

# Childhood horse and donkey bites; a single tertiary health center experience in a rural area

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## ABSTRACT

**Background:** The aim of this study was to examine the characteristics of patients presenting to a pediatric emergency department in a rural province of Turkey due to horse and donkey bites and to analyze whether these features differ from those of more common animal bites in rural areas. **Materials and Methods:** The records of patients presenting to the pediatric emergency department of a tertiary hospital due to horse and donkey bites over a 3-year period were examined retrospectively. Demographic data, month of presentation, animal species involved (horse or donkey), the body area bitten, treatment applied to the wound site, whether tetanus and rabies vaccinations were administered, and whether or not antibiotics were prescribed on discharge from the emergency department were recorded from these files. **Results:** The annual incidence of horse and donkey bites was determined as 7.8/100,000. Thirty-six patients, 24 (66.7%) boys and 12 (33.3%) girls, with a mean age of  $95.6 \pm 33.9$  (48–190) months, were included in the study. Twenty-six patients (72.2%) were bitten by donkeys, and 10 (27.8%) by horses. Bites were most common in September (30.6%). The most commonly bitten areas were the back and/or upper extremities. Rabies vaccination was administered in all cases. Amoxicillin–clavulanic acid was prescribed in 28 (77.8%) cases. **Conclusion:** Horse and donkey bites are frequently observed in rural areas. The inhabitants of such areas should therefore be educated concerning horse and donkey bites. Health workers encountering such bites should behave in the same way as in more common animal bites in terms of patient management. Our results will be instructive for other developing countries similar to Turkey.

**Key words:** Animal bite, childhood, donkey, horse

## INTRODUCTION

Animal bites are still a significant problem for people living in rural areas. Such bites represent approximately 1%–2% of emergency department presentations in the United States and the United Kingdom.<sup>[1,2]</sup> The most common animal bites are from dogs.<sup>[3]</sup> Attacks against humans by horses and donkeys are much less common.<sup>[4]</sup> Horse and donkey bites occupy only a very small part of studies investigating animal bites. Only one of 34 cases involved a horse bite, and no donkey bites were observed, in a study on mammal bites by Radhakrishnan *et al.*<sup>[5]</sup> In one study from Turkey, Köse *et al.*<sup>[6]</sup> retrospectively examined 6-year data in the field of

plastic surgery and reported 24 cases of horse or donkey bites. There are no detailed studies of horse and donkey bites in childhood. Our study will therefore be particularly instructive for readers.

The purpose of this study was to compare horse and donkey bites through a retrospective examination of the medical

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records of patients presenting to our pediatric emergency department (PED) with data for more common animal bites in the literature.

## MATERIALS AND METHODS

This study was planned as a retrospective medical file review in the PED of a tertiary university hospital in Turkey. It was conducted in compliance with the Declaration of Helsinki for human research and was approved by the institutional ethics committee (no. 2018/4–12). As this was a retrospective study, informed consent from patients was not obtained. Patients presenting to the PED of a tertiary university hospital over a 3-year period between January 1, 2015 and December 31, 2017, due to horse and donkey bites were enrolled.

Demographic data (age and sex), month of presentation to the emergency department, animal species involved (horse or donkey), the owner of the animal, the fate of the animal after the bite incident, the body area bitten, treatment applied to the wound site, whether tetanus and rabies vaccinations were administered, whether primary closure (suture) was performed, whether or not antibiotics were prescribed on discharge from the emergency department, and whether any fracture was involved were recorded from the patient files.

The data obtained were analyzed on the Statistical Package for the Social Sciences (SPSS) software (IBM, Chicago, Illinois, version 24.0). Categorical data were expressed as number and percentage, and constant variables as mean plus standard deviation.

## RESULTS

The total number of patients presenting to our PED over the 3-year study period was 445,698. Thirty-six patients, 24 boys (66.7%) and 12 girls (33.3%), presented due to horse and donkey bites during that period. The annual incidence of horse and donkey bites was determined as 7.8/100,000. The mean age of these patients was  $95.6 \pm 33.9$  (48–190) months. Ten (27.8%) of the patients enrolled were bitten by horses, and 26 (72.2%) by donkeys. Thirty-five (97.2%) patients presented to our PED within 24 h of the bite occurring. One patient (2.8%) presented to a district public hospital after being bitten by a horse; that subject underwent initial examination and received the first dose of rabies vaccine at that center, but was not started on antibiotics. The patient then presented to our hospital due to infection in the wound site on the 3rd day [Figure 1A].

All the patients included in this study were living in rural areas (villages). The animals involved in 11 cases (30.6%) belonged to the family itself, whereas those in the other 25 cases (69.4%) belonged to neighbors or other relatives. No wild donkey or horse bites were involved. No animals developed any signs of rabies after the bite had occurred. Behavior provoking the biting animal was determined to have occurred in 12 (33.3%) of our cases. Presentations were most common in September, and bites most frequently involved the back and/or upper extremities. The wound site was washed (with saline solutions) at initial presentation in 35 (97.2%) cases, and primary closure (with sutures) and rabies immunoglobulin were performed in one of these [Figure 1D]. The first dose of rabies vaccine was administered in our PED in 35 (97.2%) cases, and parents were informed about the disease. Tetanus vaccination was performed in 19 (52.8%) cases. Amoxicillin–clavulanic acid (25–45 mg/kg/24 h) was prescribed in 28 (77.8%) cases (patients prescribed antibiotics; Figure 1B and C), whereas eight patients (22.2%) were not started on antibiotics due to the very superficial nature of the wounds (patients not prescribed antibiotics; Figure 1E). One patient presenting to our hospital on the 3rd day was admitted due to wound-site infection. That patient received combined intravenous cefuroxime axetil and metronidazole antibiotic therapy. No complication was observed during 1-month follow-up of the other patients. Clinical and demographic data by years are shown in Table 1. No blunt trauma-related fracture was present in any case. Images of the cases are shown in Figure 1.

## DISCUSSION

Animal bites commonly encountered in emergency departments may range from simple soft tissue lacerations to bone fractures, tissue/organ losses, and even fatal injuries.<sup>[2–4,7,8]</sup> Presentations to emergency departments due to injuries such as dog and cat bites and scratches that frequently occur in daily life are common.<sup>[1,9]</sup> Bregman and Slavinski<sup>[10]</sup> investigated animal bites in New York City between 2003 and 2006 and reported that dog bites were the most common type, followed by cats, and by rats and mice in third place, with other animals being responsible for 6% of bites. The reported annual incidence of dog bites in the general population is 103–118/100,000, whereas the annual incidence in the pediatric age-group is 1–3/1,000 children.<sup>[9,11]</sup> The incidence of cat bites is reported at 10.2/100,000.<sup>[10]</sup> The annual incidence of horse and donkey bites in patients presenting to the emergency department in our study was 7.8/100,000, and this is important as the first report of the incidence of horse and donkey bites in the literature. Another important finding of our study is that the



**Figure 1:** Images of the cases

incidence of horse and donkey bites is close to that of cat bites, and is a more common phenomenon in rural areas.

Animal bites are reported to be more common in male gender in childhood.<sup>[2,12-14]</sup> Cat bites have been reported to peak in female gender in the third decade.<sup>[15]</sup> The horse and donkey bites in our study showed a similar characteristic in terms of gender to those of more common animal bites. Animal bites can be seen in children of all ages.<sup>[12,13,16]</sup> The mean age of the subjects in our study was 7.9 years, our youngest patient being aged 4 years and the oldest 15.8 years. This indicates a wide age range, and is similar to that of common animal bites. Insufficient data are available in the literature concerning horse and donkey bites in terms of age and sex, which we investigated in our study, and further research is needed on this subject.

Animal bites show seasonal variations. Several studies have reported more bite cases in spring and summer compared to other seasons.<sup>[10,12,17-19]</sup> Cases involving children are reported to occur more easily in summer as contact with animals is more probable and children wear lighter clothing at that time.<sup>[12,20,21]</sup> Stallions mate all year round, but the reproductive period among mares is usually concentrated

between May and October.<sup>[22]</sup> The reproductive period in donkeys shows greater seasonal variation than that in horses. In our study, however, 44.5% of cases occurred in September and October. These months coincide with the horse and donkey reproductive season, although 27.7% of cases occurred in January, February, November, and December. No data concerning the seasons in which horse and donkey bites are most common are available in the literature, and our study now reveals that horses and donkeys may also bite outside the reproductive season.

The animals involved in commonly seen bites (such as dogs and cats) may well be known to the victim.<sup>[2,10,23]</sup> In our study, the animals involved belonged to the families in 30.6% of cases, whereas in the other cases, they belonged to neighbors or other relatives. From that perspective, it may be concluded that animals known to the subject are responsible for horse and donkey bites.

Provocation appears to be an important factor in the context of animal bites. Some breeds of dog are known to have a particular susceptibility to provocation. Cats may also bite following provocation, but this has not previously been reported for horses and donkeys.<sup>[1,17,24]</sup> Provocative behavior

**Table 1: Patients' clinical and demographic data by years**

General features		2015	2016	2017	Total
		n (%)	n (%)	n (%)	n (%)
Sex	Male	6 (16.7)	8 (22.2)	10 (27.8)	24 (66.7)
	Female	4 (11.1)	3 (8.3)	5 (13.9)	12 (33.3)
Animal species	Horse	3 (8.3)	2 (5.6)	5 (13.9)	10 (27.8)
	Donkey	7 (19.4)	9 (25)	10 (27.8)	26 (72.2)
Was the animal provoked?	Yes	5 (13.9)	3 (8.3)	4 (11.1)	12 (33.3)
	No	3 (8.3)	1 (2.8)	2 (5.6)	6 (16.7)
	Not known	2 (5.6)	7 (19.4)	9 (25)	18 (50)
Region of bite on body	Back	2 (5.6)	3 (8.3)	5 (13.9)	10 (27.8)
	Back and upper extremity	2 (5.6)	2 (5.6)	1 (2.8)	5 (13.9)
	Head-neck	1 (2.8)	2 (5.6)	1 (2.8)	4 (11.1)
	Upper extremity	4 (11.1)	4 (11.1)	6 (16.7)	14 (38.9)
	Anterior aspect of the trunk	1 (2.8)	-	2 (5.6)	3 (8.3)
Month of presentation	January	-	1 (2.8)	2 (5.6)	3 (8.3)
	February	-	1 (2.8)	2 (5.6)	3 (8.3)
	April	1 (2.8)	1 (2.8)	1 (2.8)	3 (8.3)
	May	1 (2.8)	1 (2.8)	1 (2.8)	3 (8.3)
	June	1 (2.8)	1 (2.8)	-	2 (5.6)
	August	1 (2.8)	1 (2.8)	-	2 (5.6)
	September	4 (11.1)	3 (8.3)	4 (11.1)	11 (30.6)
	October	1 (2.8)	1 (2.8)	3 (8.3)	5 (13.9)
	November	1 (2.8)	1 (2.8)	1 (2.8)	3 (8.3)
	December	-	-	1 (2.8)	1 (2.8)
Tetanus vaccination administered?	Yes	6 (16.7)	7 (19.4)	6 (16.7)	19 (52.8)
	No	4 (11.1)	4 (11.1)	9 (25)	17 (47.2)
Rabies vaccination administered?	Yes	10 (27.8)	11 (30.6)	15 (41.7)	36 (100)
	No	-	-	-	-
Started on antibiotics?	Yes	8 (22.2)	9 (25)	11 (30.6)	28 (77.8)
	No	2 (5.6)	2 (5.6)	4 (11.1)	8 (22.2)

was determined in 12 (33.3%) cases in our study. Children liable to encounter their own horses and donkeys in day-to-day life must be taught that these animals may bite, and in particular to avoid actions that might provoke them.

The region of the body involved in animal bites varies depending on the patient's age and the type of animal. Dog bites in preschool children most frequently involve the head and neck region, because at these ages the head and neck are easily accessible to the animals.<sup>[9]</sup> However, the extremities are more frequently the target of dog bites at later ages.<sup>[14]</sup> Injuries inflicted by cats also involve the upper extremities.<sup>[11,14]</sup> Although no previous information is available in the literature concerning which areas of the body are most frequently bitten by horses and donkeys and in which age-groups, Köse *et al.*<sup>[6]</sup> reported that such bites most commonly involved the head and neck, followed by the extremities, with the trunk being the least frequently affected.<sup>[6]</sup> In terms of case reports, Bucak *et al.*<sup>[4]</sup> reported injury to the back and neck, De Luca *et al.*<sup>[8]</sup> to the penis, and Fogel *et al.*<sup>[7]</sup> to various regions of the body.<sup>[4,7,8]</sup> In this study, the parts of the body most involved in horse and donkey bites were the back and/or upper extremities. We think that this is due to patients needing to defend themselves and trying to run away.

The principal morbidity in animal bites is infection, for which reason the first action to be taken is to cleanse the wound

site with saline solution using an oversized syringe.<sup>[1,2,9,25]</sup> Cleansing the wound site will reduce the possibility of wound site infection. The probability of infection varies depending on the type of animal involved. Infectious complications have been reported in approximately 25% of dog bites and 50% of cat bites.<sup>[13,23,26]</sup> Starting antibiotic therapy is controversial in terms of wound site infection, although antibiotics must be initiated in the presence of risk factors (presence of chronic disease, malnutrition, wound debridement requirement, contaminated wound, presence of bite-related puncture, bites to the face or hands, or immunocompromised or asplenic subjects) in animal bites.<sup>[2,9]</sup> In the absence of any separate recommendation for horse or donkey bites, the treatment of first choice should be the amoxicillin-clavulanic acid, recommended for use in animal bites in the previous literature.<sup>[9]</sup> Oral amoxicillin-clavulanic acid was prescribed in 77.8% of our cases. Examination of the records of the 35 patients excluding the case admitted for treatment showed that no subjects re-presented to hospital within 1 month from the bite event.

Rabies is still an important viral disease that can be prevented by vaccination. Approximately 99% of rabies cases occur as a result of contact with dogs carrying the virus. However, it should not be forgotten that various other animals may also carry the rabies virus (such as raccoons, foxes, bats, and monkeys).<sup>[27,28]</sup> Significant decreases in



the prevalence of rabies have been determined in many countries as a result of dog vaccination and vaccination programs following contact.<sup>[28,29]</sup> No cases of rabies have been reported in horses or donkeys in our region in the last 10 years. The World Health Organization rabies guideline involves classification of the wound site (type of contact area) to decide on rabies vaccine prophylaxis following contact with a suspect animal. All our cases were category II according to that classification (nibbling of uncovered skin, minor scratches or abrasions without bleeding, and licks to broken skin) and category III (single or multiple transdermal bites or scratches, contamination of mucous membrane with saliva from licks, and exposure to bat bites or scratches).<sup>[30]</sup> All our cases received rabies vaccination. Nineteen (52.8%) cases also received tetanus vaccination, depending on their prior vaccination status, although this was not required in the other 17 (47.2%). No symptoms of tetanus and/or rabies developed in any case.

**Limitations:** This study was conducted on a retrospective basis and represents the experience of a single center. It is important to note that our findings are specific to Turkey and cannot therefore be generalized to the US urban environment, for example.

## CONCLUSION

This is the first comprehensive study of horse and donkey bites in childhood. Horse and donkey bites are as common as cat bites in rural areas. Residents in rural areas therefore need to be educated about the months when horse and donkey bites most frequently occur, the need to avoid provocative actions, and to be aware that even animals known to them may bite. Health workers encountering such bites should behave in the same way as in more common animal bites in terms of patient management.

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## Conflicts of interest

There are no conflicts of interest.

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