Epidemiological Profile of Dog Bite Cases in Basra City During 2023

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Abstract

Background: Dog bites pose a significant public health concern, particularly in resource-limited settings, due to their association with Rabies, a fatal central nervous system disease. In Basra City, baseline epidemiological data on dog bites and Rabies are crucial for developing effective control measures and resource allocation. Factors such as stray dogs, inadequate reporting, and low public awareness contribute to the persistence of this issue.

Objective: This study aimed to assess the incidence, associated factors, and demographics of dog bite victims, as well as to identify the distribution of dog bites and Rabies to guide targeted interventions and resource allocation.

Methods: A retrospective cross-sectional study was conducted to examine the epidemiological profile of dog bite victims in Basra City in 2023. Data were collected from public health departments and 10 primary healthcare sectors between February and August 2024.

Results: The incidence of dog bites in Basra City during 2023 was 46.7 per 100,000 population, with 77.7% of cases occurring in males. The most affected age group was 6–15 years (43.5%), and students comprised the largest victim group (44%). Stray dogs were responsible for 98.4% of the bites. Most injuries resulted in superficial ulcers (76.2%) and single bites (90%), predominantly on the lower limbs (64.1%). Immunoglobulin was administered to 89.2% of victims.

Conclusion: Dog bites represent a significant public health issue in Basra City, with a high incidence among males, children aged 6–15 years, and students. Targeted interventions, including timely medical treatment and enhanced measures for controlling stray dogs, are necessary to mitigate the impact of dog bites and reduce the risk of Rabies.

Keywords: Dog bites, public health, Stray dogs, Basra city, Incidence rates, Preventive measures

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Introduction

Dogs are the primary animals responsible for bite-related injuries, accounting for approximately 76% to 94% of cases. In the United States, the estimated annual incidence of dog bites presented to emergency departments is 1.1 per 1,000 individuals, with similar rates reported across various European countries. Incidence and epidemiological characteristics of dog bite injuries vary depending on geographical location, income level, industrialization, and cultural factors. (1)

Dog bites have a significant impact on human health due to the risk of rabies disease, an acute viral infection of the central nervous system. It primarily spreads through the bite of infected animals, such as domestic dogs and wild carnivores. (2) The virus, a rhabdovirus, resides in the salivary glands of infected animals and is transmitted through saliva during a bite. Upon entering the body, the virus travels along nerve tissue to the brain, where it establishes itself within the central nervous system. (2)

The incubation period is 2-3 months with an average of (2-12) weeks. Still, the duration may vary from 1 week to 1 year, depending on the location of the virus (exposure site), the distance from the brain, the viral load, and the victim's immunity. (3, 4) Dogs are the main rabies reservoir species, commonly infected by an unprovoked bite. Additionally, there are other reservoirs, including foxes, raccoons, skunks, bats, and wolves. (5)

Rabies is found on every continent except Antarctica and the Arctic and is present in 150 countries, particularly in Russia, Africa, and South America. (6) Regions with significant stray dog populations, such as Asia and Africa, account for 95% of cases, with 40% occurring in children under 15 years of age. Annually, tens of thousands of people die from Rabies. (7) However, in recent years, the prevalence of Rabies in South America has significantly declined due to the implementation of rabies control programs. (8)

Rabies typically begins with mild symptoms, including malaise, fever, sore throat, and loss of appetite. Paresthesia develops, and abnormal muscle movement occurs. (9) In most cases, this is followed by hyperactivity, excitable behavior, hallucination, lack of coordination, and hydrophobia. (10) The disease is nearly always fatal. (11)

Rabies is a vaccine-preventable disease. Vaccinating dogs is a crucial and highly effective strategy for preventing human rabies cases, as dogs are the primary source of rabies transmission to humans. By vaccinating a sufficient portion of the canine population through mass vaccination campaigns, we can create herd immunity, reducing the prevalence of Rabies in dogs and thereby minimizing the risk of human exposure. (12)

Understanding the epidemiological profile of dog bite victims, including incidence rates, demographic patterns, and associated risk factors, is crucial for developing effective public health strategies. This study aims to bridge the existing knowledge gap, enabling targeted resource allocation, designing preventive measures, and implementing control programs to reduce the burden of dog bites and prevent rabies transmission in the Basra community.

Methods

This retrospective cross-sectional study examined the epidemiological profile of dog bite victims registered in Basra City during 2023, focusing on their epidemiological characteristics. Data were collected from the Public Health Department and 10 primary healthcare sectors in Basra governorate from February 1, 2024, to August 30, 2024.

Official agreements were obtained from the Iraqi Ministry of Health and Environment, as well as the Basra Health Directorate.

The study population consisted of 1,544 individuals identified from records during the specified period. Although 2,006 cases were initially registered, 462 were excluded due to duplication. Data were collected using a standardized dog bite form provided by the Ministry of Health and Environment. It included information regarding the incidence and demographic characteristics of dog bite victims. All dog bite cases recorded in the study centers at Basra City during 2023 were included in this study. Files with more than three missing information were excluded.

The official agreement was obtained from the Scientific Council of the Arab Board of Health Specializations and the Ministry of Health and Environment, as well as the Basrah Health Directorate, Training and Human Resources Centre - Research Unit (Document No. 61).

The sociodemographic characteristics analyzed included sex, age, and occupation. Districts were categorized as 1st sector, 2nd sector, 3rd sector, Al Zubair, Al Medainah, Qurnah, Aldair, Al Harthah, Abo Al Khaseeb, and Shatt Al Arab. Bite descriptions were categorized into superficial ulcers, superficial invasive ulcers, superficial wounds, and invasive wounds. Other variables investigated were the number of bites (single or multiple), bite location (lower limbs, trunk, upper limbs, head/face, or multiple bites), type of dog (stray or owned), and immunoglobulin administration after exposure (yes or no). Statistical analysis was conducted using SPSS version 24. Chi-square tests were applied, and p-values of <0.05 were calculated to assess significance.

Results

*Note: All tables mentioned in this section are provided at the end of the article.

The incidence rate of dog bites in Basra city during 2023 was 46.7 per 100,000 population. The incidence was the highest in the first district, with a rate of 151 per 100,000 population, followed by residents of the AL-Zubair area, with an incidence rate of 68.0 per 100,000 population. On the other hand, the lowest incidence was seen among those living in the third district, with an incidence rate of 1.7 per 100,000 population.

In Basra City in 2023, a total of 1,544 victims were reported to have been bitten by dogs. Among them, 1201 (77.7%) were males and 343 (22.3%) were females. The ratio of males to females was 4.5:1.

Regarding the monthly distribution of dog bite cases, Figure 1 shows that the number of dog bites was highest in May, with 240 victims, followed by November, with 175 victims. Only three cases were reported in September 2023.

According to bite location, the majority of dog bites (64 %) affected the lower limbs. Regarding the depth of injury, the majority of participants (76.2%) reported superficial ulcers. While 12.7% of the patients had a superficial invasive ulcer, only 4.3% had an invasive wound. Single bites were seen in 90% of the victims, whereas multiple bites were found in just 10%. *According to dog type,* the vast majority of the dogs were stray dogs, accounting for 98.4% of the total, while owned pets made up just 1.6%, as shown in Table 1.

As shown in Table 2, the highest number of dog bites was observed in the first district, and nearly all age groups were similarly exposed to dog bites, with a slightly higher percentage in the 16–25-year-old age group (38.1%). The Al-Zubair district had the second-highest rate of dog bites, accounting for 29.5% of cases. Among those affected, the age group most commonly bitten by dogs was 6-15 years old, accounting for 34.4% of the total number of cases. Conversely, the third district had the lowest percentage of dog bites, with a rate of 0.4%. A highly significant difference was observed between the district and age, with a p-value of 0.001.

The highest percentage of dog bites was observed among males in almost all districts except in Al Qurnah, where the rate was higher among females at 9.0%. There were no significant differences between them, as shown in Table 3. The majority of children reside in the First District and Alzubair District, accounting for 34.0% and 21.8%, respectively, of reported dog bites. Similarly, a significant proportion of students, government employees, and retired individuals live in the Alzubair district, with rates of 33.1%, 52.0%, and 60.0%, respectively. Notably, there were significant statistical differences in rates based on district and occupation (p-value = 0.001). As shown in Table 4.

Table 5 demonstrates that dog bites mostly impacted the lower limbs across all age groups, followed by the upper limbs. The observed differences between the age and bite place were found to be statistically significant, with a p-value of less than 0.05.

The association of dog bite victims' sex with bite place was investigated, revealing that dog bites mainly impacted the lower limbs in both males and females, with a rate of 65.1% for males and 60.6% for females, respectively. The upper limbs were the second most affected, with rates of 28.1% for males and 35.0% for females. However, there were no significant differences between the two groups (p-value > 0.05), as seen in Table 6.

The majority of occupations showed a higher percentage of lower limb bites, and there were significant differences in the occurrence of these bites depending on the occupation and the type of dog bite (p-value < 0.05). Immunoglobulin was given to most of the victims, and there were no significant differences between them (p-value = 0.508), as demonstrated in Table 7.

Discussion

Dog bites are the most prevalent type of animal bite in countries with inadequate animal sanitation, particularly in areas where dogs are commonly kept. These bites result in a significant number of daily victims. (13) An examination of dog bite instances in Basra City in 2023 provides essential information on the patterns and causes of these events, emphasizing differences across various demographic and geographic groups.

The data show a significant gender difference in dog bite cases, with males comprising 77.7% of victims (male-to-female ratio: 4.5:1). This trend aligns with studies from Iraq (Baghdad, 2012 and 2020)(13, 14) and internationally (USA, 2019(15); Pakistan, 2023(16)), which also reported higher male involvement. This may be due to greater outdoor activity and risk exposure among males.

Geographic variation was also observed, with the highest incidence in the first district (151/100,000), while the third sector had the lowest. Similar patterns in other studies suggest urban areas face higher risks due to dense populations, increased stray dogs, waste presence, and socioeconomic factors. (17-19)

The increase in dog bite cases in May and November suggests a seasonal trend that may be attributed to several factors, including weather conditions, dog mating seasons, and increased human outdoor activity during these months. Research conducted in Iraq also found an increase in dog bite incidence during the warmer months, suggesting a potential link to the seasonal behaviors of both humans and

dogs (13, 19). Research conducted in India in 2019 (20) revealed a notable increase in the number of cases during the spring and winter seasons compared to other seasons, warranting further studies. Nevertheless, research conducted in Ethiopia in 2011 (21) revealed that the highest number of dog bite incidents took place during the autumn months, closely followed by the summer. Research conducted in Nigeria in 2018 (22) examined the incidence and features of dog bite wounds treated in the emergency department of a teaching hospital. The study revealed that the majority of dog bites occurred during the dry summer season. A study in Italy (2015) (23) has shown that the highest occurrence of dog bites and scratches was seen during the summer season.

The age group between 6 and 15 years included the most significant number of individuals who were bitten by dogs, accounting for 43.5% of the victims. This is a common trend observed in existing research. Children in their early years are at a higher risk of being bitten by dogs due to their more diminutive stature, unpredictable

behavior, and limited understanding of dog behavior (19, 24). Implementing educational programs specifically designed for this age range might play a crucial role in decreasing the occurrence of bites.

The occupational categories that suffered the most significant impact were students and self-employed individuals, accounting for 44% and 35.1% of the cases, respectively. This dispersion may be indicative of the greater levels of outdoor exposure experienced by these specific populations. Research in Spain (2008) (25) showed that those who engaged in a greater number of outdoor activities were more likely to have an increased risk of being bitten by dogs.

Most dog attacks targeted the lower limbs (64.1%), with the upper limbs being the second most afflicted area (29.7%). This conclusion aligns with research in Pakistan (2021) (26), which reported that limbs were the predominant locations targeted by bites. The higher occurrence of bites on the lower leg may be attributed to dogs perceiving a standing person as a potential threat and responding defensively.

The majority of dog bites led to superficial ulcers, accounting for 76.2% of cases. The significant proportion of less severe bites is consistent with the findings of McGuire et al. (2018) (27), who observed that while dog bites are prevalent, most of them do not result in serious injuries. Nevertheless, the occurrence of invasive wounds in 4.3% of incidents underscores the possibility of severe injuries and the need to seek immediate medical care.

The data reveals that 90% of the victims encountered individual bites, a finding supported by previous studies. (28) Multiple bites, though less frequent, may suggest more aggressive behavior or a greater degree of provocation.

About 98.4% of the bites were caused by stray dogs, highlighting a significant public health concern. The percentage of dog attacks from stray dogs aligns with research conducted in other areas characterized by comparable socioeconomic circumstances (26, 29). Implementing spaying and neutering programs, as well as public education efforts, can effectively manage the stray dog population.

Administering immunoglobulin to 89.2% of the victims demonstrates compliance with post-exposure prophylaxis standards, which is essential for avoiding Rabies, particularly in areas with a large number of stray dogs (30, 31). Nevertheless, the 10.8% of those who did not receive immunoglobulin highlights a deficiency in healthcare provision that requires attention. According to research in the USA (2020) (32), dog bites are mostly avoidable, and this research has identified risk factors that may guide preventive measures to decrease the occurrence of dog bites.

One of the study's limitations is its reliance on recorded data, which is prone to missing information and underreporting, and it does not include those treated in other non-governmental sectors. Additionally, there may be a considerable number of dog bite victims who do not seek medical care, especially if the injury is superficial. Moreover, the research lacks extensive contextual information about the specific circumstances surrounding the dog attacks, including the dogs' behaviors, the actions of the victims at the time of the bite, and whether the bite occurred in the morning or at night.

Conclusions

This study points toward a significant public health concern in Basra city. A relatively high incidence of dog bites in Basra, particularly among males, children aged 6-15 years, and certain students, underscores the need for targeted public health interventions such as timely medical treatment. The significant involvement of stray dogs in these incidents underscores the need for enhanced measures to control stray dogs and public awareness campaigns to mitigate the risk of dog bites. We recommend enhancing programs aimed at reducing the stray dog population by implementing measures such as sterilization, providing shelters, and implementing educational programs

in schools to instruct children on proper behavior around dogs and methods to prevent dog bites.

Conflict of Interest

The authors declare no conflicts of interest.

Acknowledgments

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Table 1: Distribution of Dog Bite Victims by Bite Description, Number of Bites, and Dog Type

Category		Frequency	Percentage
Bite description	Superficial ulcer	1176	76.2%
	Superficial invasive ulcer	196	12.7%
	Superficial wound	106	6.9%
	Invasive wound	66	4.3%
Number of bites	Single	1403	90.0%
	Multiple	141	10.0%
Dog type	Stray dog	1520	98.4%
	Owned pet	24	1.6%
Total		1544	100.0%

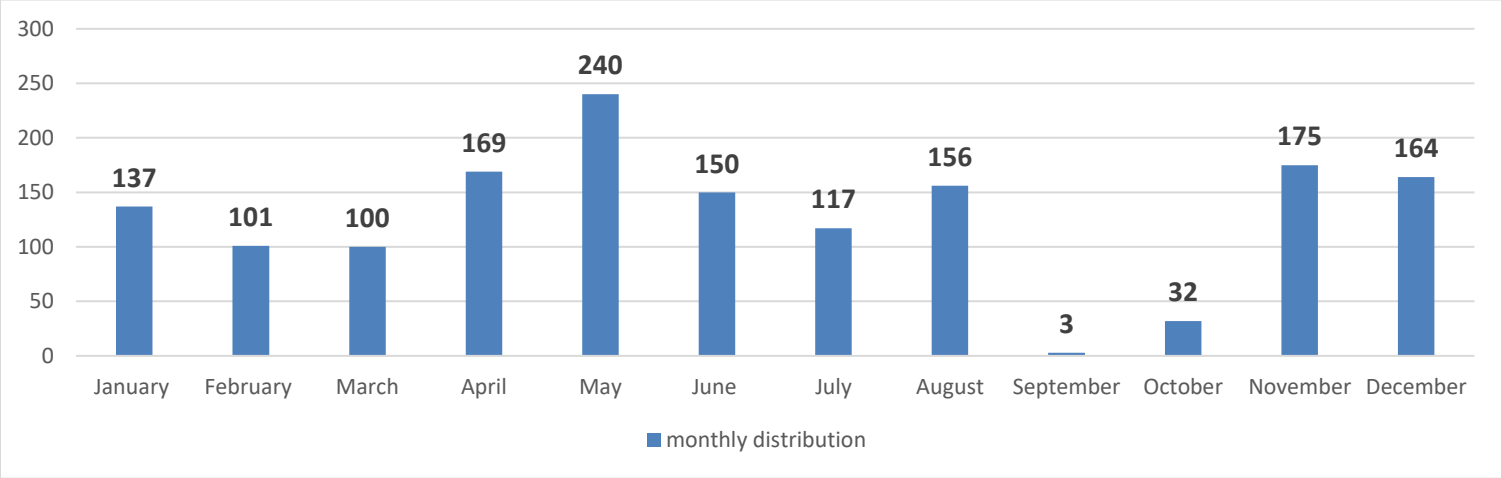

Figure 1: Monthly distribution of dog bite victims during 2023

Table 2: The association of dog bites according to age and district

District	≤ 5 years	6-15 years	16-25 years	26-35 years	36-45 years	≥ 46 years	Total	P-value
1st district	51 (37.0%)	207 (30.3%)	98 (38.1%)	54 (33.5%)	52 (37.1%)	62 (37.8%)	524	0.001
2nd district	16 (11.6%)	95 (13.9%)	34 (13.2%)	24 (14.9%)	22 (15.7%)	24 (14.6%)	215	
3rd district	1 (0.7%)	3 (0.4%)	1 (0.4%)	1 (0.6%)	0 (0.0%)	0 (0.0%)	6	
Alzubair district	27 (19.6%)	235 (34.4%)	51 (19.8%)	49 (30.4%)	42 (30.0%)	52 (31.7%)	456	
Almedainah	23 (16.7%)	51 (7.5%)	18 (7.0%)	8 (5.0%)	3 (2.1%)	6 (3.7%)	109	
Qurnah district	7 (5.1%)	44 (6.4%)	28 (10.9%)	9 (5.6%)	11 (7.9%)	11 (6.7%)	110	
Abu khatib	10 (7.2%)	20 (2.9%)	17 (6.6%)	8 (5.0%)	6 (4.3%)	4 (2.4%)	65	
Al Dair district	1 (0.7%)	14 (2.0%)	2 (0.8%)	0 (0.0%)	1 (0.7%)	1 (0.6%)	19	
Al Harthah district	0 (0.0%)	8 (1.2%)	1 (0.4%)	3 (1.9%)	1 (0.7%)	3 (1.8%)	16	
Shatt al arab district	2 (1.4%)	7 (1.0%)	7 (2.7%)	5 (3.1%)	2 (1.4%)	1 (0.6%)	24	
Total	138 (100%)	684 (100%)	257 (100%)	161 (100%)	140 (100%)	164 (100%)	1544	

Table 3: The percentage of dog bites according to sex and district

District	Male (%)	Female (%)	Total	P-value
1st District	33.1	36.7	524	0.411
2nd District	14.5	12.0	215	
3rd District	0.4	0.3	6	
Alzubair	29.9	28.3	456	
Almedainah	7.2	6.7	109	
Qurnah	6.6	9.0	110	
Abu Alkhasib	4.2	4.1	65	
Al Dair	1.5	0.3	19	
Al Harthah	0.9	1.5	16	
Shatt Al Arab	1.7	1.2	24	
Total	77.0	23.0	1544	

Table 4: The association of dog bites according to occupation and district

District	Child (%)	Student (%)	Self-employed (%)	Housewife (%)	Governorate Employee (%)	Retired (%)	Total	P-value
1st District	34.0	31.0	37.5	37.5	16.0	40.0	524	0.001
2nd District	10.3	14.0	15.1	12.5	20.0	0.0	215	
3rd District	0.6	0.6	0.2	0.0	0.0	0.0	6	
Alzubair	21.8	33.1	26.6	27.2	52.0	60.0	456	
Almedainah	16.0	7.9	4.6	2.9	4.0	0.0	109	
Qurnah	8.3	5.4	8.1	11.0	4.0	0.0	110	
Abu Alkhasib	7.1	3.2	4.4	5.9	0.0	0.0	65	
Al Dair	0.6	2.1	0.6	0.7	0.0	0.0	19	
Al Harthah	0.0	1.2	0.9	2.2	0.0	0.0	16	
Shatt Al Arab	1.3	1.5	2.0	0.0	4.0	0.0	24	
Total	100.0	100.0	100.0	100.0	100.0	100.0	1544	

Table 5: The association of dog bites according to age and bite place

Bite Place	≤ 5 Years	6-15 Years	16-25 Years	26-35 Years	36-45 Years	≥ 46 Years	Total	P-value
Lower Limbs	74 (53.6%)	427 (62.4%)	169 (65.8%)	108 (67.1%)	95 (67.9%)	117 (71.3%)	990	0.023
Trunk	6 (4.3%)	20 (2.9%)	6 (2.3%)	2 (1.2%)	1 (0.7%)	3 (1.8%)	38	
Upper Limbs	49 (35.5%)	202 (29.5%)	76 (29.6%)	45 (28.0%)	44 (31.4%)	42 (25.6%)	458	
Head and Face	5 (3.6%)	18 (2.6%)	0 (0%)	2 (1.2%)	0 (0%)	0 (0%)	25	
Multiple	4 (2.9%)	17 (2.5%)	6 (2.3%)	4 (2.5%)	0 (0%)	2 (1.2%)	33	
Total	138 (100%)	684 (100%)	257 (100%)	161 (100%)	140 (100%)	164 (100%)	1544	

Table 6: The association of dog bite victims' sex with the bite place

Bite place		Sex		Total	P – value
		Male	Female		
Lower limbs	Count	782	208	990	0.069
	% within sex	65.1%	60.6%	64.1%	
Trunk	Count	31	7	38	
	% within sex	2.6%	2.0%	2.5%	
Upper limbs	Count	338	120	458	
	% within sex	28.1%	35.0%	29.7%	
Head and face	Count	20	5	25	
	% within sex	1.7%	1.5%	1.6%	
Multiple	Count	30	3	33	
	% within sex	2.5%	0.9%	2.1%	
Total	Count	1201	343	1544	
	% within sex	100.0%	100.0%	100.0%	

Table 7: Associations between bite place, immunoglobulin administration, and occupation of dog bite victims.

Occupation	Child	Student	Self-employed	Housewife	Employee	Retired	Total	P-value
Bite Place								0.027
Lower Limbs	85 (54.5%)	427 (62.8%)	370 (68.3%)	83 (61.0%)	21 (84.0%)	4 (80.0%)	990	
Trunk	6 (3.8%)	20 (2.9%)	10 (1.8%)	2 (1.5%)	0 (0.0%)	0 (0.0%)	38	
Upper Limbs	56 (35.9%)	199 (29.3%)	148 (27.3%)	50 (36.8%)	4 (16.0%)	1 (20.0%)	458	
Head and Face	5 (3.2%)	18 (2.6%)	2 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	25	
Multiple	4 (2.6%)	16 (2.4%)	12 (2.2%)	1 (0.7%)	0 (0.0%)	0 (0.0%)	33	
IG*								0.508
No	17 (10.9%)	83 (12.2%)	51 (9.4%)	15 (11.0%)	1 (4.0%)	0 (0.0%)	167	
Yes	139 (89.1%)	597 (87.8%)	491 (90.6%)	121 (89.0%)	24 (96.0%)	5 (100.0%)	1377	
Total	156 (100%)	680 (100%)	542 (100%)	136 (100%)	25 (100%)	5 (100%)	1544	

*IG = immunoglobulin