BRIEF REPORT

Where Do We Stand in the Control of Rabies? Knowledge and Practices Among Physicians in a Health District in Turkey

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Objective.—The aim of this study was to determine the level of knowledge of rabies transmission and control among physicians practicing in healthcare centers in Sanliurfa, Turkey where 2 cases of human rabies were reported in the past 12 months. Implementation issues regarding the current guidelines will also be discussed.

Methods.—A cross-sectional study was conducted among 84 physicians practicing in healthcare centers in Sanliurfa, located in the Southeastern Anatolian region of Turkey.

Results.—Among physicians, average duration of medical practice was 8.5 ± 6.7 years. The correct incubation period of rabies cases was known by 57.1% of the physicians. While 88.1% of physicians were aware of possible exposure routes, only 44.0% of them had the information that mucosal contact may also lead to transmission. While 96.4% of the physicians correctly indicated that cats and dogs can transmit the disease, the fact that foxes also have a role in transmission was known by only 48.8%. Post-exposure prophylaxis was correctly indicated by 65.5% of participants, but only 17.9% had correct information about pre-exposure prophylaxis.

Conclusion.—An important approach in rabies control is to increase community awareness, particularly among healthcare providers. It was found that basic management issues and insufficient awareness still exist despite the presence of legal regulations. To control rabies, the issue must be dealt with locally, through both economic and social means, by supporting rabies control efforts of local health and agricultural directorate managers and by encouraging collaboration with academics.

Key words: rabies, rabies control, viral zoonosis, Turkey

Introduction

Rabies is a viral zoonosis that produces fatal encephalitis in humans and other mammals, once clinical signs occur.¹ According to the 2007 report of the World Health Organization (WHO), rabies is seen in 103 countries around the world; 42 countries have zero incidence.² Dogs are the main source of human infections, and the WHO estimates that 55 000 humans die of rabies annually.¹

In Turkey, 247 human rabies cases were reported between 1980 and 2006. The epidemiology of human

rabies post-exposure prophylaxis (PEP) in Turkey was described as 143 915 cases (218.7/100 000 population) in 2006 as recorded by the Turkish Ministry of Health. The number of PEP cases reported in Sanliurfa in 2006 was 1331 (105.0/100 000 population).³ Sanliurfa, where this study was conducted, is located in the Southeastern Anatolia region of Turkey, one of the least developed regions of the country. In this region, the (total fertility rate is 4.19 and the mean number of children born to women ages 15–49 years is 6.61); education level is extremely low (63.2% of women and 39.3% of men are illiterate); and both access to healthcare and service utilization are limited (home delivery rate is 45.9% and the infant mortality rate is 38 per 1000 live births⁴).

Two human rabies cases in Sanliurfa were reported in 2009–2010. The first case, a 29-year-old man with symp-

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toms of high fever, general weakness, paresthesia of the right arm, hypersalivation, and dysphagia was admitted to Harran University Research Hospital (HURH) Infectious Diseases Clinic in April 2009 with a history of a dog bite in the rural area of Sanliurfa 5 months previously. The second case was an 8-year-old boy, also from a rural area and bitten by a dog 2 months previously, who was admitted to HURH with aerophobia, hydrophobia, hypersalivation, and dysphagia in January 2010. Neither case had received post-exposure prophylaxis. The diagnoses of rabies were confirmed by corneal smears that were positive for rabies virus antigen revealed by direct fluorescent antibody testing (Fujirebio, Malvern, PA, USA). Saliva samples also tested positive for rabies virus by reverse-transcriptase polymerase chain reaction (RT-PCR) assay.

In Turkey, the fight against rabies currently continues in accordance with the Directive of Rabies Prevention and Control, which was updated in 2005.⁵

This study was intended to determine the level of knowledge of rabies transmission and control among physicians practicing in health care centers in Sanliurfa, as 2 cases of human rabies were reported there in the past 12 months. Implementation issues regarding the current guidelines will also be discussed.

Materials and Methods

This is a cross-sectional study of 84 general practitioners in primary healthcare centers and hospitals in the Sanliurfa City Center.

Physicians were asked to complete a structured questionnaire prior to a seminar on rabies disease and prevention methods that was organized for general practitioners by the Sanliurfa City Health Directorate Educational Unit, University of Medical Faculty Infectious Diseases and Clinical Microbiology Department, and Public Health Department. All of the practitioners participating in the seminar agreed to complete the questionnaire, and verbal consent of physicians was obtained. The local ethics research committee affiliated with the University of Medical Faculty oversaw the study.

The first section of the questionnaire prompted demographic information (age, gender, institution of practice, and duration of occupational practice).

In the second section, 16 informative questions related to rabies disease, control, and prevention methods. These survey questions were prepared in accordance with WHO recommendations⁶ and with the Rabies Prevention and Control Directive that was issued and distributed to health institutions by the Turkish Ministry of Health.⁵ Two of the questions were open-ended and 14 were

multiple-choice questions. The above-mentioned sources were used in the evaluation of responses.

The total score required for the assessment of the information level was obtained by calculating the percentage of correctly answered questions. Those who scored above the average were classified as the high score group, while those below the average were considered as the low score group. For data analysis, the Statistical Package for Social Sciences, version 11.5 (SPSS for Windows, 11.5, SPSS Inc, Chicago, IL, USA) was used. Chi-square, Mann-Whitney U test, and descriptive statistics were applied.

Results

Of the 84 physicians participating in the study, 75.0% ($n = 63$) were male. Mean age was 33.4 ± 8.8 (min 24; max 62) years and mean duration of practice was determined as 8.5 ± 6.7 (min 1; max 34) years. Among the participants, 62.6% ($n = 61$) of physicians practiced in primary healthcare centers and 27.4% ($n = 23$) practiced in hospitals. Characteristics of the participants are presented in Table 1.

Among the participants, 56.0% ($n = 47$) reported that they routinely encounter patients exposed to animals potentially carrying rabies in the units where they practice. It was determined that the Rabies Prevention and Control Directive was present in 47.6% ($n = 40$) of healthcare centers at which the participants were practicing, but implementation in accordance with this directive was carried out by only 14.3% ($n = 12$) of physicians.

In Table 2, the percentages of correct answers about rabies and prevention methods are presented. The incubation period of the rabies cases was known by 57.1% of the physicians; 88.1% of the physicians were aware of

Table 1. The characteristics of participants

Gender	
Male	75.0%
Female	25.0%
Age (years)	
24–35	63.1%
36–45	26.2%
46+	10.7%
Working place	
Primary health care center	72.6%
Hospital	27.4%
Duration of practice (years)	
1–5	44.0%
6–10	22.6%
11+	33.4%

Table 2. Physician knowledge of rabies exposure and prevention

Questions	% Correct
Incubation period of rabies	57.1
Route of exposure	
Biting, scratching	88.1
Contact with urine/feces/hair of animal with rabies	91.7
Consumption of cooked meat/milk of animal with rabies	75.0
Mucosal contact	44.0
Source of exposure	
Cat, dog	96.4
Coyote, wolf	84.5
Fox, wild cat	48.8
Skunk, weasel	20.2
Sheep, goat, buffalo, horse	16.7
Not source of exposure	
Guinea pig, rabbit, squirrel	83.3
Mouse, rat, hamster	66.7
Rabies vaccine	
Is not administered following exposure with vaccinated animals	63.1
Can be administered safely to pregnant women	29.8
Can be administered safely to people with immunodeficiency	28.6
Rabies cannot be treated after symptoms arise	79.8
Knows the post-exposure prophylaxis schedule	65.5
Knows the pre-exposure prophylaxis schedule	17.9
Rabies/exposure to rabies suspects are mandatory reporting diseases	79.8

the exposure route (by scratching and biting), but only 44% of them knew that mucosal contact may also lead to transmission.

The fact that cats and dogs transmit the disease was correctly indicated by 96.4%, while the role of foxes in transmission was correctly indicated by only 48.8% of the physicians. The use of PEP was recognized by 65.5% of participants, but only 17.9% had correct information about pre-exposure prophylaxis (PrEP).

Questions about the number of vaccine doses required by an individual who had previously been given rabies immunoglobulin and full course of PEP and then rebitten by a dog within 1 year was correctly answered by 40.5% ($n = 34$) of the participants; 10.7% ($n = 9$) indicated that they had no information about it.

In cases where rabies immunoglobulin is not available, implementation of the 2.1.1 rabies vaccine schedule, an alternative regimen recommended by the World Health Organization, was correctly indicated by only 38.1% ($n = 32$) of the physicians.⁶ In this regimen, 2 doses are given

on day 0 in the deltoid muscle, right and left arm, and additional doses are given on day 7 and day 21.

The question on the collaboration between sectors in case of rabies—namely, “When a human rabies case is diagnosed, City Health Directorate and City Agricultural Directorate should work mutually to take necessary precautions”—was correctly answered by 70.2% ($n = 59$).

Younger physicians had higher scores than older ones. The average age for the high and low scoring groups was 31.6 ± 7.3 and 35.4 ± 10.1 years, respectively. The difference was found to be statistically significant (M-W U: 658.5, $p = 0.047$). There was no significant difference between scores and other characteristics of the physicians including gender, institution of practice, duration of occupational practice, and encountering patients exposed to animals potentially carrying rabies ($P > .05$ for all comparisons).

Discussion

Rabies is a viral zoonotic disease that is fatal when untreated. The majority of rabies endemic countries are some of the least developed, have few resources for healthcare, and provide limited access for rural populations.¹ As a precaution to prevent rabies, people are being prophylactically vaccinated against rabies in some areas, and animals are also being immunized by oral or parenteral vaccines.⁷ Domestic animals, mostly stray dogs in urban areas, are still the cause of human rabies in most developing countries such as Turkey. Thus, all bites carry a potential risk for rabies.

The WHO recommends 2 methods for prophylaxis of rabies in humans.⁷ In the first method, prophylaxis before exposure (PrEP) is usually administered to veterinary physicians and laboratory personnel working in rabies investigation laboratories, and to animal handlers. With the increase of travel to rabies-endemic countries, it is also recommended that individuals traveling to such regions be vaccinated before potential exposure.⁷

The second method adapts PEP; in areas where rabies has not been eradicated, vaccine and immune globulin are administered following a contact or bite of an animal suspected to carry rabies (ie, stray animals, unvaccinated domesticated animals, or wild animal populations known to be carriers).⁷

In Turkey, a national program for the control and eradication of human and animal rabies has been adopted since 1987, and the Directive of Rabies Prevention and Control was updated in 2005.⁵ Thirty-four human rabies cases were reported in 1980 with a mortality rate of 0.77/1 000 000 by the Ministry of Health of Turkey. In the same report, there was only 1 human rabies case in 2006 (0.02/1 000 000).³ According to national data be-

tween 1992 and 2007, the city of Sanliurfa was second behind Istanbul in the number of humans receiving rabies PEP⁸ (Istanbul, population 12.8 million, is the most populous city in Turkey, while Sanliurfa, with approximately 1/27 the population or 482 000, is the seventh). Since 1987, important measures have been adopted regarding rabies control. Nevertheless, PEP administration, most often indicated in cases of dog bites, is not routinely provided despite adopting these measures.

PEP was not applied to the 2 human rabies cases reported within the past 12 months in Sanliurfa. These cases show that there are still important issues in the implementation of the rabies control program, despite the fact that it has been established in Turkey for many years. The education level about rabies in the community is not sufficient as indicated by the management of the 2 recent cases reported. A study conducted in Sri Lanka found that the level of knowledge regarding rabies was lower in individuals living in rural areas than in urban regions.⁹

More striking than a lack of knowledge among individuals that was found in the Sri Lankan study is the lack of knowledge about exposure and prevention of rabies among physicians in this study. Younger physicians had higher scores than older ones, possibly due to more recent completion of medical training and more recent review of information about rabies. Medical education about life-threatening infections like rabies, including the preventive and therapeutic interventions available, should continue life-long. Our findings provide some important gaps in physician knowledge that should be addressed during future postgraduate training. In a study conducted among German physicians and pharmacists, it was determined that participants are informed about the seriousness of disease and risk of infection related to rabies.¹⁰ Nevertheless, guidance errors were found regarding pre- and post-exposure vaccination and that currently existing information is not sufficiently clear to be implemented by these practitioners in daily life.¹⁰

Globally, avoiding domestic animal bites, especially from dogs without owners, is essential in the prevention of human rabies. In more than 99% of all human rabies cases, the virus is transmitted from dogs; half of the global human population is considered at risk of contracting rabies.⁷ As a result, in Japan and some countries in Latin America (Uruguay, Chile), human rabies cases have been prevented by the elimination of rabies in dogs.¹

To prevent animals from rabies infection, safe and efficient vaccines have been developed. Vaccination coverage of 70% has been sufficient to control canine rabies in several settings.⁷ Canine rabies control programs

should incorporate epidemiological surveillance, mass vaccination, and dog population control.⁷

In a study conducted in the general population in Sri Lanka, 90% of dog owners indicated that dogs are important reservoirs of rabies virus, 79% indicated that the disease carries a fatal prognosis, and 88% indicated that prevention of disease is possible through immunization. In the same study, it was found that pet owners tend to be more cooperative in rabies control activities than non-pet owners.⁹ The fact that the knowledge level of dog owners is high, even though not complete, indicates that stray animals carry more risks in terms of prevention and control programs. According to many rabies prevention programs, the killing of animals is recommended only when rabies has been diagnosed. It has been shown that the killing of animals by itself without a vaccination program is not sufficient to eradicate rabies. According to the regulations in Turkey, it is the responsibility of municipalities or the corresponding authorities in villages to build animal shelters, to keep animal registries, and to implement vaccinations.¹¹ However, it is impossible to solve this issue solely by regulations and guidelines, as issues such as feeding, transportation, vaccination, and sterilization of animals cannot always be implemented fully due to social, cultural, and economic obstacles.⁷ In Turkey, the number of humans receiving rabies PEP is high,⁸ possibly due to the high number of stray and unvaccinated animals. Unfortunately, the number of stray and/or unvaccinated animals in Turkey is not known. Especially due to the financial burden required to carry out vaccination and prevention programs, full support of political will is required to achieve successful results in implemented programs. In this respect, handling of the issue by the use of public resources seems reasonable. Accordingly, a project supported by the European Union was initiated in Turkey as of 2006, titled "Control of Rabies Disease in Turkey."¹² While oral rabies vaccine is being administered to foxes in the Aegean region, parenteral vaccine is administered to all owned and stray cats and dogs all over the country. Despite implementation of this program, there remain too many unvaccinated cats and dogs in the country, either domestic or stray.

Likely, the most important method in rabies control is to increase community awareness. Community awareness of all aspects of rabies is generally lacking or limited.⁷ The fact that PEP was not implemented in the human rabies cases discussed here is an important evidence of this deficiency. Basic issues regarding disease transmission, recognition, and treatment are still inadequate in spite of recommended measures and legal regulations. Handling the issue on a local basis, both in terms of economical and social aspects, supporting the

rabies control activities of local health and agricultural directorate managers with municipalities, and encouraging collaboration with academics is required in the control of rabies.

Although a directive in rabies control and prevention is available in Turkey, most physicians do not follow or apply it. The implementation of this directive should be checked regularly by the authorities. Physicians as well as the public should be educated on an ongoing basis about the important relevant data in prevention and control of rabies through public seminars and educational press releases. Perhaps ongoing physician continuing medical education is necessary particularly in communities with high rates of rabies cases.

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