Updating the current "Rabies Prevention and Control Directive" plus educating and controlling healthcare personnel on a regular schedule may help prevent inadequacies in prophylactic application.

Key words: Post-exposure prophylaxis; rabies; World Health Organization contact category.

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Correspondence: Seda DAGAR, M.D. Kars Devlet Hastanesi, Acil Servis, Kars, Turkey.
e-mail: sddagar@msn.com

Introduction

Rabies is a viral infection with a high mortality rate that spreads from animals and is currently seen in underdeveloped and developing countries.[1] Approximately 80,000 rabies suspected animal contact cases are reported to the Ministry of Health in our country each year.[2] Even though mortality has been reduced with precautions over the last twenty years, our country is the only European country where dog rabies still occurs.[3] Due to more intensive animal husbandry and lower socioeconomic level compared to other regions, the East Anatolia Region is at critical risk.[4]

In our country, it has been reported that rabies vaccine and rabies immunoglobulin (Ig) usage is unnecessarily high for rabies post-exposure prophylaxis applications.[2,4-6] The World Health Organization (WHO) has categorized rabies suspected animal contacts into three categories and stated the recommended prophylactic approaches to be administered for each category.[7] In our country, post-exposure prophylaxis is administered according to the "Rabies Prevention and Control Directive" published by Basic Health Care General Management, Ministry of Health.[8] There are local studies that have evaluated post-exposure applications for rabies vaccine centers in our country, especially in the last decade. However, there are limited studies evaluating prophylactic applications according to WHO prophylaxis instructions.

This study aims to evaluate the features of rabies suspected animal contact cases which applied to the emergency department and the appropriateness of post-exposure prophylaxis procedures applied to these cases in light of the WHO instructions.

Material and Methods

This study was performed at the second base emergency department of Kars State Hospital, where approximately 210,000 patients are admitted per year. Approval from the local ethical committee was obtained before the study began. Rabies suspected animal contact was defined as all wild and domestic animal bites and scratches, and also contamination of mucous membrane or broken skin with saliva. All patients who applied to the emergency department between August 2012 and December 2013, and were assessed as rabies suspected animal contact cases were included in the study. Patients' data were obtained by a retrospective scan of patient files, records from the hospital automation system named Sisoft HBYS, and "Rabies Suspected Animal Contact Cases Examination Form". Patients with missing data were excluded from the study.

Demographic information, legal domiciles of patients, time till application to the hospital, kind of animal contacted, facts about animal's vaccines and owner, forensic notification requirements of the case, type of contact, number and localization of injuries, treatments, and prophylaxis applications were all recorded on the data collection form. Recommended post-exposure prophylaxis depended on contact categories suggested by the WHO are given in Table 1. The post-exposure prophylaxis measures recommended by the WHO were compared to the prophylactic applications which were actually administered to the patients in the emergency department.

Statistical analyses were performed with "Statistical Package for Social Sciences (SPSS) for Windows version 21.0" (SPSS Inc., IL. USA). Quantitative data were described as the number of observations and their percentages (%), and qualitative data were marked with their mean±standard deviation (SD) or median (minimum-maximum). Statistical analyses were performed by chi-square test. In our results, $p<0.05$ was considered significant.

Results

During the study, of 515 rabies suspected animal contact cas-

Table 1. Rabies suspected animal contact categories by WHO and recommended post-exposure prophylaxis applications

Categories of contact with suspect rabid animal	Post-exposure prophylaxis measures
Category 1	
Touching or feeding animals, licks on intact skin	None
Category 2	
Nibbling of uncovered skin, minor scratches or abrasions without bleeding	Immediate vaccination and local treatment of the wound
Category 3	
Single or multiple transdermal bites or scratches, licks on broken skin; contamination of mucous membrane with saliva from licks, contacts with bats.	Immediate vaccination and administration of rabies immunoglobulin; local treatment of the wound

Table 2. Range of rabies suspected animal contact cases according to age groups

Age groups	n	%
Age 0-5	84	16.3
Age 6-10	96	18.6
Age 11-18	125	24.3
Age 19-35	147	28.5
Age 36-65	39	7.6
Age 66 and older	24	4.7

Table 3. The features of contacted animals

	n	%
Species of contacted animals		
Dogs	438	85
Cats	55	10.7
Mice	6	1.2
Cows	5	1
Horses	4	0.8
Others	7	1.3
Owner of animals		
Known	281	54.6
Unknown	234	45.4
Vaccination of animals		
Vaccinated	49	9.5
Unknown	466	90.5

es who applied to the emergency department, 383 (74.4%) were male and the average age of all patients was 28.5±20.1 years old (range: 1-99-years-old). The number of cases according to age groups is given in Table 2. We found that rabies suspected animal contact subgroup eighteen-years-old and younger (n=305, 59.2%) was more than the subgroup over eighteen-years-old (n=210, 40.8%) (p=0.0001).

Of all the cases, 248 (48.2%) were from urban areas and 267 (51.8%) were from rural areas (p=0.466). In 336 cases (65.2%), the patient applied in the first 24 hours after contact and in 131 cases (25.4%), the patient was not seen until at least 24 hours after animal contact. We could not determine the length of time that passed between contact and application for 48 cases (9.3%). In the rural subgroup, applications within the first 24 hours (n=176, 65.9%) after the contact were more than the ones after 24 hours (n=67, 25.1%) (p<0.0001). In the subgroup of patients eighteen-years-old and younger, 154 (70.3%) applied in the first 24 hours after contact and 52 (23.7%) applied after 24 hours (p<0.0001). Only seventeen

Table 4. The features of injuries after rabies suspected animal contact

	n	%
Depth of the wound		
Surface	335	65
Deep	180	35
Part of the injury		
Head-Neck	40	7.8
Torso	52	10.1
Upper extremity	271	52.6
Lower extremity	224	43.5
Kind of injury		
Bite	307	59.6
Abrasion	119	38.6
Laceration	88	17.1
Ecchymosis	15	2.9
Amputations	2	0.4

Table 5. Treatments applied to rabies suspected animal contact cases in the emergency department

Treatments	n	%
Wound suture		
Required	86	16.7
Not required	429	83.3
Tetanus prophylaxis		
Applied	320	62.1
Not applied	195	37.9
Rabies prophylaxis		
Only Rabies vaccine	299	58.1
Rabies vaccine and rabies Ig	216	41.9

cases (3.3%) needed forensic notification. The features of contacted animals are given in Table 3 and the features of injuries sustained after rabies suspected animal contact are given in Table 4. In 12.8% of cases (n=66), the patient had multiple injuries on one or more body parts.

Treatments applied to rabies suspected animal contact cases in the emergency department are listed in Table 5. Upper extremity injuries (n=46, 53.5%) needed sutured most frequently. All rabies suspected animal contact cases which applied to the emergency department received the rabies vaccine. Cases in the subgroup aged between 19 and 35-years-old (n=59, 27.3%) were most commonly administered both the rabies vaccine and rabies Ig.

Table 6. Comparison of prophylaxis approaches suggested by WHO and those performed in the emergency department after rabies suspected animal contact

	Applied prophylactic treatments	
Classification by WHO	**Rabies Vaccine**	**Rabies Ig**
Category 1	Applied in 8 cases (1.5%) unnecessarily	Applied in 1 case (0.2%) unnecessarily
Category 2	—	Applied in 31 cases (6%) unnecessarily
Category 3	—	Not applied in 191 cases (37%) even though they needed it

When cases were categorized according to the rabies suspected animal contact categories suggested by the WHO, 8 cases (1.6%) had category 1 injuries, 129 cases (25%) had category 2 injuries, and 378 cases (73.4%) had category 3 injuries. There were far more category 3 cases than the others ($p<0.0001$). The comparison of prophylactic applications recommended by the WHO and what was performed in the emergency department are given in Table 6. In light of post-exposure prophylaxis approaches suggested by the WHO, 230 of all cases (44.7%) were administered inappropriate prophylaxis.

Discussion

Rabies is a fatal viral encephalitis that is contagious from infected animals.[8] Post-exposure prophylactic procedures include wound disinfection, vaccination, and Ig applications.[9] In developed countries, rabies is only found in wild animals, so vaccination rates and Ig applications are very low.[10] But in developing countries, due to pets passing on the disease, there are differences in prophylaxis applications.[11] In terms of standardizing applications, especially for developing countries, the WHO suggests deciding on prophylactic procedures after classifying injuries.[7]

This study aims to evaluate the features of rabies suspected animal contact cases in the emergency department of a city with animal husbandry, and the appropriateness of applied prophylaxis approaches compared to WHO recommendations. In 44.7% of the cases in our study, prophylaxis was inappropriately applied with respect to WHO recommendations. Unnecessary rabies Ig applications (6%) for category 2 injuries were the most common unnecessary applications. Gülaçtı et al. reported that 9.8% of cases had unnecessary rabies vaccine and 6.2% had unnecessary rabies Ig.[5] Song et al. found that category 1 cases (12% of all cases), received unnecessary rabies vaccine.[12] In our study, all suspected contact cases received the rabies vaccine. This result means that all the category 1 injury cases (1.5%) received an unnecessary rabies vaccine. The rate of contact cases being included in a vaccination program was very low in developed countries. Moran et al. reported 6.7% of cases and Long et al. reported that 1.7% of cases were included in a vaccination program in their studies.[10,13] This rate has been reported at 95% or more in our country.[2,4,6,11] We thought that unnecessary rabies vaccines and Ig applications were administered because of the expectation of contact cases and so health personnel would feel secure against the disease. Another reason might be incorrect information, given by cases about prophylactic applications administered to people and animals in the past. Each rabies vaccination program costs between 50 and 100 US dollars.[11] If rabies Ig costs are added, unnecessary prophylaxis applications bring huge economic losses in developing countries such as ours. At the same time, each unnecessary application poses a risk of side effects, which include serious anaphylactic reactions.[8]

Song et al. reported incomplete prophylactic approaches in 27.6% of all cases.[12] Kamoltham et al. found that just 4% of category 3 injuries received rabies Ig, and that result was supported by the fact that there is not enough Ig in Asian countries.[14] We found that 37% of cases had inadequate rabies Ig, in spite of having a category 3 contact. Because the Ministry of Health provides enough rabies Ig in our country, lack of information and the inexperience of health personnel might be the cause of missing rabies Ig administrations.

Category 3 injuries were more common than the other injuries in this study and the difference was statistically significant ($p<0.0001$). Song et al. found that category 3 injuries were 63.3% of total cases, while category 1 injuries were only 6.3%.[12] In literature, the rate of category 3 injuries is higher in countries where animal husbandry is common. Kamolthom et al. observed that 73% of all cases in Thailand were category 3 injuries and Chhabra et al. found the rate was 78.8% in India.[14,15] Gülaçtı et al. reported in their study (which was the only one in our country containing WHO classifications), that 76.8% of cases were category 3 injuries.[5] Many people work with animals for long periods of time in our city, where animal husbandry is a source of income,

which could explain why category 3 injuries were so common in our study.

In this study, we found that men (74.4%) and children (59.2%) experience rabies suspected animal contact most frequently. According to data from the WHO, boys under fifteen-years-old generate 40% of the suspected contact cases in developing countries.[7] Song et al. found this rate was 25%.[12] Eslamifar et al. reported that the rate of cases in those younger than twenty-years-old was 28.8%.[16] In a study conducted in the middle region of Anatolia, Gündüz et al. found the rate of cases for those under eighteen-years-old was 45.5%.[17] Kılıç et al. found the rate of cases for those under twenty-years-old was 43.5% in their study, performed in Western Anatolia.[18] But in Eastern Anatolia, where animal husbandry is more common, rates for those under eighteen-years-old (50% or more) was even higher than WHO data.[6,11] Like other studies in our region, we found that patients under eighteen comprised 59.2% of all cases. We believe that educational and socioeconomic differences of countries and regions cause different data in age ranges.

The WHO specifies that people living in rural area have more risks involving rabies and rabies suspected animal contact.[7] Song et al. related this to crowded population, low rate of animal vaccination, inadequacy of education, and poor economic conditions.[12] In our country, when socioeconomic levels decrease and animal husbandry increases, rabies application rates from rural areas increase. Erkal et al. found in their study, performed in the capital city, that 7% of applicants were from rural areas.[19] Temiz et al. found this rate was 47% in their study, which was performed in the eastern side of our country.[11] Like other studies in our region, 51.8% of our cases were from rural areas. Göktaş et al. observed in their study, performed in a western city, that 73.9% of cases applied to the emergency department within 24 hours after animal contact.[20] But in the study, performed by Temiz et al. in a city where animal husbandry was very common, this rate increased to 85.2%.[11] These rates made us think that regional differences affect social sensitivity. In our study, there were significantly more cases that applied to the emergency department from rural areas within 24 hours after contact (n=176, 65.9%) than those that applied more than 24 hours after contact ($p<0.0001$). This result shows that despite inadequate education in rural areas, people are more sensitive to rabies there. Increased exposure and possibility of animal contacts due to intensive animal husbandry in rural areas gives people more experience with diseases related to animals. This could explain why people are more sensitive to rabies there.

In this study, dog contacts (85%) were far more common than other animal contacts. In prior studies in our country, it was revealed that approximately half of all rabies suspected contact cases applied to hospitals after contact with animals, especially dogs with no owner.[4,5,20] In our study 45.4% of contacted animals had no owner. This shows that those animals, especially dogs, pose huge risks for public health in our region. Although 54.6% of contacted animals had owners, just 9.5% of them were vaccinated. Pets are the main source of disease in developing countries such as ours, so pet owners should be educated about this subject and diligent in administering vaccines for their pets on a regular basis.

Limitations

Because of our study was retrospective, there may be incorrect or missing data. Also, because there are differences in educational, socioeconomic, and cultural levels in various regions, we cannot generalize our results for the entire country. This is the most important limitation in our study.

Conclusion

We observed that 44.7% of cases received inappropriate post-exposure prophylaxis according to WHO instructions. Besides unnecessary vaccine and Ig applications, there were also missing prophylaxis procedures. Updating the current "Rabies Prevention and Control Directive", plus educating and controlling healthcare personnel on a regular schedule may help prevent inadequacies in prophylactic applications.

Conflict of Interest

The authors declare that there is no potential conflicts of interest.

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