Chapter

Occurrence of Dog Bites and Rabies within Humans in Srinagar, Kashmir

Namera Thahaby, Afzal Hoque Akand, Abdul Hai Bhat, Shabeer Ahmed Hamdani and Mudasir Ali Rather

Abstract

Open garbage dumps and dog bites are major public health problems in the Kashmir region. In Srinagar city, there are more than 91,000 dogs, or about one dog for every 12 citizens. The mounting street dog population is leading to increasing fright in the city due to the fear of rabies. Although treatable, rabies can be deadly without access to vaccines and treatment. Unfortunately, Kashmir is experiencing a shortage of the anti-rabies vaccine. More than 80,000 dog bites and 20 deaths due to rabies were reported in the Kashmir valley in the period 2008–2012. We conducted our study of dog bites in Srinagar, which has a large stray dog population, perhaps due to mismanagement of garbage. We obtained our data from Shri Maharaja Hari Singh (SMHS) Hospital. We found that most dog bite victims were males aged 30–40 years presenting with category 3 bites to the legs. The majority of victims were bitten in the evening and reported to the hospital the same day. Most victims received immunoglobin treatment. We suggest that proper garbage control can help to curb the stray dog population in the area and thus reduce the incidence of rabies.

Keywords: rabies, dog bites, Srinagar, Kashmir

1. Introduction

Open garbage dumps and dog bites are major public health problems in the Kashmir region. In Srinagar city, there are more than 91,000 dogs [1], or about one dog for every 12 citizens. More than 80,000 dog bites and 20 deaths due to rabies were reported in the Kashmir valley in the period 2008–2012 [2]. The area's Anti-Rabies Clinic (ARC), Shri Maharaja Hari Singh (SMHS) Hospital, depleted its stock of vaccine fourfold in a ten-month period [3]. The overwhelming majority of dog bite cases (9514) occurred in Srinagar [4]. Of these cases, 80% occurred in urban spaces and 20% occurred in rural areas.

2. Research methodology

The present study was conducted in the Srinagar district in Kashmir, which has a large stray dog population, perhaps due to mismanagement of garbage. We obtained data on dog bites and victims from SMHS.

Wards	North zone (9 wards)	South zone (9 wards)	East zone (8 wards)	West zone (8 wards)
1	Tarbal, JamiaMasjid, Kawdara	Malroo, Lawaypora	Harwan, Nishat	SafaKadal, IddGah
2	Zadibal, Madeen Sahib	BeminaKhumaniChowk	Dalgate, Lalchowk	Palpora
3	Lal Bazaar, Umer Colony	AllochiBagh, MagermalBagh	Dud Dal, Locut dal	Nawab Bazaar, Ali Kadal
4	Hazratbal, Tailbal	Rajbagh, JawaharNagar, WazirBagh	JogiLankar, Zindashah Sahib	Syed Ali Akbar, Islam Yarbal
5	New Theed, Alusteng	Mahjoor Nagar, Natipora, Chanapora	Ganpatyar, Barbarshah	Shaheed Gung, Karan Nagar
6	Zakoora	BaghatBarzallua, Rawalpora	BanaMohalla,Chinkral Mohalla, S.R.Gung	Qamarwari, Chattabal
7	Ahmad Nagar	Humhama	Akil Mir Khanyar, Khaja Bazar	Bemina East, BeminaWest
8	Soura, Buchpora	PanthaChowk, Khanmoh	Hasna Abad, Makhdoom Sahib	Parimpora, Zainakote
9	Nowshahra, Zoonimar	S.D.colony Batamaloo Nundrash colony		

Table 1.
Srinagar Municipal Corporation zones and wards.

We categorized the incidents into zones as per the Srinagar Municipal Corporation, as shown in **Table 1**. This was done to determine which zone recorded the greatest number of cases.

3. Results

Table 2 shows the distribution of dog bite victims according to gender and zones (**Figure 1**). Overwhelmingly, the majority of victims in each zone are male. In the east zone, 82.23% of victims were males and 17.76% of victims were females. In the west zone, 71.90%, of victims were males and 28.09% of victims were females. In the north

Gender	Zones			
	East	West	North	South
Male	162 (82.23)	238 (71.90)	213 (72.94)	236 (73.06)
Female	35 (17.76)	93 (28.09)	79 (27.05)	87 (26.93)
Pooled	197	331	292	323
	$\chi^2 = 8.023$, $p = 0.045$			

Figures in parentheses indicate percentage.
**indicates difference at 5% level of significance.*

Table 2.
Distribution of victims according to gender and zone.

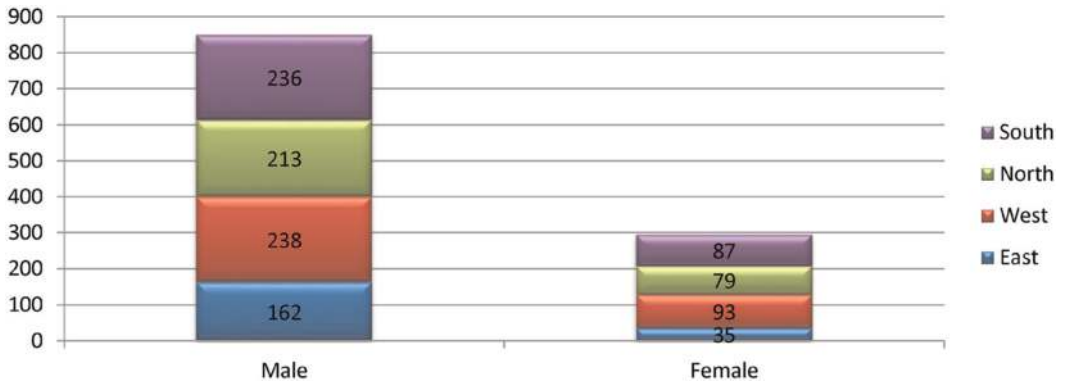

Figure 1.
Distribution of dog bite victims according to gender and zone.

zone, 75.94% of victims were males and 27.05% of victims were females. In the south zone, 73.06% of victims were males and 26.93% of victims were females. Statistically, there is a nonsignificant difference concerning gender for different zones. **Table 3** shows the distribution of victim age according to zones. In the east zone, 24.87%, of victims were aged 30–40 years, 19.28% of victims were aged 20–30 years, 14.72% were aged 10–20 years, 12.89% were aged 40–50 years, 12.69% were aged 1–10 years, 9.64% were aged 50–60 years, and the remaining 6.59% of victims were aged 60 years and older.

The same pattern was observed for the west, north, and south zones. Statistically, there is a nonsignificant difference concerning age for different zones. **Table 4** shows the date of reporting according to different zones. In the east zone, 67.51% of victims reported on the same day, 25.88% reported after a day or more, and the remaining 6.59% reported after a week. The same pattern was observed among the other zones. Statistically, there was a nonsignificant difference concerning the date of reporting for different zones. **Table 5** depicts the distribution of victims according to the time of

Age	**Zones**			
	East	**West**	**North**	**South**
1–10 years	25 (12.69)	33 (9.96)	33 (11.30)	39 (12.07)
10–20 years	29 (14.72)	43 (12.29)	43 (14.72)	58 (17.95)
20–30 years	38 (19.28)	63 (19.03)	58 (19.86)	64 (19.81)
30–40 years	49 (24.87)	102 (30.81)	84 (28.76)	70 (21.69)
40–50 years	24 (12.18)	44 (13.29)	32 (10.95)	45 (13.93)
50–60 years	19 (9.64)	31 (9.36)	22 (7.53)	22 (6.81)
60 years and older	13 (6.59)	15 (4.53)	20 (6.84)	25 (7.73)
Pooled	197	331	292	323
Mean SD	33.91 17.49	47.28 28.22	41.7 22.6	46.14 18.75
	χ^2 = 15.726, p = 0.611			

Figures in parentheses indicate percentage.
**indicates difference at 5% level of significance.*

Table 3.
Distribution of dog bite victims according to age and zone.

Date of reporting	Zones			
	East	West	North	South
Same day	133 (67.51)	255 (77.03)	221 (75.68)	261 (80.80)
After one day or more	51 (25.88)	63 (19.03)	55 (18.83)	45 (13.93)
After a week	13 (6.59)	13 (3.92)	16 (5.47)	17 (5.26)
Pooled	197	331	292	323
	χ^2 = 14.103, p = 0.028			

Figures in parentheses indicate percentage.
**indicates difference at 5% level of significance.*

Table 4.
Distribution of dog bite victims according to date of reporting and zone.

Time of exposure	Zones			
	East	West	North	South
Morning	58 (29.44)	86 (25.98)	63 (21.57)	55 (17.02)
Daytime	17 (8.62)	28 (8.45)	29 (9.93)	29 (8.97)
Evening	106 (53.80)	203 (61.32)	183 (62.67)	227 (70.27)
Night	16 (8.12)	14 (4.22)	17 (5.82)	12 (3.71)
Pooled	197	331	292	323
	χ^2 = 21.524, p = 0.01			

Figures in parentheses indicate percentage.
**indicates difference at 5% level of significance.*

Table 5.
Distribution of dog bite victims according to time of exposure and zone.

Time of reporting	Zones			
	East	West	North	South
Morning	72 (36.54)	98 (29.60)	85 (29.10)	83 (25.69)
Day	28 (14.21)	54 (16.31)	44 (15.06)	46 (14.24)
Evening	84 (42.63)	165 (49.84)	153 (52.39)	179 (55.41)
Night	13 (6.59)	14 (4.22)	10 (3.42)	15 (4.64)
Pooled	197	331	292	323
	χ^2 = 12.34, p = 0.194			

Figures in parentheses indicate percentage.
**indicates difference at 5% level of significance.*

Table 6.
Distribution of dog bite victims according to time of reporting and zone.

exposure for different zones. In the east zone, 53.80% of victims were bitten by dogs in the evening, 29.44% were bitten in the morning, 8.62% were bitten in the daytime, and 8.12% were bitten in the nighttime. The same pattern was again seen in the other

Site of bite	Zones			
	East	West	North	South
Face	2 (1.01)	7 (2.11)	3 (1.02)	7 (2.16)
Hands, arms, & shoulders	26 (13.19)	75 (22.65)	65 (22.26)	70 (21.67)
Legs	125 (63.45)	173 (52.26)	159 (54.45)	190 (58.82)
Knees, thighs	26 (13.19)	31 (9.36)	25 (8.56)	22 (6.81)
Buttocks	14 (7.10)	36 (10.87)	33 (11.30)	30 (9.28)
Abdomen & back	4 (2.03)	9 (2.71)	7 (2.39)	4 (1.23)
Pooled	197	331	292	323
$\chi^2 = 21.899$, p = 0.11				

Figures in parentheses indicate percentage.
**indicates difference at 5% level of significance.*

Table 7.
Distribution of dog bite victims according to site of bite and zone.

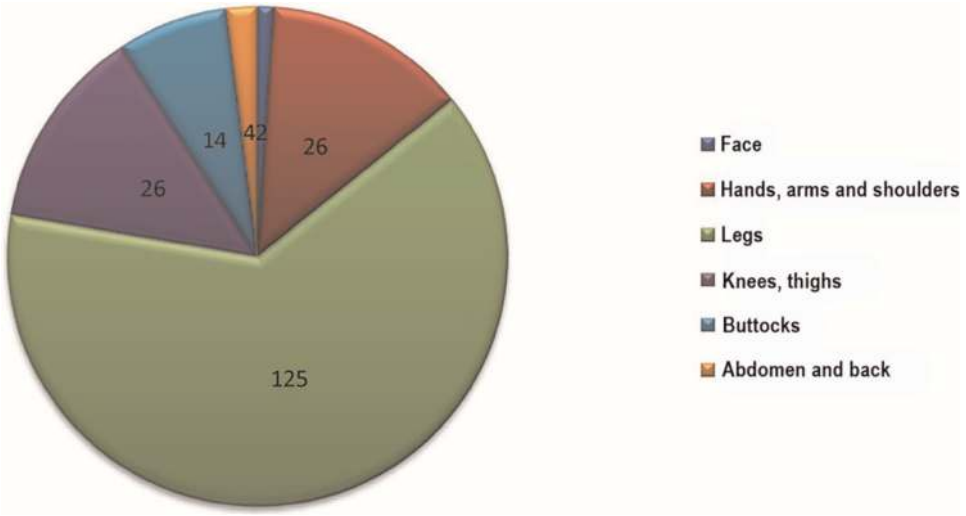

Figure 2.
Site of bite.

Category of bite	Zones			
	East	West	North	South
1	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
2	47 (23.85)	114 (34.44)	92 (31.50)	88 (27.24)
3	150 (76.14)	217 (65.55)	200 (68.49)	235 (72.75)
Pooled	197	331	292	323
Fisher exact test = 0.04*				

Figures in parentheses indicate percentage.
**indicates difference at 5% level of significance.*

Table 8.
Distribution of dog bite victims according to category of bite and zone.

Immunoglobin	Zones			
	East	**West**	**North**	**South**
Received	153 (77.66)	266 (80.36)	246 (84.24)	282 (87.30)
Didn't receive	44 (22.33)	65 (19.63)	46 (15.75)	41 (12.69)
Pooled	197	331	292	323
	$\chi^2 = 10.085$, $p = 0.017$			

Figures in parentheses indicate percentage.
**indicates difference at 5% level of significance.*

Table 9.
Distribution of dog bite victims who received immunoglobin treatment according to zone.

zones. Statistically, there was a nonsignificant difference concerning the time of exposure for different zones. **Table 6** depicts victims according to the time of reporting for different zones. In the east zone, 42.63% victims reported in the evening, 36.54% reported in the morning, 14.21% reported in the daytime, and 6.59% reported in the nighttime. **Table 7** depicts victims according to the site of the bite. In the east zone, 63.45% of victims had bites on the legs, 13.19% had bites on the hands, arms, and shoulders, 7.01% had bites on the buttocks, 13.19% had bites on the knees and thighs, 1.01% had bites on the face, and 2.03% had bites on the abdomen and back. Likewise, the other zones showed a similar trend. Statistically, there was a nonsignificant difference concerning the site of bite for different zones (**Figure 2**). **Table 8** depicts victims according to the category of bite. In the east zone, 76.14% of victims had category 3 bites, while 23.85% had category 2 bites. A similar pattern was observed for the other zones. **Table 9** depicts victims according to those who received immunoglobin treatment. In the east zone, 87.30% of victims received immunoglobin, while 12.69% did not. The other zones showed a similar distribution. Statistically, there was a nonsignificant difference in receiving immunoglobin for different zones.

4. Discussion

Rabies is a deadly disease if not treated promptly and properly. In our study, we collected data on dog bite victims and patterns in different zones in Srinagar, Kashmir. We found that males were bitten more than females, which is likely due to the fact that men in the area venture out of their homes to go to work more often than the women do. Most victims are 30 to 40 years old, which conforms with the findings of Mohammadzadeh et al. [5] and Agarvval and Reddaiah [6]. Due to fear of rabies, most victims reported to the hospital on the same day they were bitten. The highest number of cases was seen in the evening when people usually return from work and school. The site of the bite is important, as the rabies virus has broad tissue tropism. The majority of dog bites were to the legs, which other studies by Ain et al. [4], Acharya et al. [7], Chopra et al. [8], and Agarvval and Reddaiah [6] have also confirmed. When a dog threatens a person, it typically bites the lower extremities. Conversely, when a person threatens a dog, the dog is more prone to biting the upper extremities. Although only some of the bites were to the face and head, we observed that children aged younger than 10 years were more prone to being bitten on the head compared to older victims. Typically, children display offensive acts toward dogs, and the head of a

child is closer to the mouth of a dog. Most of the bites were category 3, which means the bites penetrated the skin and caused deep wounds. Victims of category 3 bites received immunoglobin treatment. The west zone of the city experienced the greatest number of dog bite incidents. This might be because the area is crowded and has many open garbage dumps, which attract stray dogs and increase the risk of rabies transmission. The west zone is a downtown area where streets are densely inhabited and where people regularly throw food into the streets. The accessibility of food in the garbage not only augments fertility in dogs but also makes them more prone to attack humans whom they may view as competition for food.

5. Conclusion

Open garbage dumps are a public health problem and they have led to an increased stray dog population in Srinagar, Kashmir, and thus an increased incident of dog bites and rabies cases. We suggest that proper garbage control can help to curb the stray dog population in the area and thus reduce the incidence of rabies.

Abbreviations

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