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Assessment of Emergency Service Attendance Due to Rabies Suspect Animal Bites in the Van Region

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Abstract

Aim: Rabies is a zoonotic viral disease transmitted by the bite of an animal. In Turkey, 100,000 individuals are administered prophylaxis annually after contact with animals carrying the risk of rabies. In this study, we investigated compliance with treatment and the affecting factors.

Materials and Methods: The study assessed data from a total of 813 patients with potential animal bites throughout the year 2013.

Results: The mean age of participants in the study was 22.6±16.8 years, and 80.6% (n=655) were male. Participants of both sexes mainly attended in the spring and summer months; however, it was identified that the rate of women attending in winter was higher than men. Also, five doses of vaccination were ordered for nearly all patients, independent of immunoglobulin administration; however, the rate of patients completing all five doses remained at about 30%.

Conclusion: Increasing awareness of rabies will aid in the control of the significant public health problem of potential bite cases. As the young population is at risk, it is necessary to take precautions for the childhood age group.

Keywords: Emergency service, rabies, animal bites

Introduction

Rabies disease is a zoonotic viral disease transmitted by bites from an animal with rabies. The rabies virus is a bullet-shaped, single-chain, negative-strand RNA virus from the Rhabdoviridae family. Clinical symptoms progress with acute encephalitis, causing mortality in humans and animals (1,2). According to the 2010 World Health Organization (WHO) data, it is reported in more than 150 countries. The most important source of transmission to humans is the animals living in close surroundings. Some carnivores and bats are natural reservoirs, but 99% of transmission to humans occurs via dogs (3,4).

Deaths linked to rabies in many countries are not reported, especially in the young age group (4). Additionally, a significant portion of the 55,000 annual deaths occurs in Africa and Asia. It is observed in every age group, but children under the age of 15 years are the at-risk group. Of vaccinations linked to potential bites from rabid animals, 40% are administered to the 5-14-year age group. It is known that the male gender is dominant in the vaccinated population (5). Beginning with fever and frequently pain and paresthesia around the wound, rabies disease develops with encephalitis progressing to mortality after the virus spread through the central nervous system. Within a few days, death is observed after cardiovascular arrest (4,6,7). Rabies disease with paralytic progression is less dramatic and lasts longer, but

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mostly results in death. Paralytic rabies disease is frequently not reported due to a lack of diagnosis (4).

As there is no effective treatment for rabies, prophylaxis after contact is very important (8). Prophylaxis with vaccinations prepared in modern tissue and rabies immunoglobulin (RIG) after contact with rabies ensures close to 100% success with accurate dose administration at the right time. WHO has a broad spectrum concerning prophylaxis after contact, including the Essen regimen. The Essen regime recommends intramuscular administration of 5 doses of human diploid cell rabies vaccine (on days 0, 3, 7, 14, 28) in addition to RIG. The Center for Disease Control (CDC) in 2009 did not include the dose on the 28th day in the regime and modified it to four doses and RIG. There are studies showing compliance to four-dose treatment is better than compliance with five-dose treatment (9-11). In the literature, after the first administration, compliance appears to reduce linked to factors such as forgetting, missing or neglecting, patient's health status, age, and gender (12-15).

Vaccinations produced from cell cultures and produced from embryo egg cell cultures are used around the world. Apart from the vaccine, there are two types of RIG used for rabies prophylaxis; the human RIG (HRIG) with a recommended dose of 20 IU/kg and the RIG (ERIG) used at 40 IU/kg dose. According to the recent recommendations of WHO and CDC, if the wound is anatomically suitable, the full dose RIG should be administered around the wound (16).

Together with a reducing trend in human cases through the years, animal cases continue to represent a significant problem. In Turkey, 100,000 people are administered prophylaxis annually after contact with animals at risk of rabies (17). Rabies prophylaxis is completed following the Rabies Protection and Control Regulation by the Ministry of Health General Directorate of Primary Health Care. Rabies vaccines and RIG are acquired under state authority.

Monthly mean 70-80 and annually 800-900 cases attend our clinic with potential animal bites. 98% of them received immediate prophylaxis. Due to the high mortality of rabies disease, the number of individuals receiving prophylaxis may be higher than necessary. As a result, this is significant for the efficacy of the vaccine and side effects. Currently, the side effects linked to the vaccine are less severe and very rare, varying according to the origin of the vaccine (18-22).

The necessity for regular administration of the prophylaxis regime and the side effects of the vaccine affect individual compliance. In this study, the compliance and factors affecting the compliance of patients receiving prophylaxis after attending our clinic with a preliminary diagnosis of potential rabid animal bites were investigated.

Materials and Methods

The study was completed with information obtained from patients attending the emergency service of an education and research hospital in the Van region from 01.01.2013 to 31.12.2013. The study assessed data from a total of 813 patients. The type of contact (bite, scratch, splash in the mucous membranes, etc.) and the condition of the animal (breed, vaccination status, etc.) are taken into consideration.

Statistical Analysis

Statistical analyses used the SPSS version 15 software. Statistical significance was accepted as $p<0.05$. Descriptive statistics such as age were given as mean ± standard deviation. Categorical variables, such as gender, planned dose of vaccine, the dose of vaccine administered, immunoglobulin administration, etc. were given as numbers and percentages.

Results

Our study assessed the data from a total of 813 patients, 80.6% male (n=655) and 19.4% female (n=158). The demographic data and treatment characteristics of participants in the study are summarized in Table 1.

The differences between the sexes in terms of demographic characteristics and clinical parameters are summarized in Table 2. Accordingly, participants of both sexes mainly attended in spring and summer; however, it is notable that the proportion of females attending in winter was elevated compared to males. There was no statistically significant difference observed among participants in terms of residential areas and planned and administered vaccine doses.

The distribution of planned and administered vaccine doses according to immunoglobulin administration is shown in Table 3 for study participants. As suggested by the Essen regime, five doses of vaccination were planned for nearly all of the patients, independent of immunoglobulin administration; however, only 30% of patients completed all five doses.

Discussion

Rabies is one of the zoonotic diseases progressing with mortality that threatens the whole world (23,24). Rabies is a serious health problem, especially in developing countries like Turkey. Despite reductions in frequency due to the Ministry of Health vaccination and prophylaxis protocols, it is still an important disease vector in regions with low socioeconomic status and in provinces with

Table 1. Demographic and clinical characteristics of the study group

		Mean	SD
Age mean ± SD		**n (22.6)**	**(16.8)%**
Sex	**Male**	655	80.6
	Female	158	19.4
Residence	**Center**	455	56.5
	Periphery	350	43.5
Month of attendance	**January**	70	8.6
	February	65	8.0
	March	58	7.1
	April	53	6.5
	May	83	10.2
	June	96	11.8
	July	103	12.7
	August	84	10.3
	September	71	8.7
	October	53	6.5
	November	34	4.2
	December	43	5.3
Immunoglobulin administration	**Yes**	495	61.2
	No	314	38.8
Planned vaccination dose	**1 dose**	1	0.1
	2 dose	1	0.1
	4 dose	6	0.7
	5 dose	804	99.0
Dose administered	**1 dose**	76	9.4
	2 doses	87	10.7
	3 doses	204	25.2
	4 doses	173	21.3
	5 doses	271	33.4

SD: Standard deviation

Table 2. Distribution of demographic and clinical characteristics of the study group according to sex

Mean (SD)		Male	Female	p
		Mean (SD)		
AGE mean ± SD		21.7 (15.7)	26.1 (20.5)	0.232
Residence	**Center**	363 (56.1)	92 (58.2)	0.629
	Periphery	284 (43.9)	66 (41.8)	
Month of attendance	**January**	62 (9.5)	8 (5.1)	**0.02**
	February	44 (6.7)	21 (13.3)	
	March	50 (7.6)	8 (5.1)	
	April	41 (6.3)	12 (7.6)	
	May	59 (9.0)	24 (15.2)	
	June	74 (11.3)	22 (13.9)	
	July	83 (12.7)	20 (12.7)	
	August	70 (10.7)	14 (8.9)	
	September	59 (9.0)	12 (7.6)	
	October	49 (7.5)	4 (2.5)	
	November	28 (4.3)	6 (3.8)	
	December	36 (5.5)	7 (4.4)	
Immunoglobulin administration	**Yes**	401 (61.6)	94 (59.5)	0.626
	No	250 (38.4)	64(40.5)	
Planned vaccination dose	**1 dose**	-	1 (0.6)	-
	2 dose	-	1 (0.6)	
	4 dose	3 (0.5)	3 (1.9)	
	5 dose	651 (99.5)	153 (96.8)	
Dose administered	**1 dose**	64 (9.8)	12 (7.6)	0.246
	2 doses	76 (11.6)	11 (7.0)	
	3 doses	157 (24.0)	47 (29.9)	
	4 doses	142 (21.7)	31 (19.7)	
	5 doses	215 (32.9)	56 (35.7)	

SD: Standard deviation

Table 3. Distribution of vaccination administration according to immunoglobulin administration

n		Immunoglobulin (+)		Immunoglobulin (-)	
		%	n	%	
Planned vaccination dose	**1 dose**	1	0.2	-	-
	2 dose	-	-	1	0.3
	4 dose	1	0.2	5	1.6
	5 dose	493	99.6	307	98.1
Dose administered	**1 dose**	45	9.1	31	9.9
	2 doses	46	9.3	41	13.1
	3 doses	125	25.3	79	25.3
	4 doses	111	22.4	62	19.9
	5 doses	168	33.9	99	31.7

intense animal husbandry. Due to the disease being a significant public health problem, primary protection is essential. Animals suspected of having rabies should be removed from the environment, and individuals living in risky regions should be informed about this topic. Primary protection is not always sufficient for rabies disease. Vaccination after contact is crucial.

In our study assessing the rabies prophylaxis regime and treatment compliance of patients attending our clinic with suspect animal bites and rabies suspicion, data from 813 patients were investigated. The mean age of patients beginning treatment was 22.6±16.8 years. Of the cases in our study, 39.1% were aged 11 years or younger, and 54.4% were aged 18 years and older. Another study investigating patients attending the emergency service found that 54% of patients were aged 18 or younger (25).

As seen in studies, the young age group is at risk of this disease, but there was no correlation identified with age. Additionally, attendance in the first 24-48 hours after contact with the disease is considered to be effective in reducing mortality that may occur due to rabies.

Most of the patients attending with suspect animal bites were male. Males are involved more in agriculture and animal husbandry and spend a long time outside compared to females, which may have increased their chances of encountering danger. In the literature, it is reported that rural contact is less compared to urban contact. More than half of our cases (56.1%) attended from the city center. The study by Temiz and Akkoç (26) identified lower attendance from rural areas. Again, a study by Tunç et al. (25) found that attendance from urban areas was more common. One reason for frequent attendance from the city center may be that access is easier. Also, it may be due to the control of stray animals being harder in urban areas.

Again, another reason may be that awareness about attending a vaccination center for rabies is not at sufficient levels among those living in rural areas (27).

Generally, rabies cases intensify in spring and summer. This period is known as the aggressive period for dogs. Due to wearing thinner clothes and spending more time outdoor, animal bites increase in summer. The study identified that the potential animal bite cases increased in spring and summer when individuals spend more time outside. Nearly half of the cases (50.7%) were in the period from April to August. In the literature, there is not much information about seasonal variations in rabies disease. Also, females had higher potential rabid animal bites in winter compared to males (p=0.02); however, this is not an expected result. Studies to be performed must consider the periodic effects on disease control.

In developing countries, rabies is transmitted to humans by bites from stray animals, especially dogs. In cases, attention is paid to dogs, especially, but also cats and other domestic animals, bats, and other wild animals (28). In our study, the distribution of potential rabies bites was not investigated, but it is considered that the incidence of dog bites was high. For transmission of rabies, direct contact with infected saliva in some situations involving biting, scratching, and licking is the most important route. Most of the cases identified in the study had a history of bites. An assessment by Yılmaz et al. (29) observed that more than half of the cases (56.1%) had a history of bites. Most of the cases, having a history of bites and being from the city center lead to consideration that local administrations do not have sufficient success in controlling rabies. Again, the insufficient number of stray animal shelters in Van city center may be an important cause.

The contact region of potential rabies bite varies according to the age and physical features of the person. The most common injured region in the literature appears to be the extremities. This information was not collected in the study; however, it was observed that the extremities were most commonly injured clinically, especially at a young age (29,30).

Globally, it is known that between ten and twelve million cases have prophylaxis after rabies contact. In Turkey, there is a reduction observed in human rabies cases, but the suspect bite cases have not reduced. Annually, our country administers prophylaxis to 100,000 bite cases. The rabies risk contact incidence was 211.35 per hundred thousand in 2005 (27). In the early period, local wound care and washing the wound with water and soap are the most effective treatment methods (31). In our clinic, immunization was planned after washing the patients' wounds. Doses were planned as follows; 0.1% 1 dose, 0.1% 2 doses, 0.7% 4 doses and 99.0% 5 doses. The incidence of 5 dose vaccination plans was 99.5% for male patients and 96.8% for female patients. In cases where animal monitoring could be performed, three-dose vaccination is sufficient, while five doses were planned for cases without animal monitoring. Vaccine, along with rabies HRIG administration, is life-saving (32). Of cases, 61.2% had HRIG administered. Rabies studies have observed that RIG administration is not at desired levels (27,29). Cases in Turkey were identified to have higher levels of immunoglobulin administered; however, it was not observed to be at sufficient levels.

There was no information collected related to whether animals had owners in the cases, which led to all cases requiring vaccination. Prophylaxis vaccination is mandatory due to not knowing whether animals are vaccinated or not. This is a public health problem and is encountered with a different dimension in the country's economy. Of cases, 99.0% had five-dose vaccination planned; however, 33.4% fully completed the five doses. The planned (96.8%) and administered (35.7%) incidence was higher among females, while fewer were administered (32.9%) for males (p=0.246). In developed countries, vaccination planning is done according to case circumstances. A study in the United States of America concluded that vaccination was required for only 6.7% of cases (33). Surveillance and monitoring are found to be primary paths for the management of potential rabies bite cases. In the study, 99.6% of cases with immunoglobulin administered, had five dose vaccination planned, while 33.9% were vaccinated with five doses. The reason for the difference between planned and administered vaccination doses may be linked to factors such as the administration method of the vaccine, side effects linked to the vaccine, forgetting administration, missing or not attending appointments, patient health status, age, and gender (12-15).

There were no side effects linked to the vaccine observed in our study. Again, in the study period, there were no deaths linked to potential rabid animal bites.

Conclusion

One of the most effective solutions for reducing the risk of rabies contact is taking control of stray animals in animal shelters. In these places, street cats and dogs are collected, cared for, and vaccinated, which may ensure primary protection by performing animal fostering and neutering studies. Increasing awareness of this type of application and service, which is among municipality responsibilities, will aid in the control of the significant public health problem of potential rabies bite cases. As the young population is at most risk, the necessity to take precautions among the childhood age group was noted.

Ethics

Ethics Committee Approval: Çanakkale Onsekiz Mart University Clinical Research Ethics Committee (approval number: 02.01.2019/01-02)

Informed Consent: Consent form was filled out by all participants.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: B.V., Concept: B.V., H.Ç., M.B., Design: S.Y., M.B., Data Collection or Processing: B.V., Ö.O., Analysis or Interpretation: S.Y., H.Ç., Literature Search: B.V., H.Ç., M.B., Ö.O., Writing: B.V., M.B.

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