



## Evaluation of Case Reports for Contacts with Risk of Rabies-Samsun Sample

### Kuduz Riskli Temas Vaka Raporlarının Değerlendirilmesi-Samsun Örneği

Evaluation of Contacts with Risk of Rabies

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#### Özet

**Amaç:** Türkiye kuduz enfeksiyonu için endemik bir alandır ve kuduz riski temas olgularında beklenen düşüşe ulaşamamıştır. Biz bu çalışmada Samsun'da 1 Ocak- 31 Aralık ,2014 arası 1 yıllık süreçte görülen kuduz riskli temaslarını inceledik. **Gereç ve Yöntem:** Bu yazı retrospektif, kesitsel bir çalışmadır. Verilere, halk sağlığı müdürlüğünden edinilen kuduz riskli temas formlarından ulaşılmıştır. Analizler Haziran 2015 tarihinde yapılmıştır. SPSS 20.0 paket programı kullanılmıştır. **Bulgular:** Araştırmada %69,9'unun erkek olduğu 2892 olgu analiz edilmiştir. Medyan yaş farkı (m: 27, f: 32) anlamlıdır (p = 0,000). Hastaların en yaygın grup 10-19 yaş grubu (%21,1) idi. Riskli temasta bulunan hayvanların %75,5'i köpekti. En sık temas (% 31,8) ilkbahar mevsiminde gözlenmiştir. Kadınlarda mevcut ilaç kullanımı veya hastalık oranı erkeklerin yaklaşık iki katıdır (p = 0,000). Kedilerin neden olduğu yaralanmalar Atakum ilçesinde diğer ilçelerin yaklaşık iki katıdır (p = 0,000). Ekstremitte yaralanmaları tüm temasların %95,4'ünde mevcuttu. **Tartışma:** Sahipsiz köpeklerle karşı mücadele edilmelidir. Enfeksiyon aşılama ve zehirlenme ile önlenmelidir. Halk sağlığı hizmetleri ve diğer disiplinlerin işbirliği içerisinde çalışması gerekmektedir.

#### Anahtar Kelimeler

Kuduz; Riskli Temas; Türkiye; Samsun; Köpek

#### Abstract

**Aim:** Turkey is an endemic area for rabies infection. The number of contact cases at risk of rabies has not decreased as quickly as expected. We investigated the one-year at-risk contacts observed in Samsun between January 1 and December 31, 2014. **Material and Method:** This is a retrospective, cross sectional study. Data were taken from at-risk contact report forms collected in public health institutions. Analyses were made on June 2015 using the SPSS 20.0 package software. **Results:** We analyzed 2892 cases, of whom 69.9% were male. The difference in median age by gender (m:27, f:32) is significant (p=0.000). More patients were found in the 10-19 age group (21.1%) than in any other group. 75.5% of the animals causing an at-risk contact were dogs; however, in Atakum, injuries were caused by cats at nearly two times the rate of other towns (p=0.000). At-risk contacts were observed most commonly in the spring (31.8%). Rate of females who take medication or have a diagnosed disease is nearly two times the rate in males (p=0.000). There was an extremity injury in 95.4% of the cases. **Discussion:** Stray dogs are a public health problem that must be addressed. Rabies infection can be prevented by vaccination and antiserum. Public health services should work in constant collaboration with other disciplines.

#### Keywords

Rabies; At-Risk Contacts; Turkey; Samsun; Dog

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## Introduction

Rabies is a Lyssavirus virus from the rhabdoviridae family. It is mainly transmitted to humans through contact with infected animals. Most often, it causes a deadly encephalomyelitis infecting the central nervous system within 20-90 days. The microorganism is generally spread by the saliva of the biting animal inoculating in the subcutaneous or muscle tissue of a person; other contaminations are very rare [1]. Around the world, between 30,000 and 70,000 people die every year from rabies, according to World Health Organization (WHO) data [2]. Turkey is still an endemic area for rabies infection [3]. While the rabies occurrence rate in Turkey as a whole has decreased in recent years, there has been an increase in the Aegean region. Furthermore, the number of at-risk contacts has not decreased as quickly as expected. Different solutions are still applied in Istanbul's Anatolian side and in Izmir, which is a city in the Aegean region [4,5]. Domestic dogs are the main vector in the transmission of rabies among animals in developing countries (such as Turkey) and in undeveloped countries [6]. In contrast, wild animal rabies stands out in developed countries where domestic animal rabies is under control. Although it is always fatal in unvaccinated people, protection from rabies is possible in vaccinated people [7].

All contacts with risk of rabies that took place in Samsun, Turkey in 2014 were evaluated in this study. Samsun is an ideal city for this research because it is representative of Turkey as a whole regarding the population, socioeconomic level, and geography. This study is important because Turkey is the European country in which dog-caused rabies cases are the most common [8].

## Material and Method

This is a retrospective, cross-sectional study. All contacts with risk of rabies that took place in Samsun between January 1 and December 31, 2014 were evaluated. Data were taken from risky contact report forms collected in public health institutions. The report forms used in the various towns of Samsun are not standardized—three different forms were used. Generally, the forms recorded demographic information about the patient, climate and seasonal characteristics, the species and present condition of the animal, the type of injury, and vaccine application. Since the questions are not the same in each form, the number of data differs for some parameters. In addition, a separate retrospective file scanning study revealed some missing data. All the missing case information is presented in Table 2.

Table 2. Missing Parameter Data

Form Sections	Missing Data (n)	Percentage
Age	35	1,2 %
Contact Type	90	3,1%
Kind of Animal	53	1,8%
Present Condition of Animal	39	1,3%
Previous Exposure	810	28,0%
Previous Prophylaxis	1061	36,7%
Constantly Used Medicine and Constant Disease	813	28,1%
Contact Place	2258	78,1%
Case Place	2636	91,1%

Analyses were made on June 2015. The chi-square test was applied in values countable for statistical analyses; the Fisher Exact Test was used when the expected value was higher than 20% or lower than 5% of cell groups; and the suitability of measurement values to normal distribution was examined by visual (histogram and probability graphics) and analytical methods (Kolmogorov-Smirnov). The Wilcoxon and Mann Whitney U test was applied in analyses without a normal distribution. The SPSS 20.0 package software was used in analysis. Statistical meaningfulness was accepted as  $p < 0.05$ . All the procedures in the study were designed in accordance with the Helsinki Declaration and Good Clinical Practice guidelines and approved by the Ondokuzmayis University Institutional Ethical Committee (29.05.2015).

## Results

2892 cases were analyzed in our research. Among the participants, 69.9% (n=2021) were male and 30.1% (n=871) were female. The age distribution of the cases was not homogenous. The median age was 27 for males and 32 for females, a difference that is statistically significant ( $p=0.000$ ). 78.9% of contacts took place in the city and 21.1% in rural areas. Among the age groups categorized by decade, the most common group of patients was in the 10-19 age group (21.1%).

With respect to animal species, there was no statistical difference by patient age. Significant results were reached when gender was considered, dog contact in all cases and cat contact in females are more common ( $p=0.000$ ). 75.5% of the animals with risky contact were dogs and 23.3% were cats (Table 1).

Table 1. Kinds of Animals with Risky Contact

Animal	Number	Percentage
Dog	2144	75,5
Cat	661	23,3
Donkey	8	0,3
Monkey	6	0,2
Horse	4	0,1
Undetermined kind	4	0,1
Mouse	2	0,07
Bat	2	0,07
Pig	2	0,07
Cow	2	0,07
Sheep	1	0,03
Squirrel	1	0,03
Hawk	1	0,03
Fox	1	0,03
Total	2839	100

79.3% of contacts were biting. It was learned that 6.8% of the patients had been attacked previously. 94.1% of the patients did not have rabies prophylaxis before the contact. Distribution of deficiencies in our data obtained from 2892 cases considering parameters is shown in Table 2. Contacts were observed most commonly in spring (31.8%) and most rarely in autumn (17.4%). However, it was interesting that in Havza town, autumn was the season in which at-risk contact was most common (38.3), while in Salipazari town it was winter (33.8%). It

was determined that males were most often attacked in May and females in August (Figure 1).

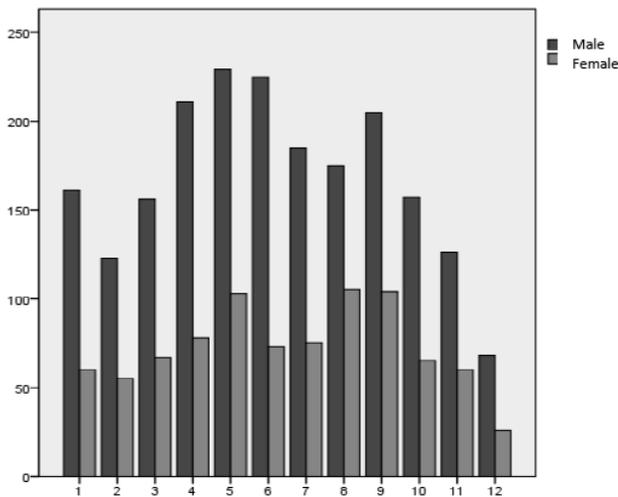


Figure 1. Number of Cases in Months

Most frequently, the attacks were by owned but unvaccinated animals (m= 29.3%, f= 30.4%). 6.6% of males and 7.1% of females had a previous at-risk contact. Report forms asked whether the patient had any chronic diseases; 9.2% of the patients indicated some chronic disease such as diabetes mellitus, hypertension, hypothyroid, depression, asthma, or cardiac failure. Interestingly, rate of females who take medication or have a diagnosed disease is nearly two times the rate in males; this difference is statistically significant (p=0.000). There was an extremity injury in 95.4% of all contacts (Table 3). Although

Table 3. Constantly Used Medicine or Present Disease. Case-Contact Place Comparison.

Gender	Constantly Used Medicine or Present Disease		P value
	Yes (n,%)		
Male	107 (7,4 %)		0,000 (Pearson Chi Square)
Female	84 (13,3 %)		
Total	191 (9,2 %)		
Contact Place	Case Place		P value
	City (n,%)	Rural area (n,%)	
Extremity or Body	193 (78,1%)	54 (21,9%)	0,209 (Fisher's Exact Test)
Head, neck	8 (100%)	0 (0%)	
Total	201 (78,8%)	54 (21,2%)	

all head and neck injuries took place in the city, no statistical difference was found when place of occurrence was compared. Samsun has 17 towns. In this study, at-risk contact was most frequently seen in Ilkadim (25.1% of occurrences) and secondly in Atakum (10.4%). There was no difference observed for gender distribution by town (p= 0.155). When the animal species were compared among the towns, injuries caused by cats in Atakum were nearly two times the rate of other towns and this difference was statistically significant (p=0.000) (Table 4). Biting was the most common contact type for dogs (91.1%), whereas the scratching rate was higher for cats (57.1%). Overall, a significant difference was detected for animal species.

Table 4. Comparison of Animal Kinds Among Towns

		Dog	Cat	Other	Total
Other Towns	n	1977	535	28	2540
	%	77,8%	21,1%	1,1%	100,0%
Atakum	n	167	126	2	295
	%	56,6%	42,7%	0,7%	100,0%
Total	n	2144	661	30	2835
	%	75,6%	23,3%	1,1%	100,0%

Post hoc analysis determined that the group causing the difference was cats. According to this, while scratching was significantly higher in cats, biting was higher with dogs and other animals. (p=0.000). 54.9% of the animals were owned, 23.5% were stray and 21.6% were unknown because they ran away, died or were killed. 64.1% of dogs were owned; of these, 49.0% were vaccinated. Only 24.3% of cats were owned, and of these, only 21.8% were vaccinated. There was a significant difference among cats and dogs when vaccination and ownership are considered (p=0.000). Rabies antiserum was applied in 8.0% of all cases. The rate of completing 5 doses was 42.3%.

**Discussion**

Rabies has been observed in all regions of the world, excluding Antarctica and some island countries. It is among the most common viral causes of mortality in developing countries [9]. Although the surface area of the world doesn't change, the increase in the number of human beings and dogs increases the contact risk [10]. Dogs are still the main rabies reservoirs in many regions. Most of the people dying from rabies have a low socioeconomic status [11]. Rabies has been eradicated in England, Japan, Belgium, Finland, France, Norway, Portugal, Spain, Switzerland, and Sweden [12]. 247 rabies related deaths were reported in Turkey between 1980 and 2006 [8]. According to another data set, 39 rabies cases were reported in Turkey between 1992 and 2007 (31 male, 8 female); the median age of the cases was calculated as 28.6 ± 19.3 (min. 5, max. 69). While Istanbul was the first city to track the number of at-risk contacts (11 cases), Sanliurfa (5 cases) and Izmir (4 cases) were other important cities to do so. The dog is the animal which is the most common cause of at-risk contacts (29 cases) [13]. In Turkey, more than 150,000 at-risk contacts per year have been reported in recent years [14]. Yearly incidence has been reported as 0.02 cases per 100,000 in Tunisia and 0.1 cases per 100,000 in Egypt [15].

Samsun city in the northern part of Turkey has 17 towns (Figure 2). With a population of 1,269,989 people, 37% of whom live in

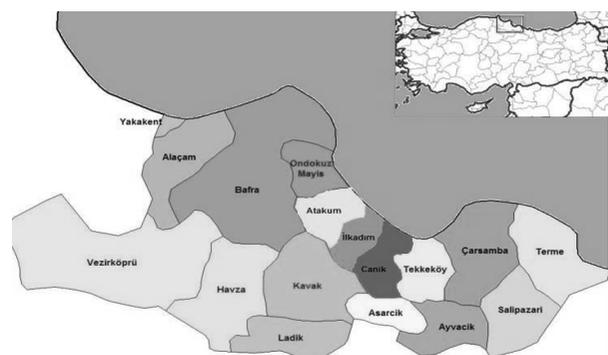


Figure 2. Samsun and its towns

Ilkadam and Atakum towns, the population density is 136 people per square kilometre. This is higher than the average population density in Turkey (100 people/km<sup>2</sup>) [16]. We calculated the at-risk contact rate as 2.2 people per 1,000 in Samsun in 2014, compared to a rate of 2.4 per 1,000 in Turkey in 2013. Thus we can say that the at-risk contact rate in Samsun is representative of Turkey in general. However, Samsun is among the cities in which the disease risk is lower due to the lower number of rabies cases in humans. Dogs are responsible for 75.5% of at-risk contacts in Samsun. Atakum is the most socioeconomically developed city in Samsun [17]. Although there is no information showing that the number of cats in this town is higher than in other towns, at-risk contacts from cats were interestingly much higher than in other towns. It may be that higher education and income level may constitute a higher rate of cat ownership.

It was reported that animal rabies were very rare among dogs in Continental Europe, where red foxes constitute 50-75% of the cases [18,19]. The ratio of pet rabies to wild animal rabies is 10:1 in Turkey, 1.7:1 in Russia and 1.4:1 in Ukraine [20]. Dogs were responsible for 79% of the cases in Alaska, 59.5% in New Zealand, and 81.2% in France [21-23]. In some studies, cat and dog rates were very close [24,25]. In a study made in the United States, 67% of the cases were due to wild animals, especially raccoons [26]. The most frequent cause of rabies in Baltic countries is raccoons, followed by red foxes and badgers [27].

Boys were bitten more frequently by dogs than were girls, according to Morgan's research [28]. Similarly, dog contact in males and cat contact in females were higher in our study. In a study by Gulacti et al, it was observed that at-risk contact was significantly lower in the 0-5 age group, significantly higher in the spring, and significantly higher in cities compared to rural areas. Dog contacts were more common than contacts with other animals [29]. Gunduz et al. identified the 0-8 age group and Sogut et al. identified the 6-15 age group as the most frequently affected [30,31]. According to WHO data, 40% of contact cases with rabies risk were observed in children under the age of 15. On the other hand, there are publications showing that adult males are affected more. Our findings demonstrate that at-risk contact occurs most often between 10-19 years of age in the city in spring. Mitchell et al. determined that the areas most often affected in children were the head and neck [32]. In our study, extremities were the area most often injured. Head-neck injury risk is higher in children because they are shorter. People trying to communicate with cats and dogs using their hands and arms or trying to get them away during attack is the main factor in extremity injuries.

In some studies in Turkey it was stated that nearly half or more of the animals were stray [30,33-34]. Strayed animal ratio was about 30% when animals whose owners were unidentifiable were kept apart in our study. This ratio was higher in cats.

It was stated that vaccinating at least 70% of the dogs in endemic regions would knock down the disease [35]. In a study by Sengoz et al, it was determined that only 6% of the animals were vaccinated [36]. According to our findings, it was understood that 25-50% of the animals were vaccinated. Up to 5 doses of vaccine can be applied in Turkey, depending on the damage caused by the animal with rabies risk or observability of the animal. According to a study made in Diyarbakir, in

87.5% of the cases 3 doses and in 12.5% of the cases 5 doses of human diploid cell culture vaccine were applied. Overall, rabies antiserum was applied in 8.2% of all cases [37]. In a study in which Goktas et al evaluated nearly 11 thousand patients, it was observed that rabies antiserum was applied in 3.1% of the cases [38]. 5 doses of vaccine in 42.3% of the cases and rabies antiserum in 8.0% of the overall cases were applied in Samsun. In the struggle against wild dogs, the most cost-effective way is poisoning, especially in areas which are remote and hard to reach. Setting up a trap is one of the methods which can be used in order to capture in areas where poisoning is not practical, rational, or legal [39,40].

Since this research is based on retrospective evaluation, it was compiled in the light of information and findings obtained from the files. Again as the forms in different formats were evaluated together, there may be some limitations in the evaluation of the cases due to missing data. The fact that we have a sufficient amount of suspected contact cases makes the study valuable.

Rabies disease is still observed in our country. In particular, dog contact is the most risky contact type determined. So stray dogs are an issue that must be addressed. Even though rabies is incurable, infection can be prevented, and vaccination and poisoning have an important role in this. Public health services, health personnel, veterinary services, and municipalities should work in constant collaboration. Education to be provided to teachers and students in schools could be effective in protecting against the disease and a tool in crisis management.

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#### Competing interests

The authors declare that they have no competing interests.

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