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ANALYSIS OF CASES OF DOG BITES IN STARGARD, POLAND

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Abstract

The aim of this study was to analyse dog bites (n = 213) in the area supervised by the County Veterinary Inspectorate in Stargard between 2018 and 2020. The proportion of dog bites was significantly higher in 2018 (44%; $p < 0.05$) and in the summer (36%; $p < 0.05$). Adults (84%) were bitten significantly more often ($p < 0.05$) than children (16%). Most frequently (56%; $p < 0.05$) the bite took place in the home or on the owner's property. The highest percentage of bites (39%) was characteristic of 0 to 4-year-old dogs ($p < 0.05$). The proportion of biting males (70%) was significantly higher ($p < 0.05$) than that of females (30%). Mixed-breed dogs (77%) predominated ($p < 0.05$). The highest percentage of bites (16%) was caused by the smallest dogs (below 10 kg of body weight; $p < 0.05$). The proportion of bites caused by vaccinated dogs (81%) was significantly higher than that for unvaccinated animals ($p < 0.05$). The problem of dog bites requires further investigation, since the large proportion of cases is not reported.

Key words: *cynology, bites, dog breeding.*

INTRODUCTION

Millions of dog bites take place around the world every year (Desai, 2020). Most of these incidents are not serious, but the police have noted fatalities in Poland as well (Fiszdon and Boruta, 2012). In the vast majority of cases the victims are children (Abuabara, 2006; Chen et al., 2018), who very often experience trauma as a result (Fiszdon and Boruta, 2013; Reinholz, 2017). Failure to adequately supervise dogs leads to serious legal conflicts, injuries, and emotional disorders (following trauma) in people (Fiszdon and Boruta, 2012). Depending on the extent of the injuries, they may result in disability, deformation and mutilation of the body (Abuabara, 2006; Chen et al., 2018).

The subject of dog bites is linked to every aspect of raising a dog (Bernardo et al., 2000). Its later life will depend on the owner's level of awareness, commitment, and inclination (Edo and Estrada, 2016). Dog bites do not only result from aggression; they are more often due to a lack of awareness about dog breeds, breeding, diseases, and most importantly, a dog's individual needs (Abuabara, 2006; De Keuster et al., 2006). Very often it is the owners who bear responsibility for dog bites, when they purposely or unintentionally trigger aggression in the dog (Matthias et al., 2015). A lack of adequate supervision is the most common cause of dog bites, as dogs are territorial animals that defend their territory and may behave aggressively towards strangers (Abuabara, 2006).

Taking into account the above, the aim of this study was to analyse cases of dog bites in the area under the supervision of the County Veterinary Inspectorate in Stargard from 2018 to 2020, taking into account the sex and age of the victims, the circumstances of the incident, the time of year when it took place, and the type of dog.

MATERIALS AND METHODS

The research material consisted of documenttation provided by the County Veterinary Inspectorate in Stargard. These were documents from epizootic investigations containing statements from dog owners regarding cases of dog bites, taken down by a veterinarian. The data covered the period from 17 January 2018 to 31 December 2020.

The area under the supervision of the County Veterinary Inspectorate in Stargard includes the city of Stargard and the Stargard rural commune (Figure 1).

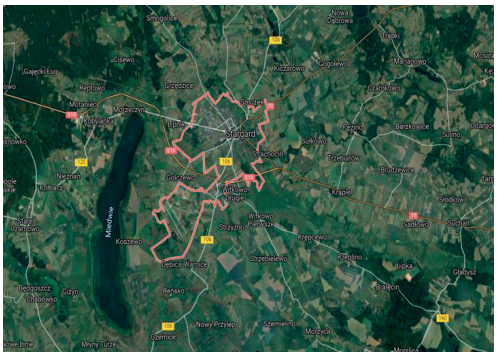

Figure 1. Map of the commune of Stargard, Poland
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A total of 213 cases of dog bites were described during the study period. The study took into account factors pertaining to the dog, the circumstances of the incident, and characteristics of the victims. For the analysis of dog age and body weight, four groups were distinguished (0 to 4, 5 to 8, 9 to 12 and 13 to 15 years, as well as 0 to 10, 11 to 24, 25 to 39 and 40 to 70 kg, respectively). Detailed analysis of dog bite cases was analysed using Microsoft Excel (Microsoft Inc., Redmont, WA, USA) and Statistica (v13.3, Tibco Inc., Tulsa, OK, USA). The Pearson's Chi-square test was used for determining the significance of differences in the number of dog bites. Statistical significance was declared at $p < 0.05$.

RESULTS AND DISCUSSIONS

The analysis of the reports of the County Veterinary Inspectorate in Stargard (2018-2020) showed that the number of dogs subject to epizootic control following a bite decreased from year to year (Figure 2).

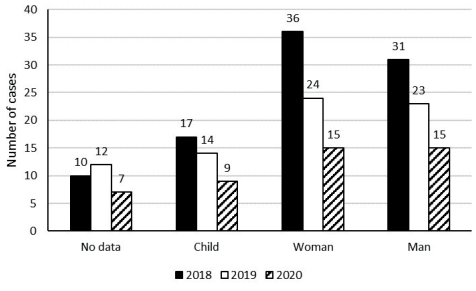

Figure 2. Characteristics of dog bite victims from 2018 to 2020

The number of dog bites was significantly higher in 2018 ($p < 0.05$; about 8 cases per month, 94 in total). In 2019 the number of dog bites fell slightly, by two cases a month (73 in total). In 2020 the number was only half of that recorded in 2018 (46 cases in total).
This may have been linked to lockdowns during the COVID-19 pandemic, when people's movements were severely restricted. Shoesmith et al. (2021) confirmed changes in the behaviour of dogs associated with the pandemic. More than 65% of those surveyed reported that during the first lockdown in 2020 they observed changes in their dogs' behaviour, e.g. apathy, depression and passivity.

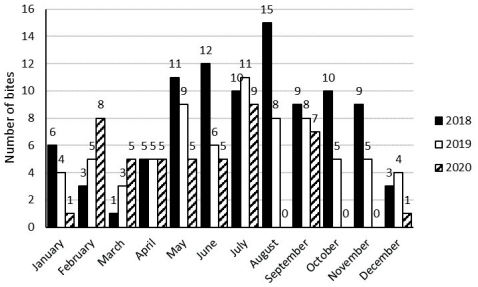

Figure 3. Number of dog bites in different months each year

Analysis of the circumstances of the incidents revealed that dog bites significantly more often took place in the summer ($p < 0.05$; Figure 3). About one-third of all bites occurred in the three-month summer period (from July to September). The increased number of dog bites in summer is probably explained by the fact that people were more active, and dogs spent more time outside of the home (Borud & Friedman, 2000; Fiszdon & Boruta, 2013). A similar pattern was observed by Fiszdon & Boruta (2013); in the period from June to October, twice as many dog bites were noted as in the remaining months of the year. Maksymowicz et al. (2016) also observed a large number of dog bites during the summer period (29.04% of all cases), similarly to Schalamon et al. (2006) and Rosado et al. (2009), who found the peak incidence of dog bites during August.
Among the victims, adult women were bitten more frequently (n = 94; 53%) than adult men (n = 84; 47%), but the difference was not statistically significant. The sex of minor

victims (under 18 years of age) was not reported in the bite records. Adults (n = 178; 84%) were bitten significantly more often ($p < 0.05$) than children (n = 35; 16%). A detailed information of child age was not provided in the records. Contrary to our findings, a study carried out in Spain (Rosado et al., 2009) showed a much higher percentage of children among victims of dog bites (30%), while research in the Netherlands revealed that dog bites were three times as common in children as in adults (Cornelissen and Hopster, 2010). According to the results of a Canadian study on the age of people bitten by dogs, 64% were adults and 36% were children (Guy et al., 2001a). A report on dog bite cases in various parts of the United States stated that the most common victims were children, and in 60-75% of cases the victims were under 20 years old (Overall & Love, 2001). The data pertaining to the site of the incidents (provided in 175 cases) are noteworthy (Figure 4).

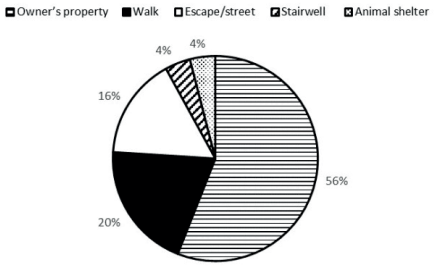

Figure 4. Sites of occurrence of dog bites from 2018 to 2020

Most often (56% of cases; $p < 0.05$) the bite took place in the home or on the owner's property. This was probably because the dog was defending its own territory or owner. Certain breeds are more likely to exhibit territorial behaviour and do so instinctively, without training. Most cases of this form of aggression, however, are taught and reinforced, more or less intentionally, by the dog's owner, who rewards this type of behaviour (Love & Overall, 2001; Jacobs et al., 2003; Taylor & Mills, 2006). In 20% of cases the dog bite took place away from the home (on a walk) (Figure 4). The cause of this type of bite may be 'lead reactivity', i.e. a dog's dynamic, unpleasant behaviour when a certain element appears in its surroundings (such as vehicles, objects, people or animals) (Shih et al., 2020; van Haaften et al., 2020). Not all behaviours that resulted in a bite were necessarily a specific form of aggression. The documentation did not contain information on any illnesses the dogs may have suffered from, their psychological state, or external factors.

Research conducted in the United States over 20 years (1979-1998) showed that about 75% of dog bites took place on the owner's property, of which 29% were associated with the dog being kept tethered (Sacks et al., 2000). Among 1,078 cases of dog bites in the Netherlands, 556, and thus slightly more than half, took place on the dog's territory, and in most cases (74%) the victim was the owner or another member of the household. These cases were usually less serious than those taking place in public spaces, and the victims did not usually require medical assistance (67% of cases) (Cornelissen & Hopster, 2010). Similar results were obtained in a study of dog bites in children. Among 100 such cases, 65 took place in the home, and 61 of the children bitten belonged to the family of the dog's owner. The bite usually took place during interactions between the child and the dog (Kahn et al., 2003; Horisberger et al., 2004; De Keuster et al., 2006). The reports analysed in that study did not contain information as to whether the property was inadequately secured or marked, or whether a stranger had intruded on the premises.

The animals observed under the supervision of the County Veterinary Inspectorate in Stargard also included very young dogs that had caused minor injuries (with their claws or teeth) to their owner/handler or a child belonging to the family. Many bites reported by the County Sanitary and Epidemiological Station in Stargard to the County Veterinary Inspectorate in Stargard were actually scratches.

In the present study, the age of the dogs ranged from 11 weeks to 15 years (mean = 5.8 years, SD = 3.5 years, n = 186; Figure 5). The highest number of bites (n = 74; 39%) was characteristic of 0 to 4-year-old dogs ($p < 0.05$). Further division of age groups according to breed was not possible due to the single representatives of individual breeds (most animals were mixed-breed dogs). Research conducted in Poland showed that the average age of a biting dog was about 5 years, but the study population also included two- and three-month-old puppies as well as 15-year-old dogs (Fiszdon and Boruta, 2012).

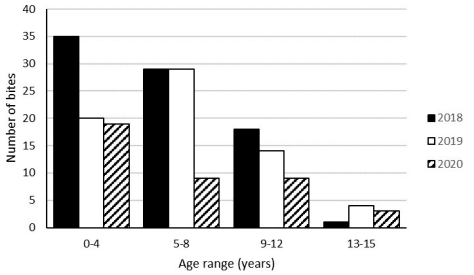

Figure 5. The number of dog bites according to dogs' age from 2018 to 2020

Beaver (1983) also reported a wide age range (from 9 weeks to 11 years among 120 analysed dogs), whereas Rosado et al. (2009) recorded values from 0 to more than 12 years among 657 examined dogs. In a Canadian study including 227 biting dogs, the average age was five years. All dogs were at least 6 months of age, and the maximum age was 15 years (Guy et al., 2001c). Another study carried out in Canada on 3,027 dogs showed the average age of four years. Most of the dogs were more than one year old, and the maximum age was 18 years (Guy et al., 2001b). The sex of the dogs was recorded in 196 cases (Figure 6).

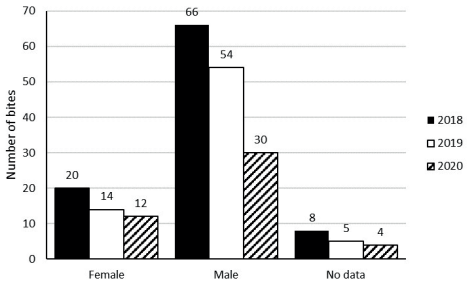

Figure 6. The number of dog bites according to dogs' sex from 2018 to 2020

The number of males (n = 150; 70%) was significantly higher ($p < 0.05$) than that of females (n = 46; 22%), although the number of dogs (both males and females) decreased from year to year. Ethological research suggests that male dogs display aggressive behaviour more often than females (Rosado et al., 2009). Offensive or territorial aggression may be positively correlated with testosterone levels (Nelson & Chiavegatto, 2001; Haug, 2008), but it is difficult to explain aggression caused by fear in this manner (Jacobs et al., 2003). Such a pronounced over-representation of males in the study material may also have been due to the preferences of dog owners who choose to keep male dogs rather than females (Fiszdon & Boruta, 2012).

From 2018 to 2020 dog bites were most often attributed to dogs of mixed breeds ($p < 0.05$; Table 1).

Table 1. Number of bites according to breed from 2018 to 2020

Breed of dog	2018	2019	2020
Mixed breed	66	52	29
French Bulldog	0	0	1
Polish Lowland Sheepdog	0	0	1
Shiba Inu	0	1	0
Saint Bernard	0	1	0
Polish Hunting Dog	0	1	0
West Highland White Terrier	1	0	0
Rottweiler	1	0	1
Australian Silky Terrier	1	0	0
Boxer	1	0	0
Beagle	1	1	0
German Shepherd Dog	6	5	3
Shih Tzu	2	1	1
Cocker Spaniel	1	1	1
Siberian Husky	1	1	0
American Staffordshire Terrier	2	2	2
Bull Terrier	1	1	0
Poodle	1	0	0
Golden Retriever	1	0	0
No data	8	6	7

According to a Canadian study, mixed breeds were predominant among canine veterinary patients which had bitten a member of the household (41.9%), followed by the Labrador Retriever (6.6%), Springer Spaniel (4.0%), Golden Retriever (3.5%), Lhasa Apso (3.1%), and Shih Tzu (3.1%) (Guy et al. 2001a). Analysis of more than 30 breeds showed that those most inclined to display aggressive behaviour in various situations were the Dachshund, Chihuahua and Jack Russell Terrier breeds (Duffy et al., 2008). Different percentages have been obtained for Poland: mixed breeds more than 65%, German Shepherd about 14%, and Dachshund 4.1%, with only single cases in other breeds (Fiszdon & Boruta, 2012). A similar distribution of breeds of biting dogs was obtained by Maksymowicz et al. (2016), with mixed breeds accounting for 41% and German Shepherds for 21%. This distribution is evidence of the popularity of these breeds rather than their behavioural predispositions. In Poland, dogs of mixed breeds are the most popular, while among pure breeds, German Shepherds account for 8.6% of pet dogs and

Dachshunds for nearly 3% (ZKwP, 2022). A Belgian study on dog bites in children showed that German Shepherds, which make up 29.3% of the population, accounted for 51.9% of cases. Second place was occupied by Rottweilers (20.4% of bites), with a 27.7% share of the overall population, followed by Labradors (16.7% of bites), for which the percentage of bites was significantly lower than their proportion in the overall population (38.1%) (De Keuster et al., 2006).

In the Netherlands, an analysis of cases of dog bites in various breeds in relation to their representation in the local population showed a significantly higher risk of bites in the case of Belgian Shepherds, Bouvier des Flandres, Dobermans, German Shepherds, Jack Russell Terriers, and Rottweilers, while the risk from mixed breeds was significantly lower (Cornelissen & Hopster, 2010).

The size of the dogs under observation was determined by veterinarians in 92 cases, who classified them as follows: small dogs up to 10 kg, medium dogs 11 to 25 kg, and large dogs over 25 kg (Table 2). The highest number of bites was caused by the smallest dogs ($n = 34$; $p < 0.05$). In 2019 and 2020 there was an increase in the number of bites from dogs weighing 25 to 39 kg. An interesting finding of the research is that dogs with body weight above 40 kg accounted for the lowest percentage of bites during the three-year period (max. 17% in 2019; $p < 0.05$). This may confirm the widespread opinion that giant breed dogs are house dogs that are not interested in physical activity and thus less likely to bite people (Shulan, 2010). It is difficult to state conclusively whether it was the predominance of large dogs in the population that explained their large share in reports of dangerous behaviour. In the research material there were no cases of dog bites resulting in death, and the dogs under observation often caused only minor injuries. A large dog, irrespective of its behaviour, often appears more dangerous, although dogs of any breed can be dangerous and very serious injuries to children were inflicted even by toy breeds (Collier, 2006; Fiszdon and Boruta, 2012). It may be presumed that small dogs that have bitten a member of the household were not reported and not placed under observation. However, it is worth noting a Canadian study, in which increasing body size was associated with a reduced odds of biting (Guy et al., 2001b). The average body weight of biting dogs was lower than that of non-biting dogs (Guy et al., 2001c).

Table 2. Percentage of bites by dogs' body weight from 2018 to 2020

Body weight range [kg]	Percentage of bites		
	2018	2019	2020
≤10	35	34	27
11–24	37	26	37
25–39	17	23	36
≥40	11	17	0

Information about vaccinations was given in 194 cases. The number of dog bites caused by vaccinated dogs was significantly higher than that for unvaccinated animals (158 vs. 36; $p < 0.05$; Figure 7).

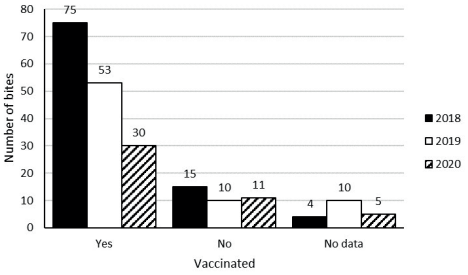

Figure 7. The number of dog bites according to vaccination status from 2018 to 2020

In 2018 the owners of 80% of dogs were able to present certification of rabies vaccination. The percentage of dogs confirmed to have been vaccinated against rabies was 73% and 65% in 2019 and 2020, respectively. This means that about 16 – 24% of owners did not have their dogs vaccinated, despite the fact that annual vaccination against rabies is the obligation of every dog owner. Veterinarians have no way to enforce this obligation, but can only recommend it during examinations. However, it cannot be directly determined whether unvaccinated status increases the frequency of biting (Fiszdon & Boruta, 2013).

CONCLUSIONS

The study indicates that the problem of dog bites has not been well investigated, and a large proportion of cases are not reported. Cases are most often reported when dogs are placed under

observation and the consequences of the bites are more serious. The victims of most dog bites in the study area were adults, while children were a clear minority. Bites most often occurred in the summer, usually on the owner's property. In most cases the dogs were 0 to 4 years old, and males were found to be more aggressive. Mixed-breed dogs predominated and the vast majority of animals were vaccinated.

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TECHNOLOGIES OF THE AGRO FOOD PRODUCTS PROCESSING