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# Imposing COVID-19 lockdown and reported dog bite cases: An experience from a tertiary antirabies center of North India



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## ABSTRACT

The world was taken aback after the corona pandemic started from China and soon engulfed the whole of the world. Strict restrictions were in place since the beginning, and people were confined to their homes; only emergency services were allowed to work. The study's objectives were to see the effect of lockdown on the number of dog bite cases being reported to our antirabies clinic. The study was conducted in the antirabies clinic of the Department of Community Medicine, Government Medical College, Srinagar, Jammu & Kashmir. This study involved a dog bite victim who approached the said clinic during the lockdown, which was implemented in the wake of COVID-19 from March 21, 2020 to June 03, 2020. We included all the dog bite victims living in the Srinagar city and from the adjoining districts who had been bitten by the street dog during the lockdown phase. Over 5 years, 4,670 (73.6%) dog bites among males were reported. The proportion of dog bites among males varies from 72% to 81% in the 5 years. It can be observed that a maximum of 783 (81.1%) dog bites were reported from males during the lockdown period in 2020. Moreover, 2,847 (44.9%) bites were category II dog bites, while 3,392 (55.1%) were category III dog bites. There were fewer dog bites reported at the first, fourth, seventh, eighth, and ninth weeks while there was a little surge in cases on the 2nd, 3rd, 5th, 6th, and 10th week. Lockdown had indirectly reduced the number of dog bite cases reported to the clinic during different lockdown phases than the previous year's data.

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## Introduction

Rabies is a zoonotic viral disease of the central nervous system caused by Lyssavirus type -1, which belongs to Rhabdoviridae. Rabies in dogs is a source of 99% of human infections, and all the warm-blooded animals, including man, are susceptible to rabies, which can be transmitted to man by contact, bites, and licks of rabid animals (Satapathy et al., 2020).

Dog bites are the primary source of human infection in all endemic rabies countries and account for 96% of rabies in the South East Asia region (Kulkarni, 2016). Most dog bites occurred in or near the home by an animal known to the child/family (Khan et al., 2020). Despite the availability of effective post-exposure vaccine treatment among humans and effective vaccines among

animals, rabies is estimated to kill 50,000 to 60,000 people worldwide each year (Masiira et al., 2018). Among the unvaccinated population, rabies is almost always fatal if post-exposure prophylaxis is not administered before the onset of symptoms (Punguyire et al., 2017). As the United Nations has sought to reorganize its activities around the recently-ratified Sustainable Development Goals, "neglected diseases" are now firmly on the agenda (UN, 2015), and WHO (2016) has also endorsed a plan to eliminate human cases of rabies by 2030 (Rock et al., 2017).

An estimated 35 million stray dogs live in India, and according to the World Health Organization, India faces about 18,000 to 20,000 cases of rabies every year (Singh, 2018). The stray dogs' ecology on the streets is maintained by a combination of factors that exponentially affect the dog population. These factors include the breeding of unowned dogs, abandonment of owned dogs by irresponsible owners, and, most importantly, open garbage (Tiwari et al., 2020). Stray dogs mostly rely on garbage while hunting for edibles. Countries that have waste kept in bins and are cleaned regularly see a lesser number of stray dogs. Moreover, many pet

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dogs are abandoned by their owners when they fall sick, get old or injured. They are being dumped on the streets, taking a toll on stray dog population (Aathira, 2018). After 2001, stray dogs present on the Indian roads have seen a tremendous increase in their growth after a law was passed, making the killing of stray dog's illegal. Over these years, the problems related to street dogs have exacerbated; the street dog population has drastically increased, and human: dog conflicts have led to rabies cases in humans to rise (Harris, 2012).

There are few data on the incidence of animal bites and, the epidemiology of dog bites in India. A decade earlier, a study carried out reported the national incidence of animal bites as 17.4 of 1,000 population (Sudarshan et al., 2007). After a thorough literature search, we have seen a significant difference in dog bites' severity and frequency during different seasons of the year in other parts of the country. In a study, dog bites were more severe in winters and springs, with a significantly higher proportion of Category III bite exposures being observed in these seasons than other seasons (Bashar and Duggal, 2019). In another study conducted in Kashmir valley, it was observed that the frequency of animal bite cases was less in winter months viz November, December, January, and February as these 4 months are usually the coldest months of the year in Kashmir valley (Saleem et al., 2018). It was found that the frequency of animal bite cases increases with the arrival of spring, that is, the month of March (Saleem et al., 2018).

The corona virus pandemic, starting in China, soon engulfed the whole of the world. Our part of the world was also hit severely, and soon a lockdown was put in place to cut down its spread. The lockdown period, which was implemented in India for COVID-19, started on March 21 until June 03, 2020, in 4 phases. Phase 1 (weeks 1-3) and Phase 2 (weeks 4-6) had 3 weeks interval each while Phase 3 (weeks 7-8) and Phase 4 (week 9-10) were of 2 weeks interval each respectively ("Centre extends nationwide lockdown till May 31, new guidelines issued: The Tribune India," 2020). The strict restrictions were in place since the beginning, and people were confined to their homes. Schools, colleges, and other business establishments were shut down, and people were not allowed to move out on the streets. Only emergency services were allowed to work. In this context, we framed a question, whether there was any effect of lockdown on the reported dog bite cases in our region or not. We conducted this study on dog bites with the objectives to see the implications of lockdown on the number of dog bite cases being reported to our antirabies clinic, which will be considered a proxy indicator of the effectiveness of the lockdown in place.

## Methodology

The study was conducted in the antirabies clinic of the Department of Community Medicine, Government Medical College, Srinagar, Jammu & Kashmir.

The clinic became functional in the year 2004 and is under the Department of Community Medicine, Government Medical College, and associated Hospital, Srinagar. It caters to the needs of the adjoining areas. Often, patients from all the Kashmir division districts visit the said clinic whenever required for expert opinions related to animal bite cases. The clinic has a record register on which details of all the animal bite victims are recorded. The details include sociodemographic information, clinic details related to the dog bite incident, category of bite, site of the dog bite, and other necessary information. This study involved a dog bite victim who approached the said clinic during the lockdown, which was implemented in the wake of COVID-19 from March 21, 2020 to June 03, 2020. We included all the dog bite victims living in the Srinagar city and from the adjoining districts who had been bitten by the street dog

during the lockdown phase. As 95% of the population of Kashmir valley follow Islam and the religion discourage owning a pet dog due to the chance of infection (Banderker, 2000), we only had 6 reported pet dog bites cases over the last 5 years. In this view, pet dog bites were excluded from the data analysis. A total of 783 individuals reported dog bite cases and were included in the study after informed consent. Moreover, a record review of the cases of dog bites was done for the last 5 years at the clinic, and secondary data were obtained for comparison with the trend of the current dog bite cases in the lockdown period.

## Data analysis

The data were entered into Microsoft Excel spreadsheets and analyzed using proportion and trend analysis using Microsoft Excel 2016. To analyze the difference in the number of reported cases during the period March 21 to June 03 across different years, Chi-square goodness of fit was used. The null hypothesis "Number of cases reported during a phase is equal across different years" was tested.  $P$  value  $<0.05$  was considered significant at 95% confidence interval.

## Results

Gender of bite victims and category of dog bite cases attending the Department of Community Medicine's antirabies clinic from the year 2016-2020 are shown in Table 1. Over 5 years, 4670 (73.6%) dog bites among males were reported. The proportion of bites among males varies from 72% to 81% in the 5 years. It can be observed that a maximum of 783 (81.1%) dog bites were reported among males during the lockdown period in 2020. Moreover, 2,847 (44.9%) bites were category II dog bites, while 3,392 (55.1%) were category III dog bites. In 2016, 885 (60.7%) dog bites were category II, while in the year 2019, 840 (68.0%) dog bites were category III.

The frequency of dog bite cases attending the antirabies clinic has been illustrated in Figure 1. The lockdown period implemented in India for COVID-19 started on March 21 until June 03, 2020 in 4 phases. Phase 1 (weeks 1-3) and Phase 2 (weeks 4-6) had 3 weeks interval, while phase 3 (weeks 7-8) and phase 4 (9-10) were of 2 weeks interval respectively. It is clearly shown in the figure that there were fewer dog bites reported at weeks 1, 4, 7, 8, and week 9, while there was a little surge in cases on weeks 2, 3, 5, 6, and week 10. While comparing with the data record of the previous years during the same period, it can be observed that a fewer number of dog bite cases were reported during the lockdown period.

The total number of dog bite cases reported in 5 years from 2016-2020 during the same period, March 21 to June 03, is illustrated in Figure 2. A significant decline in the number of dog bite cases in the year 2020 is observed during lockdown period and can be seen in the graph. ( $P < 0.001$  for all phases of the lockdown).

## Discussion

The study is a record based cross-sectional study conducted in the antirabies clinic of the Department of Community Medicine, Government Medical College, Srinagar, Jammu, and Kashmir. The study was undertaken to determine the effects of 4 phases of lockdown, which was imposed on behalf of COVID-19 mitigation and control strategies on the reported dog bite cases in the Union territory of Jammu & Kashmir. The lockdown was put in place in a phasic manner with effect from March 21, 2020 until June 03, 2020. The number of dog bites reported to the antirabies clinic during the lockdown period was analyzed and compared to the data of reported dog bites from the last 4 years during the same period.

**Table 1**

Gender and category of dog bite cases attending antirabies clinic of Department of Community Medicine during March 21 to June 03 (2016-2020).

Year	Gender		Category of dog bite		Total N (%)
	Male n (%)	Female n (%)	Category II n (%)	Category III n (%)	
2016	1051 (72.1)	406 (27.9)	885 (60.7)	572 (39.3)	1,457 (100)
2017	943 (72.4)	359 (27.6)	714 (54.8)	588 (55.2)	1,302 (100)
2018	1,025 (74.3)	354 (25.7)	527 (38.2)	852 (61.7)	1,379 (100)
2019	928 (75.0)	308 (25.0)	396 (32.0)	840 (68.0)	1,236 (100)
2020	783 (81.1)	182 (18.9)	375 (38.8)	590 (61.2)	965 (100)
Total N (%)	4,670 (73.6)	1,669 (26.4)	2,847 (44.9)	3,392 (55.1)	6,339 (100)

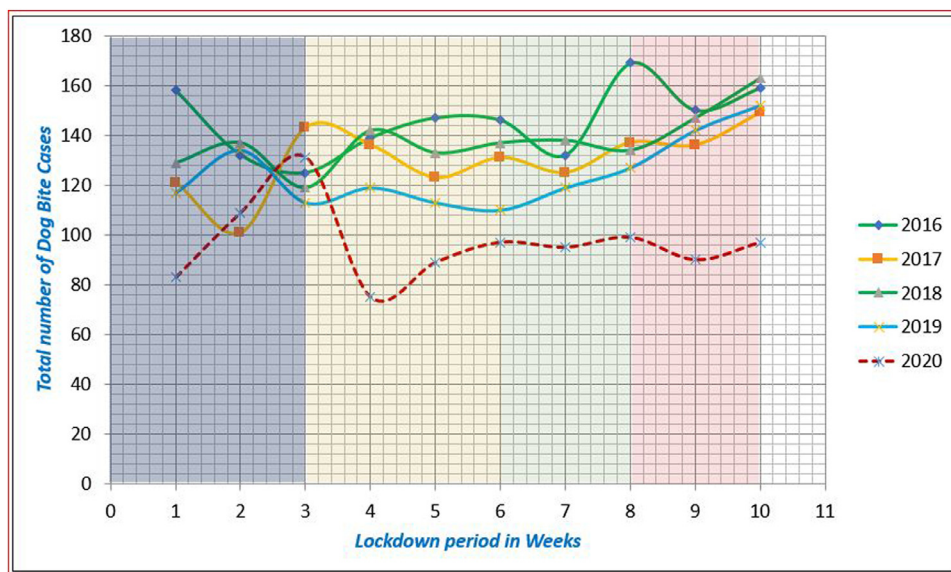
**Figure 1.** Line diagram showing frequency of dig bite cases in different phases of lockdown (2016-2020).

Table 1 describes the number of dog bite cases reported during the lockdown phases from March 21 until June 03, 2020 and the data set of the last 4 years (2016-2019) from the same period for comparison. While comparing the percentage of male and female reported dog bites, the rate of male dog bites reported was higher each year than the percentage of reported female dog bites. During 2016, the percentage of male dog bites was 72.1%, compared to 27.9% among females. During 2017, the rate of reported male dog bites was 72.4% compared to 27.6% among females, while it was 74.3% among males and 25.7% among females during 2018. During 2019, the reported male dog bite was 75.0% compared to 25.0% among females, and during 2020, the reported male dog bites were 81.1%, while among females, it was only 18.9%. It was observed that males have a higher rate of dog bite incidences than their female counterparts. Similar findings were present in studies conducted (Hsiao et al., 2012; Olarinmoye et al., 2017; Qi et al., 2018) in which they found a higher incidence of dog bites among males. Our study found a higher number of reported dog bite cases among men, especially during the period of lockdown. These findings can be explained by the fact that men usually tend to take more risks and quickly adapt to take adverse actions leading to more human-dog conflicts, which result in more cases of bites among them. Moreover, during the lockdown period, men were socially bound to hit markets for immediate grocery purchases and attend duties leaving their female counterparts back home. During the process, they were more exposed to street dogs, resulting in more human-dog interactions and dog bites.

While we are comparing the percentage of category II and category III dog bites, the percentage of category III dog bites was found to be higher when compared to category II bites except during 2016 when the percentage of category II bites (60.7%) was more than category III bites (39.3%). During 2017, 2018, 2019, and 2020, the category III bites percentage was more than category II bites. Similar findings were reported in studies conducted by (Bashar and Duggal, 2019; Qi et al., 2018), in which they found a higher percentage of category III bites among the studied population. In our study, the reduction in category III bites in the year 2016 can explain that such bites are more common among children (Saleem et al., 2018). In 2016, there was a political uprising in Kashmir valley due to which schools were called off, and parks and playgrounds were closed. The children spent most of their time indoors, which resulted in less dog interaction and eventually fewer reported bites.

When we compare the trend in the number of cases reported during the lockdown phases in 2020, the trend shows a decrease in the number of cases reported during the lockdown compared to the same period during the previous years. The association was also found to be statistically significant ( $P < 0.001$ ). The number of cases reported was 1,051 during 2016, 943 during 2017, 1,025 during 2018, 928 during 2019, and only 783 during 2020. The decrease in the number of cases reported during 2020 may be attributed to the fact that people's movement was restricted during the lockdown, which led to a reduction in the number of human-dog interactions and decreased the number of dog bite cases. During the

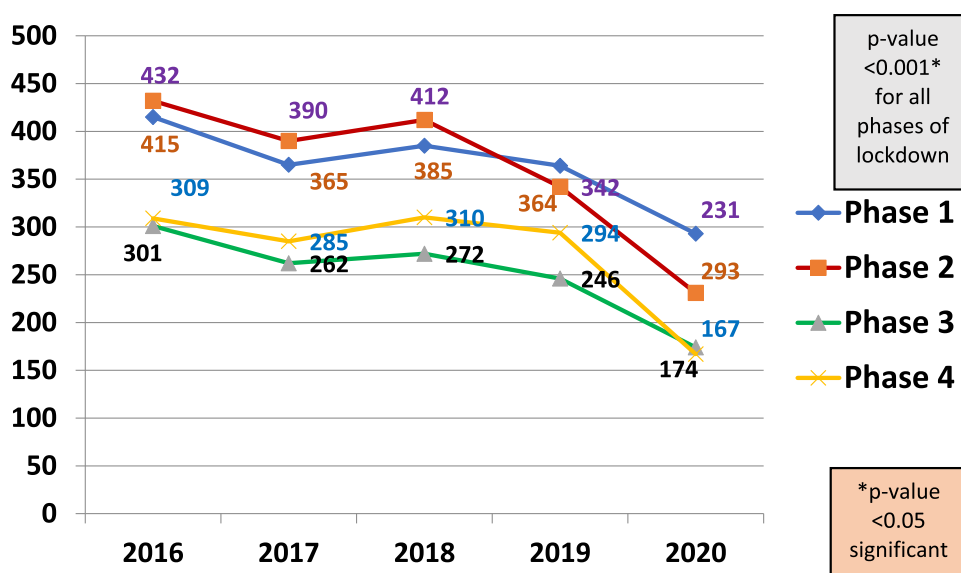


Figure 2. Frequency of dog bite cases from the year 2016–2020 in different phases of lockdown (March 21–June 03).

same lockdown period, the cases of accidental injuries and other crime rates decreased in India. As per the reports published, there were 62% reduced fatalities during the lockdown period. The data from 24 states reported 8,796 fewer fatalities, over 25,000 more occasional crashes, and 26,000 fewer people were left uninjured during the lockdown period (“750 road deaths in 2 months of lockdown | India News - Times of India,” 2020; Bhattacharjee, 2020).

On the other hand, in our region, we saw a decrease of only 28% in dog bite cases when comparing our previous data results. These findings might be because most people might have adapted alternate traveling ways, and most of them have preferred walking instead of using a vehicle. Such adaptive methods could have put them in more such circumstances where human-dog interaction could have taken place. During the lockdown phases, most of the people preferred being inside homes. They only moved outside their homes in case of any emergency, buy groceries, or to attend the essential workplace. People even stocked up the necessary items so to prevent unnecessary movement outside their homes. We observed that the restrictions that were in place were sufficient to restrict vehicular movement but were not enough strict that could restrict the movement of people who preferred walking over other transport facilities. No doubt, the restriction led to fewer human-dog interactions, and thus the decrease in the number of dog bite cases was observed but not to the extent that was seen in the case of road traffic injuries. Similar findings were reported in the studies conducted by (Bashar and Duggal, 2019; Diallo et al., 2019; Satapathy et al., 2020) and (Kulkarni, 2016), where the number of cases was reported less during the times where people were confined indoors, and they moved less outside their homes. These findings can be put forward as an experiment for policymakers to understand the effect of mobility and reduced human-dog interaction on the number of dog bite cases.

The lockdown period, which was implemented in India for COVID-19, started on March 21 until June 03, 2020 in 4 phases. Phase 1 (weeks 1–3) and Phase 2 (weeks 4–6) had 3 weeks intervals each, while Phase 3 (weeks 7–8) and Phase 4 (9–10) were of 2 weeks intervals each, respectively. It is clearly shown in Figure 1 that there was a smaller number of dog bites reported at week 1, 4, 7, 8, and week 9 while there was a little surge in cases on week second, third, fifth, sixth, and week 10th. A critical finding in the reported number of cases during the lockdown period was a

surge of cases at the end of week 3. As the authorities announced the lockdown in haste, the people were left with no other option than to confine themselves within their homes. Initially, the lockdown measures were strictly placed, and at the end of the third week, the second phase of lockdown was announced. The surge observed might be because people come out of their homes to buy and pile up stocks and necessary items for the second phase of the lockdown.

Moreover, during the other phases and weeks, it can be observed that a significantly smaller number of dog bite cases were reported during the lockdown period. The lower number recorded during the lockdown phase could be attributed to the fact that the people preferred to remain indoors to protect themselves from the spread of COVID-19. Some people even had stocked up the essentials at their homes to avoid unnecessary movement outside their homes. The restrictions led to less movement of people outside their homes, so the less human-dog interactions, the smaller number of dog bites were reported at our clinic.

## Conclusion

The study concludes that the lockdown had indirectly reduced the number of dog bite cases reported to the clinic during different phases of Countrywide lockdown compared to the previous 4 years' available data during the same period. Despite the lockdown in place, the average number of dog bite cases reported during the last 4 years compared with the current years (2020) dog bite cases showed a reduction of only 28% in said cases. These findings clearly show a lack of inter-sectorial coordination between the authorities in the proper imposition of lockdown in the region, which has resulted in less reduction from the expected number of dog bite cases during the lockdown period. The study results indicate that less mobility on streets and reduced human-dog interactions can result in fewer conflicts and overall help reduce dog bite cases.

Public interventions to promote responsible pet ownership are also an emerging field of building up the future focus. Keeping a pet for which, we can provide appropriate food, water, shelter, companionship and healthcare, properly socializing and training the pet, investing time and money, providing preventive health care like vaccinations and cleaning up after the pet and making alternate arrangements if we can no longer provide care for our



pet are proven interventions in this area (Fund, 2020). Another new cool concept of adapting street dog's is gaining popularity in one of the cities of India. People from Bengaluru are treating stray dogs with more respect, which is why more and more are adopting or fostering indies (Lakshmin, 2020). Adoption of street dogs will provide better homes for them. There may be a change in their behavior over time.

Moreover, adoptions will reduce their interactions with the general population at large. Policymakers should utilize this study's finding and "One Health" approach with a strategic focus on strengthening rabies surveillance. However, ensuring a proper environment for dogs by providing dog shelters so that the human-dog interaction can be minimized, promote better behavior among dogs, and prevent aggression-related problems reduces the prevalence of dog bites.

## Recommendation

We recommend disseminating information and education regarding human-dog interactions through mass media to reduce false beliefs and deeply seated misconceptions about the Dogs. This should be carried out at regular intervals at the health facility and public places through information, education, and communication material.

Local administrations must be geared up to reduce the stray dogs load by catching them, followed by sterilization. They must rehabilitate dogs and build dog shelters for them, so dogs live in their respective environment away from humans, which will eventually reduce dog bites and Rabies.

Policymakers must also acknowledge problems associated with long-term sheltering of dogs in the first place. Rehabilitative in-house training of dogs must be encouraged. Activities like supervised group play and socialization help reduce kennel stress, and we must develop strategies to reduce pet overpopulation, promote adoption, and promote shorter shelter stays (Fund, 2020).

## Ethical consideration

The study has no ethical issues regarding animal or human experimentation. The study was mainly based on data available at the Department of Community Medicine's antirabies clinic, so ethical clearance was not required. Moreover, permission from the Departmental Head was obtained to use the data for the study.

## Funding

None.

## Conflict of Interest

The authors declare no conflict of interest.

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