Original Article

Burden of dog bite injuries and wound management practices to prevent rabies among dog owners

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Abstract

Background: Despite members of dog-owning families being at a higher risk of dog bites owing to their proximity to dogs in their household, there are hardly any studies from India which focus on the burden of dog bites among them and their rabies control and prevention practices. This study aimed to estimate the burden of dog bites among dog owners and their wound management practices to prevent rabies. **Materials and Methods:** A cross-sectional study was conducted among pet dog owners in a high-end housing society of National Capital Region of Delhi. A pre-tested and pre-validated schedule was used to collect data by consecutive sampling through community survey. Data were analyzed using R software. The incidence of dog bites and the status of rabies prevention practices adopted by the participants are presented as proportions. Chi-square test was applied to compare proportions. **Results:** A total of 100 families were studied, which covered 355 family members. The incidence of dog bites in the past 1 year was found to be 44/355, 12.4% (95% confidence interval 9.2–16.3%). Pet dogs were responsible for 31/44 (70.5%) bites. Among 44 dog bite incidents, 30 (68.2%) reported taking any injection after the incident, and 10 (22.7%) reported receiving an anti-rabies vaccine. Only six out of 100 families reported at least one family member covered by rabies pre-exposure prophylaxis. **Conclusion:** The incidence of dog bites among the dog owners was high. The rabies pre- and post-exposure prophylaxis practices adopted by the participants were found to be inadequate.

Keywords: Burden, dog bites, dog owners, rabies

Introduction

Dog bites, a significant public health concern worldwide, cause physical injury, psychological trauma, post-traumatic stress, and sometimes death resulting from rabies infection and are mainly sustained by children.[1,2]

India is home to approximately 28 million pet dogs.[3] Dog-mediated zoonotic diseases in their owners are significant unless adequate protective measures are undertaken.[4] Members of dog-owning families are at a higher risk of dog bites due to their proximity to dogs.[5-7] In Indonesia, a study reported that only 52% dog owners had at least one of their dogs vaccinated during the 2012 vaccination campaign.[8] In another study conducted in Nepal, 80% of the dog owners had not vaccinated their dogs previously.[9]

Under One Health Initiative, both the human and animal components need to work on simultaneous campaigns to eliminate canine rabies through mass vaccination of dogs, strengthening of post-exposure prophylaxis (PEP) and targeting health education about rabies prevention.[10] The primary care physicians are frontline health workers who should be regularly updated with the revised PEP regimen and promote the same through health education to especially high-risk groups, namely, pet dog owners. Thus, both the human and animal components need to be explored in environments with close human–animal interactions.

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This study attempts to use the 'One Health' approach in exploring rabies control and prevention in a domestic environment. There are hardly any studies from India which focus on control and prevention measures adopted by dog owners. We aimed to estimate the burden of dog bites and their wound management practices to prevent rabies among dog-owning families in a high-end residential area of Faridabad city of the National Capital Region (NCR) of Delhi.

Materials and Methods

This was a community-based cross-sectional study done in a high-end residential society in Faridabad city located in Delhi NCR. For sample size calculation, the available incidence of dog bites from an urban area of Delhi, that is, 3%, was considered as a baseline.[11] As it has been reported that the incidence of dog bites is around three times more than that in the community, we considered the baseline incidence as 10%.[12] For an absolute error of 4%, 95% confidence limit, and a design effect of 1.5, the sample size comes to be 337. Furthermore, considering an average family size of around 2–3 in this high-end residential society, we estimated that around 100 families would have to be surveyed to complete the sample size. The final sample size was 100 families to be covered in this study.

All dog-owning families who had pet dogs in the study area were included in the study. Dog-owning families were considered as those families which own one or more dogs either by virtue of buying them or by their adoption. Community ownership of dogs was not considered as dog ownership in this study. A house-to-house survey was conducted to screen the families and enlist those which owned one or more dogs. Later, face-to-face interview was conducted with one of the available adult members of the selected families. Documented vaccination records of the dogs and the family members were preferred, but in case records are not available, then verbal responses were accepted for considering the vaccination status of the pet dogs or the family members.

A pre-tested and pre-validated schedule was used for data collection, consisting of socio-demographic particulars of the families, dog ownership details, rabies pre-exposure (PrEP) and post-exposure prophylaxis of family members, dog vaccination records, and knowledge regarding management of dog bites for preventing rabies.

The data were entered into MS Excel, and R software was used for statistical computations. Incidence of dog bites and rabies vaccination status are presented as proportions. Chi-square test was used for assessing the statistical significance of the difference in proportions. The approval of the Institutional Ethics Committee, Human Research of University College of Medical Sciences, Delhi, through letter no. IEC-HR/2017/30/13 dated May 15, 2017, was obtained before conducting the study.

Results

In the 100 pet dog-owning households surveyed, we interviewed 100 adult respondents, and we could gather information of 355 individuals.

The incidence of dog bites over the past one year was 44/355 [12.4%, 95% confidence interval (CI) 9.2–16.3%]. Thirty-one bites (70.5%) out of 44 bite incidents were by self-owned dogs. Among 30/44 (68.2%) bites, subjects reported bleeding at the site of the bite. A similar proportion, that is, 30/44 bite incidents, was reported having taken any injection after the dog bite. Only 10/30 of these reliably knew that they had taken an anti-rabies vaccine.

The bleeding at the site of dog bite had a significant association [odds ratio (OR) = 5.1, 95% CI: 1.27–22.14] on the status of seeking injection for prophylaxis after dog bite, that is, 80% (24/30) vs 42.9% (6/24). No significant association (OR = 3.4, 95% CI: 0.69–25.91) was observed between the ownership status of the dog and the status of seeking injection for prophylaxis, that is, 84.6% (11/13) vs 61.3% (19/21).

The mean number of dogs per family was 1.15 with a maximum of 5 dogs per family. Most (73%) pet dogs were males. PrEP was taken by 14 members belonging to 6 families out of the 355 participants of the 100 families surveyed. All the dogs were reported as vaccinated for rabies.

All (100%) respondents had heard about rabies before and were aware that dogs are a source of transmitting the disease. Most pet owners (89%) had awareness regarding transmission of rabies through saliva. Most of the pet owners (93%) knew that rabies is a preventable disease, but only 37% of them knew that it was not treatable; 85% respondents were aware that rabies is a fatal disease.

37% had a professional degree, while only 8% had an education of intermediate or lower, and 55% had a diploma/graduate/postgraduate degree. All belonged to an upper socio-economic status according to BG Prasad scale.

Discussion

Our study has a novel approach in including only pet dog owners in a metropolis city and estimating the dog bites among them. The incidence of dog bites among respondents in the past 1 year was 12.4% in this study. Our finding shows that the incidence of dog bites among dog-owning families is around four times higher than the 3% reported in a study by Sharma S *et al.* from the urban area of Delhi[11] and also higher than that (0.4%) from another study in Delhi by Lal P *et al.*[13]

Only 22.7% (10/44) of dog bite cases had received anti-rabies vaccination after the bite. This was lower than that reported from other studies in Delhi. A study by Lal P *et al.* and Sharma S *et al.*

reported this to be 32.5% and 79.2%, respectively.[11,13] A study by Abdulsalam AL *et al.* in Nigeria also reported a higher vaccination rate of 41% among dog bite victims.[14] The severity of dog bite and pet dog status of the biting animal may be responsible for the lower anti-rabies vaccination among pet owners in our study.

In our study, all respondents had heard about rabies and that dogs can transmit rabies; the majority of pet owners (89%) had awareness regarding transmission of rabies through saliva. Most of the pet owners (93%) knew that rabies is a preventable disease, but only 37% of them knew that it was not treatable. Similarly, a study by Awuni B *et al.* demonstrated that 82.3% knew that dogs were susceptible hosts of rabies, with 80.4% also agreeing that dogs transmit rabies through bites and scratching; however, 75% and 8.5% knew that rabies is preventable and that one has to go to the hospital for treatment after being bitten by a rabid dog, respectively.[15]

Even though rabies is endemic in India, with most casualties attributed to the bite of a rabid dog,[3] we found that the PrEP coverage was very low among the members of pet-owning families. There is dearth in literature related to pre-exposure prophylaxis received by individuals in our community; even the data in high-risk individuals, namely, pet owners and veterinarians, are scarce. However, a study by Marano C *et al.* reported only 8% of travelers to rabies endemic countries received PrEP vaccination.[16] This rate is however consistent with previous reports from a study in international travelers attending a travel clinic in the Netherlands (7.8%).[17] Reports from a study in Bangladesh showed only 29% veterinary practitioners had a history of taking rabies PrEP, even being in a rabies high-risk setting.[18]

All the dogs were reported to be vaccinated in our study. An almost similar finding was noted in a study by Cherian V *et al.*, where only 65.7% of the respondents had taken their pet for a rabies vaccination in the previous year.[19] Similarly, 52.1% and 71% of dog owners had their pet dogs vaccinated during the last vaccination campaign in a study by Bahiru A *et al.* and Kanutus *et al.*, respectively.[20,21] On the contrary, only 8.23% reportedly vaccinated their dogs as noted by L.D. Dahourou *et al.*[22]

The knowledge of primary care physicians regarding updated PEP regimens is equally important to achieve zero dog-mediated rabies in India by 2030. A study by Jeanpetit R *et al.* showed that most of the primary care physicians, based in rural and semi-rural areas, were usually aware of the risk of rabies; however, they did not know the precise indication for the rabies vaccine and rabies immunoglobulin and their knowledge of managing rabies exposure and its prevention required regular update.[23-25]

This study provides us with a better insight of the dog bites among pet owners in an Indian metropolis and the level of awareness regarding zoonotic diseases and the preventive measures. The limitation of the study is that it has been conducted in only a single area limiting its generalizability. Though the level of awareness regarding rabies has greatly increased in recent times, the lacunae in prophylaxis measures remain substantial. Both human and animal health practitioners need to play a more proactive role in educating their clients about rabies prophylaxis among pet owners.

Conclusion

The incidence of dog bites among the dog owners was high. The rabies pre- and post-exposure prophylaxis practices adopted by the participants were found to be inadequate.

Ethical considerations

Approval from the Institutional Ethics Committee was obtained before conducting the study.

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Conflicts of interest

There are no conflicts of interest.

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