

# Awareness on Recent Guidelines for Rabies Prophylaxis among Healthcare Professionals in Rewa District, Madhya Pradesh, India: A Questionnaire-based Cross-sectional Study

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## ABSTRACT

**Introduction:** Rabies is a zoonotic disease that can be fatal and continues to impose a significant financial burden on developing countries. Recently, there have been advancements in the introduction of cell culture vaccines and immunoglobulin, as well as the approval of Intradermal (ID) schedules for vaccine administration.

**Aim:** To assess the knowledge of doctors in Rewa District regarding the National Guidelines for Rabies Prophylaxis in 2019.

**Materials and Methods:** A cross-sectional study was conducted, involving doctors from tertiary healthcare centres, district hospitals, and private practices. Data were collected over a period of one month from 206 doctors using a Google form, which included information about their field of practice and their knowledge of recent guidelines on Rabies prophylaxis. Data analysis was performed using the Chi-square test.

**Results:** Out of the 206 doctors surveyed, 92 (44.7%) were male. A 56.7% of the doctors were aware of the regimen and dosage for ID administration of the Anti Rabies Vaccine, (ARV) and 44.6% were knowledgeable about the modification of Post-Exposure Prophylaxis (PEP) to Pre-Exposure Prophylaxis (PrEP) in the Essen regimen. Furthermore, 70.9% of the doctors were familiar with the dosage of Human Rabies Immunoglobulin (HRIG), while 42.7% knew how to manage animal bites in immunocompromised patients.

**Conclusion:** The study revealed a lack of sufficient knowledge on various aspects of rabies management among the doctors surveyed. This underscores the need for reorientation programs and Continuing Medical Education (CMEs) training to be provided to doctors to enhance their knowledge of rabies and improve the effective management of animal bites.

**Keywords:** Animal bites, Doctors, Intradermal, Knowledge, Regimen

## INTRODUCTION

Rabies remains an endemic disease affecting more than 150 nations and territories worldwide, resulting in approximately 59,000 annual fatalities and 8.6 billion USD in economic losses (with 96% of cases concentrated in Asia and Africa) [1,2]. In countries like India, where rabies is endemic, every animal bite is considered a potential rabies exposure [3]. The disease is caused by Lyssavirus type 1, a lethal condition that impacts the central nervous system. Dogs and cats, among other warm-blooded animals, serve as the primary hosts for this zoonotic disease [4].

The National Centre for Disease Control in Delhi, along with the World Health Organisation (WHO) collaborating centre for rabies epidemiology, developed national guidelines for rabies prophylaxis in 2002 to standardise PEP practices and animal bite management practices [5]. The prompt use of ARVs following an exposure, coupled with proper wound care and the administration of RIG, is nearly 100% effective in preventing the disease [6]. WHO recommends the use of an ID regimen over an intramuscular one in situations where vaccines or resources are limited [7]. Since 2005, the Indian government has endorsed and promoted ID rabies vaccination in all public healthcare facilities in alignment with these guidelines.

The WHO Technical Report Series (TRS) 1012 report, published in 2018, shed light on potential revisions to rabies guidelines [7]. Subsequently, national guidelines for rabies prophylaxis were

reviewed and published in 2019, incorporating new recommendations for ID vaccination and the management of immunocompromised individuals [8].

Timely and appropriate management of animal bites is crucial in preventing infections and reducing mortality from rabies. It is essential for doctors to possess the requisite skills and knowledge to effectively handle animal bite cases. Few studies have focused on the knowledge of healthcare professionals regarding animal bite management in compliance with recent guidelines [9-14]. Taking these factors into consideration, this study was conducted to evaluate doctors' knowledge and to identify potential training needs for clinical practice.

## MATERIALS AND METHODS

A cross-sectional study was conducted in October 2023 among doctors working in the Rewa district of Madhya Pradesh, India for a period of one month. The study received ethical clearance from the Institutional Ethics Committee (IEC) at SS Medical College, Rewa (MP). Reference Number: S No./IEC/M.C./2023/31114.

**Inclusion criteria:** All doctors working in Rewa district, including both those in government and private sectors, who provided consent and were willing to participate, were included in the study.

**Exclusion criteria:** Doctors practicing homeopathy and ayurveda, as well as those not engaged in clinical practice, were excluded from the study.

Sample size (n) calculation:

$$n = N z^2 pq / d^2 (N - 1) + z^2 pq,$$

Where, N is the population size (N=900), p is the prevalence of knowledge about post-exposure treatment in healthcare professionals (p=47.4%), (q=1-p). The sample size estimated with a 95% confidence interval and absolute precision(d) of 6 was found to be around 206 [15].

The sample size estimated with a 95% confidence interval and a 6% allowable error was 206 (based on a study by Digafe RT et al., showing a 47.4% prevalence of knowledge about post-exposure treatment in healthcare professionals) [16]. Data were collected using a Google form distributed in various WhatsApp groups and email IDs. A total of 269 doctors were approached to achieve the required sample size of 206.

**Questionnaire details:** The questionnaire, consisting of a total of 22 questions in the knowledge section, was developed by the principal investigator. It encompassed inquiries regarding knowledge and practices related to the recent guidelines on Rabies prophylaxis. The questionnaire was crafted by the investigator based on the 2019 guidelines for rabies prophylaxis, a literature review on the topic under study, and input gathered through interviews with respondents [9,17-19]. Variables included in the questionnaire covered aspects such as age, gender, doctors' qualifications, years of work experience, training/CME related to animal bite management, knowledge of rabies, classification, and management of animal bite wounds, different vaccination schedules, site of administration, and dosage. Validity and reliability were established before data collection. Content validity was ensured by a panel of experts, and the content validity index was calculated, yielding an appropriate value (S-CVI=0.84). The Cronbach's alpha value for the questionnaire assessing knowledge was calculated as α=0.92. A pilot study involving 10 subjects was conducted, and they were not included in the final study sample.

The study's purpose was clearly explained to the doctors, ensuring confidentiality regarding their participation, and informed consent was obtained. A total of 206 doctors from various clinical fields (medical officers, faculty, private practitioners, and resident doctors) provided consent and took part in the study. The response rate achieved was 76.58%.

STATISTICAL ANALYSIS

The data were entered into an Excel sheet and analysed using Jamovi 2.3.21 software. Comparisons were made using Chi-square, and results were obtained. A p-value of <0.05 was considered statistically significant.

RESULTS

[Table/Fig-1] presents the socio-demographic information about the work area of the study participants. Out of the 206 doctors, 92 (44.7%) were males and 114 (55.3%) were females. The teaching faculty comprised 72 (35%), medical officers 12 (5.8%), private practitioners 34 (16.5%), and postgraduates and senior residents 88 (42.7%), respectively.

| Socio-demographic profile (N=206)             | n (%)      |
|---|------------|
| Gender  |            |
| Male  | 92 (44.7)  |
| Female  | 114 (55.3) |
| Professional category                         |            |
| Medical officer                               | 12 (5.8)   |
| Postgraduate/Senior resident                  | 88 (42.7)  |
| Teaching faculty in medical college           | 72 (35)    |
| Private practitioner                          | 34 (16.5)  |
| Branch  |            |
| Medical branch                                | 134 (65)   |
| Surgical branch                               | 72 (65)    |
| Work experience (years)                       |            |
| ≤10   | 105 (51)   |
| >10   | 101 (49)   |
| Rabies training/workshop in the past one year |            |
| Yes   | 34 (16.5)  |
| No  | 172 (83.5) |

[Table/Fig-1]: Socio-demographic profile of doctors (N=206).

[Table/Fig-2,3] depict knowledge about animal bites and their management. Among the participants, 203 (98.5%) had correct knowledge regarding the causative agent of rabies, while less than one-third of the doctors (55, 26.6%) had the correct knowledge regarding the 10-day observation period for dogs and cats. Residents demonstrated significantly better knowledge regarding the site of rabies vaccine administration in infants and young children (p-value=0.004) compared to teaching faculty and private practitioners. It is noteworthy that the majority of doctors (196, 95.1%) had correct knowledge regarding the administration of ARV in provoked bites, but only half of them (124, 60.2%) had correct knowledge regarding ARV administration in cases of documented animal vaccination. Additionally, 150 (72.8%) of doctors were aware that ARV is not contraindicated in pregnancy and lactation, and 123 (59.7%) knew that corneal donation is contraindicated in suspected or confirmed cases of rabies. Residents also performed significantly better than faculty in categorising wild animal bites (p-value=0.04).

| Variables/(Correct answer)   | Teaching faculty/<br>private practitioners<br>n=106 (%) | PG Residents/SRs/<br>Medical officers<br>n=100 (%) | Total doctors<br>n=206 (%) | Chi-square | p-value             |
|--|---|--|----------------------------|------------|---------------------|
| Correct responses  |   |  |                            |            |                     |
| What type of pathogen causes Rabies? (Virus)   | 106 (100)   | 97 (97)  | 203 (98.5)                 | 3.2        | 0.07                |
| Which is the ideal site of administration of rabies vaccine in infants and young children? (Antero-lateral thigh)          | 56 (52.8)   | 72 (72)  | 128 (62.1)                 | 8.0372     | 0.004 (significant) |
| Observation of 10 days after animal bite is valid for? (Dogs and cats only)  | 25 (23.5)   | 30 (30)  | 55 (26.6)                  | 1.08       | 0.29                |
| Bites by wild animals and all bites at forest areas should be considered as category III exposure                          | 85 (80.2)   | 90 (90)  | 175 (84.9)                 | 3.87       | 0.04 (significant)  |
| In case of well documented vaccination status of the biting animal, should Post-Exposure Prophylaxis (PEP) be given? (Yes) | 65 (61.3)   | 59 (59)  | 124 (60.2)                 | 0.11       | 0.73                |
| In case of a provoked dog bite should PEP be given? (Yes)  | 98 (92.4)   | 98 (98)  | 196 (95.1)                 | 3.42       | 0.06                |
| According to new guidelines for rabies prophylaxis, is pregnancy and lactation a contraindication to PEP? (No)             | 78 (73.6)   | 72 (72)  | 150 (72.8)                 | 0.06       | 0.79                |
| Can cornea for transplantation be collected from suspected/ confirmed rabies or rabies like encephalitis cases? (No)       | 62 (58.5)   | 61 (61)  | 123 (59.7)                 | 0.13       | 0.71                |

[Table/Fig-2]: Correct knowledge regarding rabies amongst doctors.

| Variables/(Correct answer)  | Teaching faculty/<br>private practitioners<br>(n=106) | Residents/<br>Medical officers<br>(n=100) | Total doctors<br>n=206 (%) | Chi-square | p-value |
|---|---|---|----------------------------|------------|---------|
| According to WHO, which route of administration of rabies vaccine for Post-Exposure Prophylaxis (PEP) is safe, efficacious and cost-effective? (ID route)   | 41 (38.6)   | 48 (48)                                   | 89 (43.2)                  | 1.82       | 0.17    |
| What is the indication for rabies vaccination for PEP? (Category II and III exposure)   | 81 (76.4)   | 83 (83)                                   | 164 (79.6)                 | 1.37       | 0.24    |
| What is the regimen for PEP according to Updated Thai Red Cross regime/ID route? (2-2-2-0-2)  | 54 (50.9)   | 63 (63)                                   | 117 (56.7)                 | 3.05       | 0.08    |
| What is the regimen for PEP according to Intramuscular Essen regime? (1-1-1-1-1)  | 59 (55.6)   | 64 (64)                                   | 123 (59.7)                 | 1.48       | 0.22    |
| The schedule for PEP can be modified to PrEP by skipping the dose on day 14 and administering it on day 28 if the suspected dog or cat involved in the incident is healthy after 10 day observation period. Which route you feel is preferable for this modification? (IM regimen/Essen schedule) | 47 (44.3)   | 45 (45)                                   | 92 (44.6)                  | 0.71       | 0.39    |
| Which is the preferred route of administration of rabies vaccine for PEP in immunocompromised individuals or individuals receiving Chloroquine, Hydroxychloroquine or immunosuppressive therapy? (Intramuscular)  | 44 (41.5)   | 44 (44)                                   | 88 (42.7)                  | 0.13       | 0.71    |
| What is the dosage of Human Rabies Immunoglobulin (HRIG)? (20 IU/Kg)  | 77 (72.6)   | 69 (69)                                   | 146 (70.9)                 | 0.33       | 0.56    |
| Rabies Immunoglobulin (RIG) should be administered to all patients with category III bite   | 61 (57.5)   | 59 (59)                                   | 120 (58.25)                | 0.044      | 0.83    |
| In immunocompromised conditions RIG should be administered in category II and III bite  | 44 (41.5)   | 44 (44)                                   | 88 (42.71)                 | 0.130      | 0.717   |
| RIG can be given after how many days of first dose of Anti-Rabies Vaccination (ARV) (within 7 days)   | 62 (58.5)   | 64 (64)                                   | 126 (61.1)                 | 0.65       | 0.41    |
| How much antirabies neutralising antibody titre in serum is considered as adequate seroconversion post vaccination? (0.5 IU/mL or more)   | 52 (49.1)   | 46 (46)                                   | 98 (47.57)                 | 0.192      | 0.660   |
| How many doses of vaccine for PEP is given as per updated Thai red cross regimen/ID route? (8 doses)  | 21 (19.81)  | 27 (27)                                   | 48 (23.3)                  | 1.487      | 0.222   |
| Only adequate wound wash is required in case of re-exposure where animal bite victim has documented proof of complete PEP or PrEP within 3 months.  | 54 (51.9)   | 51 (51)                                   | 105 (50.97)                | 0.0001     | 0.993   |
| Entire vial content of rabies vaccine should be utilised within how many hours after reconstitution of the vaccine? (within six hours)  | 55 (51.9)   | 49 (49)                                   | 104 (50.4)                 | 0.17       | 0.67    |

**[Table/Fig-3]:** Correct responses for knowledge and practices on Post-Exposure Prophylaxis (PEP) for management of animal bite amongst doctors.  
p≤0.05 – Significant

While 164 (79.6%) of the doctors were aware of the categories of animal bites and their management, only 89 (43.2%) were knowledgeable about the cost-effectiveness and current recommendation of the ID route of vaccination. Approximately, 117 (56.7%) of doctors responded correctly regarding the regimen and dose for ID as well as the 5-dose regimen for intramuscular administration of ARV. Only 92 (44.6%) were aware of the modification of PEP to PrEP in the Essen regimen, and 88 (42.7%) knew how to manage animal bites in immunocompromised patients. Although 146 (70.9%) of the doctors were familiar with the dosage of HRIG, only half of them knew when to administer RIG in relation to the vaccine. Furthermore, 104 (50.4%) of the doctors knew that the rabies vaccine vial should be utilised within six hours of reconstitution [Table/Fig-3].

## DISCUSSION

Animal bite management is of utmost importance if we are to achieve zero deaths from rabies by 2030. The results of this study reflect that only half of the doctors had an overall understanding of rabies and PEP for managing animal bites. A similar study conducted in Uganda showed that 41% of doctors had sufficient knowledge about rabies [20]. The doctors in this study demonstrated good knowledge of the causative agent of rabies (98%), which was slightly higher compared to a study conducted in Belgau city (95.23%) [21].

The observation period of 10 days in the case of bites by dogs and cats was known to very few participants, i.e., 26.6% in this study, as compared to 56% in a study conducted in Patiala [19] and 70% in a study by Sudarshan MK [12]. In this study, only 44.6% of the doctors were aware that the Essen regimen could be modified from PEP to PrEP. Given that the majority of bites in India are from dogs and cats, the observation period holds significance for these animals. A correct understanding of this concept would enable the modification of PEP to PrEP, leading to lower dosages and increased cost-effectiveness [5].

The categories of animal bites were correctly known to 84.9% of doctors in this study, compared to 50% of doctors in AIIMS Jodhpur

[18]. Additionally, 56.7% of doctors had correct knowledge regarding the regimen and dosage of the ID route in this study, which was comparatively lower than 66.6% in a study conducted in Gwalior [22] and only 3% in a study by Chuchu VM et al., [23]. Implementing the ID route in practice on days 0, 3, 7, and 28, with 0.1 mL in both deltoids, reduce costs and the vaccine dose, subsequently improving its availability to people in countries like India where animal bites are frequently encountered [8].

The safety of the ARV in pregnancy was known to 72.8% of doctors in this study, compared to 66.7% in a study conducted in Mumbai [24] and 63.3% in a study by Sudarshan MK [12]. Correct knowledge of the dosage and site of HRIG in this study was found to be 70.9%, compared to 31% in the study conducted in Patiala [19], 45% in AIIMS Jodhpur [18], and 41.3% in a study by Choudhary R et al., [14]. HRIG is life-saving in category III bites where an immediate immune response is needed at the site of exposure. This was known to 58.25% of doctors in this study, while 68.75% of doctors were aware of post-exposure management according to the category of bite in a study by Malhotra V et al., [19].

The time limit for the utilisation of reconstituted vaccine vials was known to 50.4% of doctors in this study, which was similar to the study conducted by Sudarshan MK [12]. Additionally, 42.7% of them were aware of how to handle animal bites in immunocompromised patients. It is essential that doctors are aware of the immune status and co-morbidities of animal bite victims before administering ARV. Furthermore, 47.57% of doctors in this study knew that a serum titre of anti-rabies neutralising antibody of more than 0.5 IU/ml is considered adequate seroconversion post-vaccination. This was almost similar to a study by Agarwal A et al., where 45.83% of doctors knew the titre of serum considered adequate for protection [22]. Similar studies from the literature have been tabulated in [Table/Fig-4] [19,23-25].

There was a significant difference in knowledge between faculty and residents regarding the site of administration of the rabies vaccine



| S. No. | Author's name and publication year | Place of study  | Number of subjects | Objective   | Conclusion   |
|--------|------------------------------------|---|--------------------|---|--|
| 1.     | Kadam M and Shinde A, 2022 [24]    | In an urban area/a metropolitan city (Mumbai) of India          | 60                 | To assess awareness among general practitioners regarding animal bite management and rabies immunisation  | It was observed that majority of the general practitioners were non MBBS doctors and their lack of knowledge and awareness is more as compared to that among MBBS doctors. Keeping in view this background, robust training and refresher training sessions have become the need of the hour for all the physicians, irrespective of the branch of medicine they practice.   |
| 2      | Chuchu VM et al., 2022 [23]        | In Makueni and Kibwezi West sub-counties, Makueni County, Kenya | 73                 | To assess the knowledge and awareness on rabies and its management among healthcare workers and the availability of rabies biologicals in Makueni County, a region in rural Kenya implementing rabies elimination activities                | The availability and use of PEP for rabies was suboptimal. We identified two urgent needs to support rabies elimination programmes: improving availability and access to PEP; and targeted training of the healthcare workers to improve awareness on bite wound management, judicious use of PEP including appropriate risk assessment following bites and the use of the dose-sparing Intradermal (ID) route in facilities seeing multiple bite patients.  |
| 3      | Malhotra V et al., 2018 [19]       | At peripheral health Institutes of district Patiala.            | 103                | To assess the skill and knowledge about animal bite management among primary healthcare providers healthcare providers at peripheral health institutes of district Patiala  | Both groups lack knowledge on how to manage common clinical scenarios frequently seen in rural areas. There is urgent need for upgrading the knowledge and skills of doctors working at the peripheral health facilities. State health department must coordinate with medical colleges for training by organising continued medical education for the success of national rabies control programme.   |
| 4      | Mbaipago N et al., 2020 [25]       | in selected regions of Chad                                     | 247                | To evaluate the level of KP (knowledge and practice) of both human and veterinary healthcare sectors during a one-day joint training program to kick start a large scale rabies burden and vaccine demand study in selected regions of Chad | In general, the importance of a one health approaches such as vaccination of dogs to prevent human rabies, is well understood in both sectors. Regarding treatment, many participants did not know the adequate number of doses required for a full course of PEP, but through the training, this knowledge improved. Detailed knowledge of atypical transmission routes and pathophysiology (neurotropism of the virus) was generally lacking and did not significantly improve through the training. |
| 5      | Present study, 2024                | In Rewa district of Madhya Pradesh                              | 206                | To assess knowledge on National guidelines for Rabies prophylaxis, 2019 among doctors of Rewa District  | The study highlighted the need to upgrade the knowledge of doctors in Rewa district for PEP management of animal bites according to the recommended guidelines. More emphasis is to be laid on the ID route, its cost effectiveness, dosage, and regimen; Post-Exposure Prophylaxis (PEP) modification to Pre-Exposure Prophylaxis (PrEP); animal bite management in immunocompromised animals; and the duration needed to use vaccination vials upon reconstitution.                                  |

[Table/Fig-4]: Similar studies from the literature.

in infants and young children, which could lead to adverse reactions following immunisation. Additionally, a significant knowledge gap was found among faculty and residents in the categorisation of wild animal bites. Resident doctors appear to be more updated with the recent guidelines for rabies prophylaxis. Due to the fact that only 16.5% of doctors have undergone training in the previous year, most clinicians are not well-versed in the new additions to the rabies guidelines.

### Limitation(s)

A Google form was used for collecting data with a limited sample size, making it not possible to observe the study subjects' attitudes or practices.

### CONCLUSION(S)

The study highlighted the need to upgrade the knowledge of doctors in Rewa district for PEP management of animal bites according to the recommended guidelines. More emphasis should be placed on the ID route, its cost-effectiveness, dosage, and regimen; PEP modification to PrEP; management according to the category of animal bite; animal bite management in immunocompromised individuals; and the duration needed to use vaccination vials upon reconstitution. These are some of the points to be considered while planning reorientation programs and CMEs for doctors. Therefore, by adhering to standard guidelines for rabies prophylaxis, collective efforts will work towards the elimination of Dog-Mediated Rabies by 2030, i.e., 'Zero by Thirty'.

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- For any images presented appropriate consent has been obtained from the subjects. No

**PLAGIARISM CHECKING METHODS:** [\[Jain H et al.\]](#)

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