

DOG BITE-RELATED INJURIES.

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Abstract

Introduction: Dogs are everywhere around us, they inhabit our homes, as well as the streets, parks, and many other areas. Directed by the conditions of the environment and the situation, the dog can change from a faithful friend of the human to his enemy. It can attack, injure, and sometimes even kill a human being. Injuries range from small, limited superficial bruises, abrasions, and wounds, to significant contusions, rough lacerations of the soft tissues and the blood vessels, and infections, which threaten the health and lives of the victims. **Material and methods:** This study aimed to perform a retrospective analysis of all the cases reported to be due to dog attacks against humans for the last five years, by materials of the clinic of Forensic medicine and Deontology in Sofia, Bulgaria. **Results:** For the period 2015-2019, a total of 10139 forensic medical examinations performed at the clinic. Out of them, we have examined the cases related to different types of injuries associated with dog incidents. The results were divided into three main groups: by gender, by age of the victim, and by the origin of the dog - if it's a domestic one or a free-ranging urban one. **Discussion and Conclusion:** Dog attacks have been identified worldwide as a substantial public health problem. Too often, as canine bite-associated injuries are seldom serious, limited attention has been given to them. Proper education about bite prevention and responsible pet ownership, has to be done from the youngest age.

Key words: Dog bites, dog bite-related injuries, dog attacks, animal attacks, bite marks.

Introduction

Dogs are a part of our lives. They inhabit our homes, those of our families, and friends, and have gradually become man's best friend. Too often, however, dogs are being abandoned, and bit by bit, begin to take over the streets, parks, and places near residential buildings and restaurants, and many other areas close to the human population - where there are food and water. Street dogs may be feral animals that have never been owned by someone. Overgrowth of the dog's population - street or domesticated ones, the irresponsible pet ownership, and the lack of education concerning the relationship between humans and animals can lead to substantial health consequences, legal or financial outcomes worldwide. [1, 2] Surviving an assault like this can lead to significant physical and psychological trauma to the victim. The severity and the localization of the injuries can lead to further disability of the victim, as well as a different type of body deformations and mutilations - which can have a significant impact on the future life of the victim. [2, 3] Dog bite wounds are being subdivided into three main groups, depending on the severity and the possible fatal end. The first group consists of injuries that are non-fatal for human lives - they can be light, severe, or life-threatening. The next group refers to trauma, which directly or indirectly leads to the victim's death. One of the most serious consequences of a dog bite is the possible risk of rabies infection. The third category of wounds is associated with injuries inflicted on the victim's body after his/her death - post-mortem lacerations. [1, 3, 4, 5] The typical injuries that can be observed over the human body after dog

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assaults are bite marks and claw marks. Teeth of animals leave patterned lesions that appear quite different from those created by human teeth that make it easy to diagnose. [6] The dental formula of a dog includes the following teeth - 3/3 incisors for nibbling, 1/1 canines by which they stab and tear the tissues, 4/4 premolars for grasping, and 2/2 molars for crushing the food/tissue. [1] The received trauma is a combination of biting, crushing, and tearing forces. The more vigorously the assault is, the more prominent, more detailed and representing the dog dentition the lesion will be – a characteristic pattern of punctures, lacerations and avulsion of the skin and other soft tissues. [5, 7] The state of the dog dentition may create a bite mark with a high level of individuality, which can help in further identification of the attacking dog. [6] The dog size - small, medium, or large, as well as the person - if it is a child or an adult, will affect the localization and the severity of the lesions over the victim's body. The reason for the assault is complex, and it refers to the dog's natural, aggressive behavior as a canine species [8], as well as human demeanor. Proper education about bite prevention and responsible pet ownership has to be done from childhood to diminish these incidents.

Material and methods

This study aimed to perform a retrospective analysis of all the cases associated with injuries due to dog bites for the period - 2015-2019, by materials of the clinic of Forensic medicine and Deontology in Sofia, Bulgaria. The present study has been based on information contained in the reports of all forensic medical examinations performed at the clinic for the mentioned period time. The collected data were processed and divided into separate files with information containing the victim's age and gender, localization of the traumatic injuries, and the origin of the dog - if it's a domestic one or a free-ranging urban one.

Results

Ten thousand one hundred thirty-nine forensic medical examinations were performed at the clinic of Forensic medicine and Deontology in Sofia, Bulgaria, for the studied five-year period. Out of them, a total of 187 or 1.9 % were cases of people who sought medical care in connection with injuries from dog bites. Concerning the gender distribution, a total of 110 cases or 59% were of men injured in various dog attacks, and 77 or 41% were the injured women.

Our study shows that the cases of injured men are significantly higher than those of injured women. Attacks of men predominate except for the decade from 11 to 20 years of age. Here, a higher number is reported for the girls - a total of 11 cases in comparison with only six onsets for the boys. In childhood, until the age of 10 years, a total of thirteen reported attacks for the boys, and only five for the girls. The peak of assaults, over men, is observed in the decade 31-40 years of age - a total of 21 cases. Over the next three decades, the number is close to the above, but there is a tendency of slightly reducing it by the years. For the women, the numbers of dog-bite related injuries are relatively constant - between 11 to 13, and slightly reducing after the age of 60. (Figure 1)

Concerning the type of dog, the results are as follows – 125 or 67 % for the domestic ones involved in attacks, and 62 or 33 % for stray dogs. The most mentioned breed of dogs, among the perpetrators of attacks, were Pit Bulls (11 times), followed by German Shepherd (4 times), and the following mentioned only one time - Rottweiler, Karakachan, Doberman, Bulldog, Beagle, and Pekingese. Too often, people do not know the exact breed of dogs that attacked them, or they were not able to see the attacker dog. In situations like this, they only say, when possible, if the assault was by a big, medium, or a small-sized dog.

The next step of our study is to point, which is the most common localization of the traumatic injuries over the human body after the dog attack (Figure 2). The most affected are the lower limbs - in 24 % of the cases, the leading injuries are situated over the different surfaces of the left lower limb, in 19 % - on the right lower limb. In 9 % of the reported incidents, we have severe injuries on both lower limbs. The second most affected part of the human body is the upper limb - with almost equal percentage for the right - 12 % and 13 % for the left upper limb. In 7 % of the dog attacks, the lesions were situated on both upper limbs. In 5% of the studied assaults, the leading injuries are on the head and face. Sometimes, the wounds also affect the neck area. Predominantly the traumas in these areas occur in children. Less affected are the thoracic area and the buttocks - with only 4 % reported attacks. The least affected anatomical area, according to our study, is the abdomen. Dog bites in this area occur in only 3% of cases. (Figure 3)

The typical injury occurring from dog assault is the bite mark - this is a specific pattern produced from the dog dentition over different surfaces of the human body. Most commonly, it is composed of superficial abrasions, bruises, and not so severe small punctured wounds, which represent the denture arch outline of the attacking dog dentition. The canines are the ones causing the small punctured injuries. Sometimes the affected zone may consist of wounds, larger in size, with irregular and ragged margins from the teeth in the process of biting, shaking, and tearing the underlying tissues. Depending on the biting force, the findings may vary from superficial to severe, affecting the underlying tissues and anatomical structures, and sometimes can be threaten for the human life. The findings are often associated with claw marks - multiple, parallel, linear scratches and small or larger in size graze abrasions from the contact with the underlying ground - if the victim falls during the attack. According to our practice, one of the most severe injuries were ruptures of different body muscles and tendons, most commonly of the upper and lower limbs. We have reported cases of tears and fractures of the phalanges of both hands and even fractures of metacarpal bones of the hand. Such injuries need immediate medical attention, and the recovery process is long and painful. It is not always clear whether the affected limb will fully restore its function. The degree and severity of the damage depend primarily on the affected anatomical area and anatomical structures.

Discussion and Conclusion

For five years, 187 cases of dog attacks on humans were reported at the clinic of Forensic medicine and deontology in the city of Sofia, Bulgaria. Our survey shows that men are predominantly victims of different types of dog assaults in comparison with women. A total of 59% of the cases were injured men, and 41 % were women, which has been confirmed by other studies. [3,9-12] Karbeyaz et al. conducted research for a five-year time and the results were similar to ours - men were the most common victims of dog assaults - with a total of 71, 6 %, and 28,4 % for women. [9] According to the study of Maksymowicz et al. for six years, 7953 medico-legal examinations were performed and out of them 53,12 % were men bitten by canines, and 46,88 % injured women. [3] The researches show that often victims are boys up to the age of 9. The results from our study confirmed the tendency. A high number of cases of boys, until the age of 10, were examined at the clinic with lesions over their bodies from incidents associated with dogs. Children are fearless, curious, and playful. Driven by the desire to get to know the world, to play with everyone, and to touch everything close to them, they too often involuntarily cross certain boundaries and are less able to defend themselves. [11] The most common situations reported are the children to enter the dog's "territory" or attempting to

interact with the dog when the dog is eating. [2, 13] It has been described that patients diagnosed with attention-deficit hyperactivity disorder (ADHD) are at elevated risk of dog bites. [10,14] Among adults, the most common incidents happen while the dog owners are trying to separate two fighting dogs.

The findings are with different localization over the body. In 84 % of the cases, the leading traumatic injuries are over the upper and lower limbs of the victim. Karbeyaz et al. report a total of 80,2 % injuries to the extremities compared with other regions of the body. [11] Explained by the victim's instinctive reaction to protect himself from the attack by using his hands and feet, trying to repel the dog, or cover different areas of his body with them. In 5 % of the studied cases, lesions were over the victim's head, and often it is about injured children. They are frequently bitten in the head, face, and neck area because these anatomical regions are of the same height as the dogs. [1] The least affected zones were the thoracic area, the buttock, and the abdominal one. Even after minor injuries, at the end of the recovery period, scars remain on the body. After the severe ones, the marks are correspondingly larger and rougher, and in case they are located in visible anatomical areas like the face, creates additional adverse consequences for the victim, as they change their appearance and lead to disfigurement.

Based on the study, 67% of cases concerns injuries caused by domestic dogs, and in 33%, an attack by stray dogs. The significant prevalence of the incidents with domestic ones is explained by the fact that people seek help from a forensic pathologist when they want to initiate criminal or civil proceedings against the dog owner, to assert a claim for damages.

The victim is not always able to recognize the exact breed of dog, and this may be because they do not know the specific breed or that the attack took place in the night, in poor visibility, and due to the stress of the attack. However, the two most frequently mentioned dog breeds are the Pit Bull and the German Shepherd, confirmed by the study of Fonseca et al., De Munnynck et al., Horisberger et al., and Byard et al. [1,5,13,15]

Dog attacks have been identified worldwide as a substantial public health problem. Too often, as canine bite-associated injuries are seldom serious, limited attention has been given to them. Proper education about bite prevention and responsible pet ownership, has to be done from the youngest age. Education has to be engaged with the pet owners, their children, and the dog as well. Early socialization of the dog and the proper obedience training for the pet are of high importance for the future interaction between humans and dogs. [2] Special attention has to be direct towards the children - they have to know how to play with dogs. When walking their dog, always to be accompanied by an adult, to not disturb the animals when feeding, to be careful not to injure the animal involuntarily, and not to approach it when aggressive. In the event of an attack, they need to know how to protect themselves and possibly get fewer injuries. As they are at the height of the dog, they have to protect their heads with hands or to stand in embryonic posture, covering their face. Adequate education can diminish the number of dog-related accidents and the health consequences for human beings.

Statement for potential conflicts of interest: The authors declare that they have no conflict of interest.

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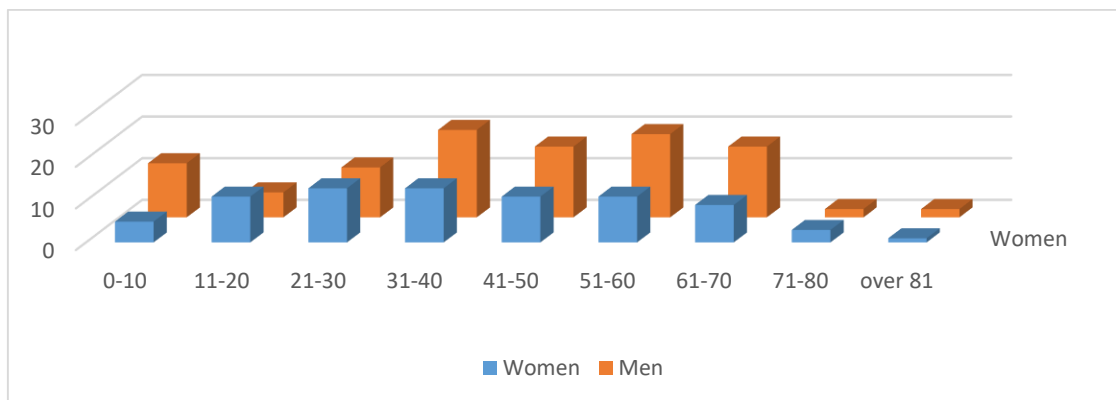


Figure 1. Age and gender distribution of injured people from different type of dog attacks.

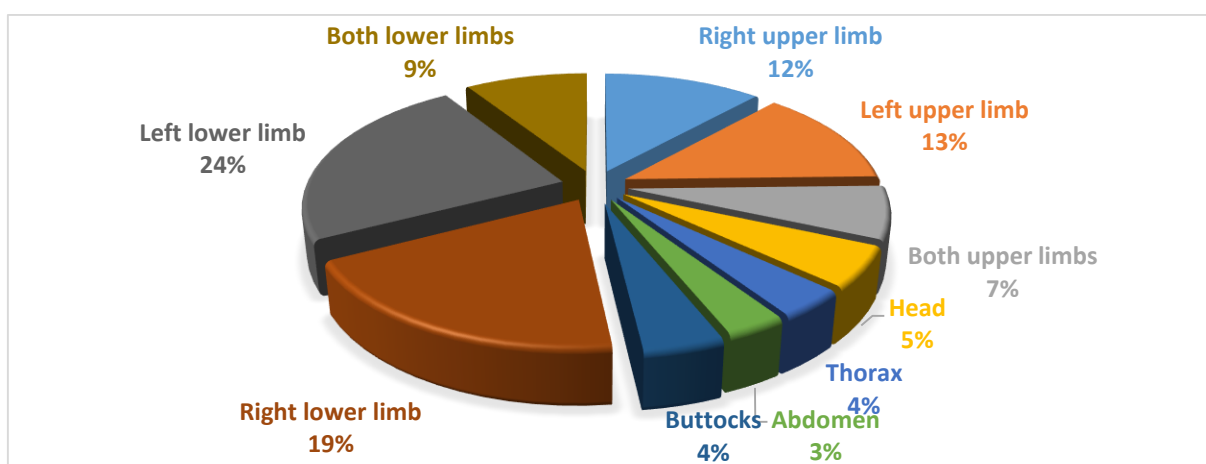


Figure 2. Most common localization of the traumatic injuries over the human body



Figure 3. Dog bite injury in the abdominal area.