Introduction

Rabies is an acute viral disease of the central nervous system (CNS) that affects all warm-blooded animals, including mammals, and occurs in over 150 countries and territories. The etiological agents responsible for rabies encephalitis belong to the order Mononegavirales, the family Rhabdoviridae, and the Lyssavirus genus. Worldwide, this disease remains the tenth biggest cause of death because of infectious diseases. The yearly death toll due to this fatal disease is approximately 50,000–60,000, with the majority of the deaths taking place in tropical developing countries. In India, the annual number of dog bites is estimated to be 17.4 million, causing approximately 18,000–20,000 human rabies cases annually. Prompt post-exposure use of the anti-rabies vaccine (ARV) combined with proper wound management and simultaneous administration of rabies immunoglobulin (RIG) in severe exposures is close to 100% effective in preventing rabies. However, delay in seeking treatment, improper wound care, and unnoticed wounds may contribute to treatment failure and subsequent death.

Background and Objectives: Rabies, although a 100% fatal disease, is preventable with appropriate post-exposure prophylaxis. A hospital-based cross-sectional study was conducted among 360 animal bite patients in the anti-rabies clinic (ARC) of Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi (VMMC & SJH). Methods: A predesigned, pretested, structured questionnaire was administered by interview technique to assess the sociodemographic profile, health-seeking behavior, and the various domiciliary practices adopted by the animal bite patients. Results: Out of 360 study participants (348; 96.7%) visited a health facility (government/private) after an animal-bite incident. Of the 241 study participants who washed their wounds, 131 (54.4%) had washed the wound using soap and water and 216 (89.6%) had washed the wound for less than 5 min. Chili paste (128; 35.6%) was the most commonly used household remedy. Interpretation and Conclusions: It was observed that a considerable segment of the study population approached health care facilities for vaccination following animal bite but did not practice the correct wound-washing practices immediately after the incident, and a sizeable proportion of the study participants resorted to non-allopathic practices (e.g., chili paste) as a measure of first aid to manage animal bite wounds. No association was found between the sociodemographic determinants and domiciliary practices and health-seeking behavior (P > 0.05). As rabies is a preventable disease, increasing awareness pertaining to its prevention may prove to be beneficial in reducing the morbidity and mortality.

Keywords: Animal bite, domiciliary practices, health-seeking behavior, rabies, wound washing practices
the vaccination strategies, it becomes necessary to focus on perpetual and consistent community awareness campaigns on health-seeking behavior post-animal-bite incidents and proper wound management practices. As dog bite is a prevailing problem in both urban and rural areas, the treating physicians at the primary as well as tertiary care level have a critical role to play to sensitize the animal bite victims/patients to seek proper medical care post the incident and refrain from using irritants and other home remedies which do not have any role in preventing this fatal disease. The present study was conducted in the anti-rabies clinic (ARC) of Vardhman Mahavir Medical College and Safdarjung Hospital (VMMC and SJH), New Delhi to understand the various domiciliary practices and health-seeking behavior among animal-bite patients.

**Materials and Methods**

**Study design** – This was a hospital-based cross-sectional study conducted at the ARC of Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi.

For this study, the study participants were the animal-bite patients attending the ARC of VMMC & SJH.

**Study duration** – The study was conducted from February 2019 to July 2020.

**Sample size** – The primary aim of the study was to assess the various domiciliary and wound management practices adopted by the animal-bite victims. Therefore, taking the population proportion (prevalence) for wound washing by the study participants following animal bite as 72.2% as per a study carried out by Lilare et al.,[6] among patients attending anti-rabies OPD at the Government Medical College, Nagpur, and absolute error as 5%, the sample size was calculated using the following formula:

\[ n = \frac{4pq}{d^2} \]

where,

- \( n \) = sample size
- \( p \) = anticipated population proportion
- \( q = 1 – p \)
- \( d \) = absolute error

The sample size was calculated to be 321. After adding 10% as loss to follow up, the sample size was computed to be 360.

**Inclusion Criteria** – Patients with category-II and category-III animal bite wounds coming to the ARC for day 0 dose of the ARV were included in the study. The wound categorization was done based on the WHO recommendations for the classification of animal bite wounds for post-exposure prophylaxis.[2,7]

Data Collection – A non-probability convenient sampling method was used to select the study participants and attain the required sample size. The importance of the study was explained to the animal bite patients or to the accompanying guardians for those who were less than 18 years. Only those participants who were willing to participate were included in the study. Written informed consent/assent was collected in the study for their participation. Information regarding their sociodemographic profile and history of animal bite exposure, health-seeking behavior, and various domiciliary practices following animal bite exposure were collected using a predesigned, pretested, structured questionnaire which was administered by interview technique.

Data analysis and statistical methods – All the data were coded and entered into a master sheet on MS Office Excel and later transferred to SPSS (IBM SPSS Statistics 21.0) for analysis. Data validation checks were performed at regular intervals for data entered into the worksheet of MS Excel. The results were demonstrated in terms of proportions and percentages and depicted as tables and graphs.

**Ethical consideration** – Certification for ethical clearance was obtained from the Ethics Committee of VMMC and Safdarjung Hospital, New Delhi.

**Results**

The study was conducted among 360 animal-bite patients who attended the ARC of VMMC and Safdarjung Hospital following the incident of animal bite. The sociodemographic profiles of the animal-bite patients are presented in Table 1.

The age of the study participants ranged from 2 to 65 years, and the mean age was 29.3 ± 15.2 years. The median age (interquartile range) of the study participants was 26 (18–40) years.

About three-fourths (266; 73.9%) of the study participants were males, while one-fourth (94; 26.1%) were females. The majority (298; 82.8%) of the study participants were literate, while 212 (58.9%) study participants were employed, and little more than one-fourth (27.5%) were students [Table 1].

The majority (118; 32.8%) of the study participants belonged to class-II socioeconomic status, followed by class-III (91; 25.3%) as per the Modified BG Prasad Socio-economic Classification, Update–2019.[8]

The majority (317; 88.1%) of the bites were caused due to dogs. Almost four-fifth (298; 82.8%) of the study participants were bitten by stray animals, whereas 53 (14.7%) were bitten by pet dogs [Table 2].

The majority (291; 80.8%) of the study participants had category-III wounds as per the classification of animal bite wounds for post-exposure prophylaxis based on WHO.
recommendations. While the majority (217; 60.3%) of the study participants presented with single wounds, the most common type (227; 63.1%) was observed to be abrasion wounds [Table 2].

A larger proportion (238; 66.1%) of participants reported to have been bitten in their lower limb, followed by upper limb (81; 22.5%) [Graph 1].

It was observed that 241 (66.9%) study participants reported to have washed their wounds before coming to the hospital. The minimum and maximum time lapse between the incident and wound washing were 2 min and 92 min, respectively. It was also seen that among the 241 study participants who washed their wounds, the majority (182; 75.5%) reported to have washed the wounds within 30 min of the incident; 131 (54.4%) had washed the wound using soap and water, and 216 (89.6%) had washed the wound for less than 5 min [Table 3].

No significant association was found between the sociodemographic parameters of the study participants and the wound washing practices ($P > 0.05$).

In the present study, 129 (35.8%) did not resort to any domiciliary practice following animal bite, whereas 231 (64.2%) reported to have used some (at least one) domiciliary practice/household remedies [Table 4]. No significant association was found between the sociodemographic parameters of the study participants and the use of different home remedies ($P > 0.05$).

Among the 360 study participants, 129 (35.8%) of the study participants did not resort to any household remedy or antiseptic treatment following the incident of animal bite. While chili paste (128; 35.6%) was the most commonly used household remedy, others were turmeric paste, herbal pastes, etc., [Table 4]. No significant association was found between the sociodemographic parameters of the study participants and the use of different home remedies ($P > 0.05$).

### Table 1: Sociodemographic profile of animal bite patients (N=360)

| Variable                  | Number (n) | Percentage |
|---------------------------|------------|------------|
| Age (years)               |            |            |
| 0-20                      | 112        | 31.1       |
| 21-59                     | 237        | 65.8       |
| >=60                      | 11         | 3.1        |
| Gender                    |            |            |
| Male                      | 266        | 73.9       |
| Female                    | 94         | 26.1       |
| Occupation                |            |            |
| Employed/Working          | 212        | 58.9       |
| Student                   | 99         | 27.5       |
| Housewife                 | 33         | 9.2        |
| Unemployed                | 9          | 2.5        |
| Retired                   | 7          | 1.9        |
| Literacy status           |            |            |
| Literate                  | 298        | 82.8       |
| Illiterate                | 62         | 17.2       |

### Table 2: Distribution of the study participants according to characteristics of animal bite exposure (N=360)

| Variable                        | Number (n) | Percentage |
|---------------------------------|------------|------------|
| Type of Animal                  |            |            |
| Dog                             | 317        | 88.1       |
| Cat                             | 22         | 6.1        |
| Monkey                          | 16         | 4.4        |
| Rat                             | 5          | 1.4        |
| Category of biting animal       |            |            |
| Stray animals                   | 298        | 82.8       |
| Pet dogs                        | 53         | 14.7       |
| Wild                            | 9          | 2.5        |
| Type of bite                    |            |            |
| Provoked                        | 125        | 34.7       |
| Unprovoked                      | 235        | 65.3       |
| Category of wound               |            |            |
| Category II                     | 69         | 19.2       |
| Category III                    | 291        | 80.8       |
| Type of wound                   |            |            |
| Abrasion                        | 227        | 63.1       |
| Laceration                      | 133        | 36.9       |
| Number of wounds                |            |            |
| Single                          | 217        | 60.3       |
| Multiple                        | 143        | 39.7       |

### Table 3: Distribution of study participants according to wound washing practices following animal bite

| Variable                          | Number (n) | Percentage |
|-----------------------------------|------------|------------|
| Wound washing practice (n=360)    |            |            |
| Wound washing done                | 241        | 66.9       |
| Wound washing not done            | 119        | 33.1       |
| Method of wound washing (n=241)   |            |            |
| Wound washing using Soap and water| 131        | 54.4       |
| Wound washing using water only    | 110        | 45.6       |
| Time b/w incident and wound washing (n=241) | | |
| 0-30 min                          | 182        | 75.5       |
| 30-60 min                         | 18         | 7.5        |
| >60 min                           | 41         | 17.0       |
| Duration of wound washing (n=241) |            |            |
| 0-5 min                           | 216        | 89.6       |
| 6-10 min                          | 23         | 9.6        |
| 11-15 min                         | 02         | 0.8        |

### Table 4: Distribution of study participants according to the use of different domiciliary practices following animal bite (N=360)

| Domiciliary practice followed     | Number*    | Percentage |
|-----------------------------------|------------|------------|
| None                              | 129        | 35.8       |
| Chili paste                       | 128        | 35.6       |
| Dettol/Savlon                     | 44         | 12.2       |
| Other antiseptic†                  | 34         | 8.9        |
| Other household remedies‡         | 30         | 9.4        |
| Turmeric paste                     | 21         | 5.8        |
| Herbal paste§                      | 7          | 1.9        |

†Multiple responses possible. ‡Other antiseptic includes Rectified spirit, benzidine, etc. §Other household remedies include lime/chuna, garlic paste, soil/mitti, etc. Herbal paste includes tulsi, neem, etc.
Out of 360 study participants, 348 (96.7%) visited a health facility (government/private) after the incident of animal bite. While the majority (195; 54.2%) of the study participants approached the ARC of VMMC and SJH, around 153 (42.5%) approached other health facilities/dispensaries/private practitioners. Some (7; 1.9%) approached Hakeems, whereas a few (5; 1.4%) approached the local quacks/faith-healers in the community [Graph 3].

No significant association was found between the sociodemographic parameters of the study participants and their health-seeking behavior ($P > 0.05$).

**Discussion**

The age of the study participants varied between 2 and 65 years. Study participants’ mean age was 29.3 ± 15.2 years. In the present study, the majority (317; 88.1%) of the bites were caused due to dogs, followed by cats (22; 6.1%). Of the 360 cases of animal bites in the current study, almost 4/5th (298; 82.8%) of the study participants were bitten by stray animals, whereas 53 (14.7%) were bitten by pet dogs.

The majority (241; 66.9%) of the study participants reported to have washed their wounds before coming to the health facility. Out of the 241 study participants who had washed their wounds, 131 (54.4%) had washed the wound using soap and water, whereas 110 (45.6%) had washed their wound with water only.

Similar findings were stated by Shankaralah et al.[9] in their study that following animal bite, wound washing was done only in 66.0% of IMRV-group subjects and in 68.2% of IDRV-group subjects. Venkatesan et al.[10] and Lilare et al.[11] in their study reported that 64% and 72.2% of animal bite victims had washed the wound site, respectively. However, the findings of the present study were different from those reported by Jain et al.[12] and Salve et al.[13] who reported that only 18.7% and 24.1% of patients, respectively, had washed their wounds with running water or soap and water before attending the ARV clinic. Anandaraj et al.[14] stated in their study that correct wound management practices of washing the wound with soap and water and application of antiseptic were observed only in 12.5% of the animal bite victims. Ganasva et al.[15] in their study reported that only 11% of the patients had cleaned the wound with soap and water and 12% of the patients had cleaned it using plain water only. However, a community-based cross-sectional study conducted by Sivagurunathan et al.[16] reported that 37.5% of the study participants washed their wound with soap and water. This difference in wound washing practices can be attributed to different study settings and the literacy level of the study subjects, which was poorer in these studies as compared to the present study.

In the present study, 129 (35.8%) study participants did not resort to any household remedy following animal bite, whereas the rest of the study participants had resorted to the application of antiseptics or natural homemade pastes as a method of first aid/pretreatment practice before coming to the hospital. Of them, the majority (128; 35.6%) of the participants applied chili paste over the wound as a household remedy, while a very small proportion used Dettol antiseptic (44; 12.2%). Venkatesan et al.[10] and Anandaraj et al.[14] in their study reported 21% and 33.3% of the study subjects, respectively, to have applied irritants (e.g., onion, ash, lime, turmeric powder, lime juice, and chili powder) on the wounds. However, in the study by Salve et al.[13] applying
chili-oil paste directly on the bite wound was reported by 54.6% of the study subjects. Jain et al.\[13\] in their study stated that 56.2% of the animal bite cases had applied indigenous products over wounds before attending the ARC.

Of the 360 study participants in the current study, 348 (96.7%) visited a health facility (government/private) after the incident of animal bite. Similar findings were found in the study conducted by Ganasva et al.\[14\] where the majority (93.8%) of the study participants had approached other health facilities such as private clinics or other government health facilities before coming to the ARC. A study done by Haradanhalli et al.\[15\] reported that health-seeking behavior among the animal-bite patients was unsatisfactory as 16.4% visited non-allopathic/consulted veterinarians/local practitioners/traditional healers/ANMs/others before visiting the health-care facility. Similarly, a study by Ghosal et al.\[16\] showed that only 73.2% of the victims preferred visiting an allopathic doctor; however, the remaining preferred visiting some local practitioners/religious practices. Furthermore, a study conducted on dog bite cases in Ethiopia showed that to receive PEP, only 77.4% of the animal-bite victims visited a health facility directly.\[17\] Such differences in the health-seeking behavior may be ascribed to the differences in the study settings of these studies. This was also one of the limitations of the study that since it was a hospital-based study, we cannot comment on the wound washing practices, domiciliary practices, and the health-seeking behavior of the animal-bite patients in the community setting.

Although the findings of the current study are related to a tertiary care setting, it was quite alarming to witness such poor wound management practices being followed and the use of different types of irritants by the study participants. Dog bite is prevalent in both urban and rural areas, and several literature studies have shown animal-bite victims to be following such incorrect wound management practices. The present study highlights that there is a requirement to educate and raise awareness among the general population to follow correct first aid measures and post-exposure prophylaxis following animal-bite incidents. In this regard, the primary health care providers and family physicians, being the first point of contact for the animal bite victims in rural and urban areas, have an important role to play. They can clarify to their patients the various myths associated with animal bite and can also clarify any queries related to wound management practices and appropriate post-exposure prophylaxis post an animal-bite incident. The inappropriate traditional indigenous practices being followed and misconceptions of the community about this fatal disease can be addressed to a large extent by the health care providers and physicians, which can contribute to improvement in the health-seeking behavior and wound management practices followed by animal-bite patients.

**Conclusion/Recommendation**

This study is one of the very few hospital-based studies that has been carried out in the National Capital Region (NCR) of Delhi. The study brought about the lack of awareness, misconceptions, and improper practices followed by animal-bite patients in the study setting and showed that although a considerable segment of the study population approached health care facilities for vaccination, they did not practice the correct wound-washing practices immediately. A sizeable number of the study population resorted to the use of irritants (e.g., chili paste) and other household remedies to manage animal bite before seeking any medical aid. Further, the study found no significant association between the different sociodemographic parameters of the study participants and their use of different home remedies, wound washing practices followed, and their health-seeking behavior. This suggests that in an era of technological and healthcare advancements and where knowledge is freely available over the internet and other sources, people from different sections of the society are still resorting to different domiciliary practices/indigenous remedies that have no relevance in the prevention of this fatal disease. Accordingly, it was felt that primary care physicians need to educate animal-bite patients and make them aware of the importance of seeking timely medical aid and proper management of animal bite wounds. Implementing health education activities and carrying out widespread awareness programs/campaigns will help to bust the myths associated with the usage of irritants and to avoid the adoption of improper wound management practices by animal-bite victims.

**Key messages**

A considerable segment of the study population that approached the health care facility for vaccination following animal bite had not resorted to correct/proper wound-washing practices, and a sizeable proportion among them had resorted to non-allopathic practices (e.g., application of chili paste on the wound site) as a first-aid measure to manage animal bite wounds. Several literature studies show this practice to be quite common in both rural and urban settings. Primary care physicians can play a significant role to promote health education activities and community awareness about effective management of animal bite cases; this can eventually lead to the prevention of deaths occurring due to rabies. This can create a positive impact on the knowledge levels of the general public, which is an essential step toward the elimination of human rabies. As rabies is 100% preventable, increasing awareness pertaining to its prevention can certainly prove beneficial in the years to come.

**Ethical approval and/or Institutional review board (IRB) approval**

Approval was taken from the Institutional Ethical Committee of VMMC and Safdarjung Hospital.

**Patients’ consent form**

Written informed consent/assent was obtained from the study participants before the commencement of the interview.

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Nil.
Conflicts of interest

There are no conflicts of interest.

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