Characteristics of the Human and Pet Populations in Animal Bite Incidents Recorded at Two Air Force Bases

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ANIMAL BITES are a major community health problem in the United States. Hazards associated with them can be extremely serious. Each year more than 30,000 people are given specific postexposure rabies treatment as a result of being bitten. Although rabies must be considered, other infections such as tetanus and pasteurellosis can also be associated with animal bites (*1*). Many bite injuries are minor, some are serious, and a few are fatal; psychological trauma can also be a serious consequence. Studies show that children and males are at higher risk of bites than other persons (*2–4*).

Because the U.S. Air Force stresses complete reporting and thorough investigation of each bite incident and maintains comprehensive records, residents of two Air Force base populations formed the denominator populations for this study of the actual incidence of animal bites.

Methods

Data were collected from Scott Air Force Base, Ill., and Whiteman Air Force Base, Mo., for the period January 1976 through December 1977. Animal bite reports (AF Form 1551) and rabies quarantine notification form (AF Form 1552), which are completed for each reported bite incident, were evaluated. Of course, only those incidents in which the victim sought medical care or advice for the injury are included in this study. At the time of treatment, medical personnel completed AF Form 1551 and sent one copy to the Base Veterinary Service. Base Veterinary Service personnel then located and examined the animal if the incident occurred on base. Local civilian health authorities were notified if the bite occurred off base. Veterinary personnel then completed AF Form 1552 and, after the necessary quarantine period for the offending animal, a copy of this form was placed in the patient's records. Additional copies of both forms were maintained in the Base Veterinary Office.

The classification we used for severity of injury was a modification of a coding developed for automobile safety (*5*). The seven categories in the bite rating were no injury, minor, moderate, severe, fatal, severity unknown, and presence of injury unknown. Animals for which no owner could be located were classed as strays.

Estimates of the dog and cat, as well as the human, populations were obtained to calculate incidence rates and risk factors. Whiteman Air Force Base Personnel Office provided a computer-generated summary of the families housed on the base. A similar summary was not available for Scott Air Force Base, but the population was estimated by taking a 20 percent sample (with a random start) of records maintained on the occupants of each housing unit. Age and sex of each household member were recorded.

An estimate of the animal population was obtained

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by reviewing a systematic sample of records of pet registrations maintained by the respective Base Veterinary Services. At Scott Air Force Base, a 20 percent sample was examined. However, because of the smaller population housed at Whiteman Air Force Base, a 25 percent sample was evaluated. Since both the human and the animal populations for the areas off base were unknown, only on base populations were used in calculating incidence rates and relative risks.

Scott Air Force Base had 1,890 family housing units and Whiteman Air Force Base had 996 units, a difference that affected the total human and pet populations. However, the population density of pets and people by household was similar to that reported in other studies of nonmilitary communities (*6–9*), as the following comparisons show:

Animal ratios	*Present study*	*Schneider and Vaida (9)*	*Griffiths and Brenner (8)*
Dogs per 100 households	46.5	41.5	46.7
Cats per 100 households	13.0	27.9	33.9
Dogs per 1,000 persons	127.8	136	135
Cats per 1,000 persons	35.7	92.6	101

The pet populations of the two bases were similar by age, sex, and breed, except that Whiteman had a larger proportion of mixed breed dogs (50.9 percent), compared with Scott (29.1 percent). Nonsporting breeds were more popular at Scott (20.6 percent of the dogs) than at Whiteman (only 11.7 percent). The most popular breeds were similar to those reported by Tedor and Reif in 1978 (*10*). Poodles, German shepherds, dachshunds, cocker spaniels, and schnauzers accounted for more than 55 percent of purebred dogs.

All data were analyzed with the Statistical Analysis System (SAS 76) programs (*11*). The statistical level of significance chosen was $P \leq .01$. The chi-square test of independence was the statistical test of choice.

Results

In the records of the two bases were data on 696 bite incidents—437 (63 percent) from Scott Air Force Base and 259 (37 percent) from Whiteman Air Force Base. Ninety percent of the bite injuries were classified as minor; 69 percent were inflicted on the extremities in contrast to only 20 percent on the face, head, or neck of the victim. Other findings were that 74 percent of the bites occurred on the owner's property; 22 percent of the victims were bitten by their own pet or were a member of the owner's family; 58 percent of the incidents stemmed from some animal-victim interaction before the bite incident. Approximately 50 percent of the incidents occurred between noon and 6 pm. Finally, the highest incidence of bites was recorded for the late spring and summer months.

Dogs accounted for more than 76 percent of the bites in this study. Cats were participants in only 19 percent of the incidents, and various pet and wild rodents accounted for the remainder. Stray animals inflicted 9.5 percent of the 696 bites, and 48 percent of these (that is, 4.6 percent of the total) occurred on base. More than 70 percent of the bites were inflicted by

Table 1. Incidence rates of dog and cat bites by age and sex of biting species, two Air Force bases, January 1976–December 1977

Species and age	Bite rate [1]	Relative risk [2]	P value
Dogs			
Male:			
Under 1 year	10.6	2.4	≤ .01
1–4 years	12.1	2.8	≤ .01
5 years and older	6.7	1.5	NS
Female:			
Under 1 year	4.4	1.0	NS
1–4 years	6.5	1.5	NS
5 years and older	4.5	1	....
Cats			
Male:			
Under 1 year	3.1	[3]	....
1–4 years	3.3	[3]	....
5 years and older	2.7	[3]	....
Female:			
Under 1 year	1.4	[3]	....
1–4 years	4.5	[3]	....
5 years and older	0.0	[3]	....

[1] Bites per 100 animals per year.
[2] Calculated in comparison to females 5 years and older.
[3] Not calculated because of small numbers.
°NS = not significant at °$P < .01$.

Table 2. Incidence rates of animal bites, by breed of dog, two Air Force bases, January 1976–December 1977

Breed	Rate [1]	Relative risk [2]	P value
Collie	20.0	2.9	.01
German shepherd	17.4	2.6	.01
Cocker spaniel	13.7	2.0	.01
Labrador retriever	10.0	1.5	NS
Dachshund	8.7	1.3	NS
Schnauzer, miniature	8.6	1.3	NS
Poodle, miniature	7.1	1.04	NS
Mixed breed	6.8	1.0	...

[1] Bites per 100 animals per year.
[2] Calculated in comparison to mixed breed dogs.
NS = not significant at $P < .01$.

Table 3. Incidence rate of animal bites by American Kennel Club breed groupings, two Air Force bases, January 1976–December 1977

Group	Rate [1]	Relative risk [2]	P Value
Sporting	12.3	5.3	.01
Hound	7.7	3.3	NS
Working	10.9	4.7	.01
Terrier	7.8	3.4	NS
Toy	2.3	1	...
Nonsporting	7.4	3.2	NS
Mixed	6.8	3.0	NS

[1] Bites per 100 animals per year.
[2] Calculated in comparison to toy breeds.
NS = not significant at $P < .01$.

dogs less than 4 years old. Male animals were involved in 70 percent of the incidents.

Approximately 50 percent of the bite incidents occurred on the Air Force bases, and the data on these were used to calculate incidence rates and risk factors because population estimates were available only for the base housing units. The crude attack rate was 1,390 bites per 100,000 persons per year. There was a difference ($P \leq .01$) in the distribution of rates among the age and sex groups; boys 0–18 years had the highest risk of bites. The incidence rates by age and sex of the victim follow:

Victim	Bite rate [1]	Relative risk [2]	P value
Male			
0–18 years	2,419	5.4	≤ .01
19 years and older	830	1.9	≤ .01
Female			
0–18 years	1,883	4.2	≤ .01
19 years and older	448	1	...

[1] Bites per 100,000 human beings per year.
[2] Calculated in comparison with females 19 years and older.

The crude attack rate was 7.4 bites per 100 animals, with the on base pet population as the denominator. There was a statistically significant difference ($P \leq .01$) in the distribution of incidents among the animals' age and sex groups; male dogs 1–4 years old had the highest bite rate, that is, 12.1 bites per 100 animals (table 1); the highest relative risk was associated with this group of dogs ($P \leq .01$).

Several breeds of dogs had higher bite rates, as well as higher relative risk values than mixed breed dogs. The collie, German shepherd, and cocker spaniel had the highest attack rates (table 2). The sporting and working groups had the higher rates and relative risks when compared with the toy group (table 3). Breeds of the sporting and working groups were also more likely to inflict more severe injuries. More than 14.5 percent of the injuries involving sporting breeds were classified as moderate in contrast to the bites of nonsporting breeds, of which 3.2 percent were classified as moderate.

Discussion

There are several reasons why this study was conducted on U. S. Air Force bases. The Air Force routinely keeps records on each reported bite occurrence for both victim and the animal. Since medical care is available at no cost to the victim, the incidence rates probably are a more accurate estimate of the actual rate of bites than estimates for civilian communities. The incidence for animal bites calculated for the two bases was 1.7 times the estimate by Berzon and co-workers of 800 animal

bites per 100,000 persons (*12*). Finally, an equally important feature of the bases is that the human and pet populations are more easily defined because record-keeping is more complete than in civilian communities, and thus it is easier to calculate incidence rates and risk factors for both human beings and animals.

The main demographic difference between military family housing and civilian communities is that military family housing includes few single adult or older adult residents. But studies by others suggest that these segments of the population are not necessarily at highest risk of animal bites (*2–4, 12*). The base populations, however, include the portion of the population most likely to be bitten. The pet population of Scott and Whiteman were similar to the populations observed in surveys of civilian communities in the ratio of dogs to humans being (*6–9*). Also, the same breeds of dogs were most common in both kinds of communities (*6, 10*). In contrast, the ratio of cats to human beings on the bases was approximately one-half that reported by other investigators (*6–9*). A possible reason for this difference was that the civilian jurisdictions in the vicinity of the bases did not require cats to be licensed and, consequently, registration of cats on the military bases was lower than expected.

The high incidence rates of animal bites in this study were partly attributable to more complete reporting in this military setting. Evaluation of these rates suggests a somewhat greater magnitude of animal bites as a public health problem than previous estimates would indicate. Moreover, one high-risk group (males 0–18 years) accounted for most of this increase. Their rate was more than double the rates previously reported for this age group (*13*). This age group has also been reported to be at greater risk for serious bite injuries and facial bites (*2*).

The species and breed of animal are important variables in the incidence of bites. In our study, collies and German shepherds had twice the risk of being biters than mixed breed dogs. Other breeds might also have been at high risk as biters, but because of the few animals involved, accurate risk factors could not be calculated for breeds other than those listed in table 2. Our study and that of Parrish and co-workers (*4*) showed that working and sporting breeds, as groups, had a greater risk of being biters.

Certain breed groups also have a tendency to inflict more severe bites. In our study, 14.5 percent of the bite incidents that resulted in moderate injury involved sporting breeds and 8.2 percent, working breeds. In contrast, only 4.1 percent of the bites of hounds were classified as moderate injuries. Our findings are similar to those reported by Harris and co-workers (*3*).

Evaluation of the results suggests that the animal's age and sex have an effect on its biting behavior. Animals under 4 years and males had a greater risk of being biters.

The variation in the incidence rate by month and time of day appears to be closely related to degree of exposure; that is, outdoor activities probably reach a peak during the summer months and in the afternoon (*3*).

Efforts to reduce the incidence of animal bites must take into account demographic, zoographic, and environmental factors. Prevention efforts should be directed at both the potential victims and pet owners. Parents and children need to be informed of ways to avoid potential bite situations. At the same time, as Beck and co-workers (*2*) have suggested, attention must be directed not only at owners but also at the animals with a propensity for biting. Stray animals accounted for only 9.5 percent of the bites in our study. Restraint and control of pets on the Air Force bases probably reduced the number of bites by stray animals (only 4.6 percent of these occurred on the bases), but this circumstance would not prevent a child from approaching potential biters.

The incidence rates that are higher than in previous studies suggest a need to devise community health programs that will reduce the number of bites involving owned pets. More promising measures might be to acquaint prospective pet owners with behavioral traits of certain breeds so that they might then choose a pet that not only would fulfill their needs but also be less likely to bite. In addition, the potential owner's attitudes and actions might result in better care for the animal and help limit the number of potentially hazardous situations.

Harris and co-workers (*3*) suggested that the increased incidence of bites in New York City might partly be caused by a trend toward owning larger, more aggressive dogs. This trend toward larger dogs is also supported by the findings of Tedor and Reif (*10*), who reported increasing numbers of births of Irish setters, Doberman pinschers, Siberian huskys, Great Danes, and Laborador retrievers. Many animals in these larger breeds pose a greater risk than mixed breed dogs of being biters. Unless this trend is changed or more owners behave responsibly, the incidence of animal bites may well continue to increase.

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SYNOPSIS

HANNA, THOMAS L. (U.S. Air Force), and SELBY, LLOYD A.: *Characteristics of the human and pet populations in animal bite incidents recorded at two Air Force bases. Public Health Reports, Vol. 96, November–December 1981, pp. 580–584.*

Animal bites reported at Scott Air Force Base, Ill., and Whiteman Air Force Base, Mo., were investigated to determine the incidence of reported bites and possible causes. Data were collected by abstracting information contained in animal bite files maintained by the Base Veterinary Office. A total of 696 bite incidents were reported for the 24 months from January 1976 through December 1977.

An overall incidence rate of 1,390 bites per 100,000 persons was calculated from these statistics. This rate is far greater than the previous estimates of 800 animal bites per 100,000 for an urban population. Males less than 18 years old were the group most frequently bitten; they had an incidence rate of 2,419 bites per 100,000. These data support the hypothesis that animal bites occur more frequently than previous studies have shown.

Most bites resulted in minor injuries to the victim and were inflicted on the extremities. The incident occurred most commonly on the owner's property. The highest incidence of bites occurred during the summer months and in the early afternoon and evening. Animals in the study had a bite rate of 7.36 per 100 animals. The rate was significantly higher for male dogs 1 to 4 years old (12.1 bites per 100 male dogs).

Certain breeds of dogs were more frequently involved. Collies and German shepherds ran twice the risk of being biters as mixed breed dogs. Working breeds and sporting breeds also had a higher risk of being biters than toy breeds as well as a higher rate of more severe bites than toy breeds.