



Evaluation of Our Rabies Prevention Practices: Is Our Approach Correct?

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Abstract

Background: Rabies disease is zoonotic disease-causing encephalitis and resulting in death. It is possible to prevent the disease with suitable prophylaxis approaches. This study examined the compliance of post-exposure prophylaxis approaches with the guidelines and the reasons for non-compliance in contact cases at risk of rabies.

Methods: This retrospective cross-sectional study includes patients who continued the vaccination program from 2014-2018 at the Ordu University Medical Faculty Hospital Rabies Vaccination Center in Ordu, Turkey. Cases were assessed in terms of sociodemographic features, previous rabies vaccination history, features of the contact with rabies risk, attendance duration after contact, and whether all stages of prophylaxis were completed after contact.

Results: Of the 748 cases attending the vaccination center, the age range was 1- 91 yr, with a mean age of 28.12 ± 21.60 yr. Of cases, 62.3% were male (n =466) and 37.7% were female (n =282). Of risky contact, 60% comprised stray animals. Of recorded cases, 55.2% displayed approaches compatible with guidelines. Among incompliant approaches, the most frequent was administering vaccines even though observation was sufficient. (n = 174, 52%).

Conclusion: Contact with risk of rabies may result in insufficient administration of the stages in prophylaxis after contact, or contrarily, mistaken administration based on acting with a sense of excessive safety. Stray dogs or domestic animals without sufficient vaccinations comprise a significant risk despite all efforts. In order to prevent risky contact, there is a need for the development of correct strategies and to ensure continuity of in-service training for health professionals.

Keywords: Rabies; Postexposure prophylaxis; Prophylaxis compliance; Turkey

Introduction

Rabies is a zoonotic viral infection caused by *Lys-savirus* from the *Rhabdoviridae* family and progresses in the form of encephalitis (1). It is transmitted by the bite of an infected animal. It is a 100%

deadly disease requiring mandatory prophylaxis in exposure situations. Turkey is located among endemic countries in terms of rabies. Annually more than 200,000 rabies risk contacts are re-



ported, and a mean of one or two rabies cases are observed every year. When animal species with rabies identified are assessed, more than 90% are domestic animals, and the highest percentage comprises dogs (2). The Centers for Disease Control (CDC) and Advisory Committee on Immunization Practices (ACIP) state the necessity to administer prophylaxis in the shortest duration after contact to people exposed to the rabies virus, and the essential components of this prophylaxis are rapid and complete wound cleaning and categorizing patients to determine the need to administer cell culture-derived rabies vaccine and/or human rabies immunoglobulin (Ig) in suitable patients (3). In Turkey, rabies prophylaxis administration was notified to health workers with field guides published in 2001, 2014, and 2019 and given a legal basis with directives.(2). The ACIP reported that the administration of four doses was sufficient instead of five in 2010. In our country's guidelines, this recommendation began to be applied starting from 2019. In this article, our assessment was performed in line with the 2014 country guidelines. In this guideline, injuries with immunoglobulin indications were recommended to have four doses, while those in other categories were recommended to have five doses of the vaccine. This study investigated cases where prophylaxis was applied after exposure and determines its compliance with the guidelines.

Materials and Methods

This retrospective cross-sectional study included patients in the rabies vaccination program. The cases that received post-exposure prophylaxis from 2014-2018 in Turkey, Ordu province, Ordu University Medical Faculty Rabies Vaccine Center were evaluated. Cases receiving vaccination at another center and implementations after the local 2019 field guidelines entered use were excluded from the study. Data for the assessment were retrospective, obtained from monitoring forms stored in the vaccination center.

All cases of adults and children receiving vaccinations were assessed in terms of sociodemographic features, previous rabies vaccination history, type of rabies risk contact, duration between contact and attending hospital, and whether all stages of prophylaxis were completed after contact.

The type of rabies risk contact was recorded as the animal causing contact, exposure type, whether the animal was owned or not, whether it was vaccinated, and whether observation could be implemented. In Turkey, stray cats and dogs are found without owners and regular rabies vaccination. Risk contacts with these animals were defined as stray animal contact. The prophylaxis stages after contact were categorized according to the 2014 field guide and assessed. The recommendations for post-exposure prophylaxis (PEP) stages are classified as wound cleaning, tetanus immunization status, antibiotic prophylaxis recommendation in patients, if necessary, and rabies vaccination and/or immunoglobulin administration. In line with this information, the compliance of implementations was assessed with the 2014 field guide, which was valid in this period. In our study, the assessment included whether approaches in the first three stages were applied or not. Rabies vaccination and immunoglobulin administration were separately assessed, and deficient or erroneous administrations were determined and defined as 'incompliant approach'.

The statistical package program SPSS for Windows, ver.22 (IBM Corp., Armonk, NY, USA) was used for the calculations. Means and standard deviations were obtained for continuous variables, while categorical variables were summarized using frequency and percentage. When analyzing the study data, a comparison of qualitative data used the Pearson chi-square test. P -values<0.05 were accepted as statistically significant.

Local ethics committee approval was received for the study (No:26.09.2019/2019-32), and it was completed following the Helsinki Declaration.

Results

The mean age of 748 patients who applied to the vaccination center was 28.12 ± 21.60 yr, and the

age range was 1-91 yr. The characteristics and contact features of cases are shown in Table 1.

Table 1: Patient demographics (n=748)

<i>Variable</i>	<i>(n, %)</i>
Gender	
Female	282 (37.7)
Male	466 (62.3)
Age (Mean \pm SD)	28.12 \pm 21.60
Immunocompromised status	5 (0.6)
Season	
Spring	150 (20.1)
Summer	235 (31.4)
Autumn	207 (27.7)
Winter	156 (20.9)
Previous history of rabies prophylaxis	107 (14.3)
Suspected rabid animal type	
Dog	463 (61.9)
Cat	259 (31.6)
Wild animal	15 (2)
Bat	2 (0.3)
Other	9 (4.2)
WHO exposure category	(n, %)
I	38 (5)
II	493 (65.9)
III	217 (29.1)
Period between exposure-application	
Same day	598 (79.9)
1-3 d	138 (18.4)
4-7 d	9 (1.2)
8 d or more after exposure	3 (0.4)
Condition of the animal	
Owned	284(38)
Stray	449 (60)
Wild animal	15(2)
Vaccination status of the animal	
Vaccinated	125 (16.7)
Unvaccinated	159 (21.3)
Stray animal	449 (60)
Wild animal	15 (2)
10-day observation (dogs and cats)	325 (45)

Risky contact was most frequent in the 10-19 year age group (n=153, 20.5%). Five patients (0.6%) had immunosuppression history. Four patients received malignancy treatment, while one used immunosuppressive treatment due to renal transplantation. In the immunosuppressive group, prophylaxis stages were completed with-

out deficiency. The animal causing the most suspicious contacts was dogs (n=463, 61.9%), and this was significantly more than all other animal contacts ($P < 0.05$). The contact category was mostly category II (n=493, 65.9%). The rabies prophylaxis components after contact are presented in Table 2.

Table 2: Prophylaxis components

<i>Wound care</i>	<i>(n,%)</i>
Applied	719 (96.1)
Not applied	29 (3.9)
Tetanus immunization status	
Unknown	742 (99.2)
Incomplete or no vaccination	2 (0.3)
Complete vaccination	4 (0.5)
Tetanus prophylaxis	
Not administered	172 (23)
Vaccinated	575 (76.9)
Vaccinated and Ig administered	1 (0.1)
Rabies vaccine	
Administered	477 (63.8)
Not administered	271 (36.2)
Rabies Ig	
Administered	62 (8.3)
Not administered	686 (91.7)
Compliance with prophylaxis recommendations	
Suitable	413 (55.2)
Not suitable	335 (44.8)

When the compliance to rabies prophylaxis is assessed, 413 (55.2%) were compliant; however, 335 (44.8%) were non-compliant. The most common non-compliant approach was administering

vaccinations despite sufficient observation (n=174, 52%). Other non-compliant approaches are summarized in Table 3.

Table 3: Ineligibility rates and reasons

<i>Justification for ineligibility</i>	<i>n = 335</i>
Vaccine not required; observation is enough	174 (52)
Category 1 but vaccinated	33 (9.9)
Previously Vaccinated Persons continued after 2 doses	25 (7.4)
Five doses of vaccine applied	21(6.3)
Vaccination continued after observation	17 (5.1)
Ig not required but administered	13 (3.9)
Ig required but not done	7 (2.1)
Animal contact without prophylaxis requirement	3 (0.9)
More than one application error	
Ig required but not done + Five doses of vaccine administered	41(12.2)
Ig not required but made + Five doses of vaccine administered	1 (0.2)

Of the cases, 12.4% had two separate administration errors observed. Compliance was significantly higher when the contact animal was a dog, after contact with stray and wild animals, and for attendance in the 20 - 39 year age interval ($P < 0.05$). No rabies developed in patients followed up with risky contact. The tetanus immune status was unknown in 99.2% of the patients. However, 76% of the patients received the tetanus vaccine, and 0.1% received the vaccine and immunoglobulin.

Antibiotic administration and records related to wound site were not recorded on the vaccination monitoring form. Data about these topics could not be shared.

Discussion

Rabies is endemic in Turkey. Annually nearly 250,000 risky contacts in terms of rabies are reported, with a mean of one or two rabies cases seen every year (2). In our study, the group with the most prophylaxis administered after contact was the 10-19 yr age group. Many studies have observed the highest attendance in the young age group (4-6). The WHO data stated that 40% of all risky contacts involved children under fifteen. Globally, deaths linked to rabies most frequently affect the 5-14 yr age group (7). Risky contact was observed less until three years, especially with an apparent increase after this age. In our study, 4.1% of attendance was in the first three years, rising to 13.1% after four years. Precautions taken to intervene against rabies must pay attention to this age group. Especially until the age of three, risky contact is less, but after that, it increases significantly.

In similar studies, the male gender exposure rate was higher than that of females, and rates of %55.4-62.6% were reported (5,6). In our study, 62.3% of the patients who applied for prophylaxis were male. The highest animal bite incidence in males may be linked to outdoor activities and close contact with animals in rural areas. In the United States of America, this rate is reported to be inverted as women have higher rates of keeping domestic animals in the home (8).

Seasonally most risky contact occurs in the summer months (9,10). In our study, the highest attendance was in the summer months, followed by the lowest attendance in the winter months. The summer is when the human population is mainly found in open areas and the probability of contact increases.

In Turkey, 43% of animals with rabies identified are dogs. In our study, the highest rabies suspicious contacts occurred with dogs. Cats were in second place. Of contacts, 60% were due to stray unowned cats and dogs. Dogs take first place among risky contact in many regions globally (5,11,12). Considering the role of dogs in rabies transmission around the world, the importance of intervention with stray dogs is understood. There are programs attended by many Asian countries. The target is to prevent human deaths from dog rabies by 2030 (13). Of animals with owners, 56% did not have vaccinations, or the vaccination status was unknown. In studies in our country and the world, the vaccination rates of owned animals are low (14,15). We think it is necessary to provide training and make it mandatory that animal owners fulfill their responsibilities concerning this topic. Of our cases, 79% applied for prophylaxis on the same day. No difference was identified in prophylaxis compliance between attendance on the same day or later days. The compliance with prophylaxis after contact was identified as 55.2%. Our incompliant approach rates were very high. There are limited numbers of studies about compliance with PEP, with rates of 60-98% given (16,17). When studies worldwide are examined, the most frequent error is that Ig is not administered even if the vaccine is administered. Only 24.5% of cases with Ig indications had it administered (18). In our study, this rate was very low at 2.1%.

Contrary to world data, our study identified high vaccine and/or Ig administration rates when not required. This approach leads to the consideration that it may be related to clinicians feeling they must act more safely in terms of rabies or not allocating sufficient time to patients and just applying standard procedure. Another aspect of this unnecessary use is the high cost. In Turkey,

rabies vaccines are administered free of charge. However, a study in 2005 assessing the country's costs stated that rabies vaccination costs nine million dollars per year (19). Each excessive dose of vaccine and Ig means a severe increase in these costs.

Compliance with recommendations was significantly high when the animal causing contact was a dog, after contact with stray and wild animals, and for attendance in the 20-39 yr age interval ($P < 0.05$). No correlation was identified between other parameters with PEP compliance. The excess frequency of dog contact and dogs playing a significant role in rabies transmission affected this compliance. Factors related to patients and parameters affecting correct administration by health service providers should be researched.

Conclusion

Rabies is still an important public health problem worldwide. PEP is a process that requires careful management in all stages. Incorrect administration of PEP may result in vaccine failure, and the desired protective effect may not be provided. Contrarily, acting with an excessive sense of security will result in unnecessary administration and additional costs. We think it is necessary to act more carefully about PEP administration and to ensure continuity of in-service training. Accurate monitoring of PEP administration and understanding rabies epidemiology is important for better public health planning at state levels.

Journalism Ethics consideration

Ethical issues (including plagiarism, informed consent, abuse of power, data generation and/or fraud, duplicate publication and/or submission, redundancy, etc.) have been fully observed by the authors.

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Conflict of interest

The authors declare that there is no conflict of interests.

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