

## Original Research Article

# Rabies and its prevention: are our medical students well informed?

Anisha A. Nair<sup>1\*</sup>, Prathibha M. Thankamoniamma<sup>2</sup>, Gayathri L. K.<sup>2</sup>, Carol Pinheiro<sup>2</sup>,  
Amala Shajahan<sup>1</sup>, Alifa Mariyam P. Eranippurath<sup>1</sup>, Aleena Asok<sup>1</sup>,  
Amal Jacob Devasya<sup>1</sup>, Amritha T. Madhu<sup>1</sup>, Amal Bijo<sup>1</sup>, Amal Raj P. A.<sup>1</sup>,  
Anand Krishna S.<sup>1</sup>, Anas Mohamed P. T.<sup>1</sup>, Amjad Ali P.<sup>1</sup>

<sup>1</sup>Government T. D. Medical College, Alappuzha, Kerala, India

<sup>2</sup>Department of Community Medicine, Government T. D. Medical College, Alappuzha, Kerala, India

**Received:** 23 June 2023

**Accepted:** 22 September 2023

### \*Correspondence:

Dr. Anisha A. Nair,

E-mail: [anishaanilnair@gmail.com](mailto:anishaanilnair@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** Rabies is a vaccine-preventable, viral disease. However, once clinical symptoms appear, rabies is 100% fatal. Significantly, India accounts for 36% of the world's rabies deaths. Recently, in Kerala, a surge in dog bite cases and a consequent rise in the incidence of rabies deaths has been noted, which is a serious public health medical concern. The present study was done to assess the level of knowledge of rabies and its prevention among medical students of Government T D Medical College, Alappuzha to identify lacunae in knowledge if any and to provide sessions on rabies prevention and control.

**Methods:** A cross-sectional study was conducted among the medical students of Government T. D. Medical College, Alappuzha in 2022. Convenient sampling was done, and data was collected using a pre-tested questionnaire which was analysed using SPSS software.

**Results:** Out of the 261 students who took part in the study, 88.13% of the study participants were observed to have medium to sufficient level of knowledge regarding rabies and its prevention, while 11.87% had low level of knowledge. In general, the level of knowledge was noted to be roughly proportional to the year of study of MBBS.

**Conclusions:** The level of knowledge of the participants with regards to the schedule of vaccination and knowledge of symptoms of rabies, was observed to be less than what would be desirable. Structured training and education of medical students can rectify this lacuna, and thereby bring about significant reduction in fatality rates.

**Keywords:** Rabies, Knowledge, Medical, Students

## INTRODUCTION

Rabies is a vaccine-preventable viral disease that occurs in more than 150 nations and territories. Despite being a preventable disease, rabies causes tens of thousands of deaths every year, mainly in Asia and Africa, 40% of whom are children under 15 years of age.<sup>1</sup> In fact, among the currently recognized infectious diseases, rabies has the highest case fatality rate.<sup>2</sup> Approximately 99% of all rabies transmissions to humans are from dogs which also form the main source of human rabies deaths.<sup>1</sup> When it comes to South-East Asia, nine countries are endemic for rabies—

Bangladesh, Bhutan, North Korea, Myanmar, Nepal, Sri Lanka, India, Indonesia, and Thailand.<sup>3</sup> In India alone, approximately 18,000 to 20,000 human deaths can be attributed to rabies annually. Most of these deaths comprise children, who do not receive timely medical care and thus their deaths are not recorded. As these cases are not recorded, especially in rural parts of India, where these cases are often misdiagnosed, the reported incidence of rabies in India is likely to be an underestimation: the true burden of the disease in India is therefore still uncertain.<sup>4</sup> The incubation period of rabies is approximately 2-3 months but may range from one week to one year. This is

dependent on factors including the location of virus entry and the viral load. The initial symptoms of rabies include generic signs like fever, unusual or unexplained tingling, pain, pricking or burning sensations at the wound site. Following the spread of the virus to the central nervous system, there is progressive and fatal inflammation of the brain and spinal cord. Once the person develops rabies, it can be managed; but cure is rare and it will be associated with severe neurological symptoms.<sup>1</sup> The management of an animal bite is thus very crucial, to prevent mortality. For the prevention of human rabies, immunoglobulins and human vaccines are available. Following a dog bite, the immediate management involves cleansing of the wound and immunization within a few hours after contact with a suspect rabid animal.<sup>3</sup> However the prevalence of many myths and false beliefs associated with wound management, including the application of oils, herbs, and red chilies on wound inflicted by rabid animals results in neglect of washing the wound properly.<sup>5</sup> It is possible to eliminate dog-mediated rabies as a public health problem by vaccination of dogs, controlling the dog population, prevention of dog bites, and establishing universal access to post-exposure prophylaxis. Vaccinating dogs, combined with effective dog population management, is the most economical approach for preventing rabies in people. It has been found that control of canine rabies can be attained with sustained dog vaccination coverage of 70% on a global level.<sup>3</sup> Insufficient knowledge of categorisation and management of animal bite wounds may lead to erroneous vaccination, scheduling of vaccines, and imparting inadequate knowledge about the disease and its importance. The inadequacies in vaccination can be attributed to a dearth of knowledge among the members of the medical community itself. Owing to the serious nature of the disease, it is imperative for medical students to be aware of rabies and its prevention and treatment. The study aims to assess the knowledge of rabies and its prevention among medical students in a tertiary care hospital in central Kerala. The results of the study would help to ascertain the gaps in knowledge and attitude that exist among them regarding rabies and would enable measures to educate them regarding the importance of the disease and its prevention.

## METHODS

This cross-sectional study was conducted in a government medical college in Alappuzha among undergraduate medical students during the year 2022. The sample size was calculated by using the formula as mentioned below:

$$n = Z\alpha^2 pq/d^2$$

The proportion of good knowledge was taken as 66% from which the calculated minimum sample size was estimated to be 198 with an alpha error of 5% and a power of 80%.<sup>6</sup> The final sample size taken was 261. The study variables comprised of sociodemographic variables like age, sex, year of education, and variables to assess the knowledge of study participants. A pre-tested semi-structured

questionnaire was used to collect information on the sociodemographic characteristics and knowledge regarding rabies through google forms. The nature of the study was explained, and consent was obtained from the study participants. Privacy and confidentiality of all information collected were maintained throughout the study. Scores were assigned to all the questions in the questionnaire and the final score was considered as a measure of the level of knowledge regarding rabies. A score of 0-6 was considered a lack of knowledge, 7-12 was low level of knowledge, 13- 18 corresponded to medium level, 19-24 was considered sufficient level of knowledge and 25-30 was indicative of high level of knowledge. The data was entered into Microsoft Excel and analysed using SPSS version 26 software. Qualitative variables were summarized using proportions and percentages and quantitative variables in mean with standard deviation. Appropriate statistical tests were done to find out the association between variables.

## RESULTS

The study included a total of 261 students; the mean age of study participants was  $21.47 \pm 1.7$  years, of which 66% (172) were females.

**Table 1: Sociodemographic characteristics of the study population (n=261).**

| Sociodemographic parameters                                           | N (%)      |
|-----------------------------------------------------------------------|------------|
| <b>Gender</b>                                                         |            |
| Male                                                                  | 89 (34)    |
| Female                                                                | 172 (66)   |
| <b>Year of study</b>                                                  |            |
| 1 <sup>st</sup>                                                       | 70 (26.8)  |
| 2 <sup>nd</sup>                                                       | 68 (26.1)  |
| 3 <sup>rd</sup>                                                       | 100 (38.3) |
| 4 <sup>th</sup>                                                       | 23 (8.8)   |
| <b>History of animal bite</b>                                         | 81 (31)    |
| Less than 6 months back                                               | 22 (8.4)   |
| 6 months to 1 year back                                               | 10 (3.8)   |
| More than 1 year back                                                 | 49 (18.8)  |
| <b>Participants who took post exposure prophylaxis following bite</b> | 56 (69.1)  |

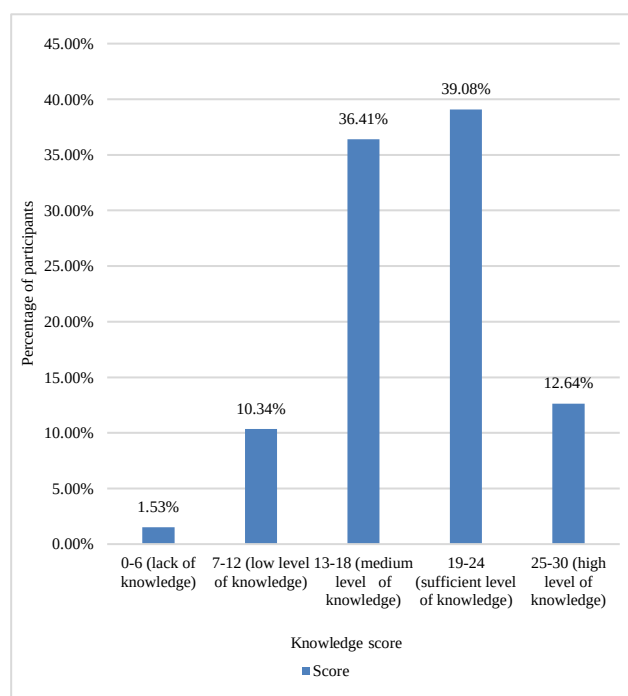
Around 33% (87) of the study participants had pets out of which 62.8% (59) had vaccinated their pets. Around 31% (81) of the study participants were either bitten or scratched by animals and of them, 69.1% (56) had taken post-exposure prophylaxis (Table 1). The study revealed that 24.5% (64) participants knew the signs of rabies in dogs whereas 32.6% (85) participants knew the symptoms of rabies in humans.

Almost three quarters of the study participants 88.9% (232) knew that the first step in the management of animal bites was wound care, around 57.9% (151) knew the correct schedule of vaccination in government hospitals and 49.4% (129) of the participants were aware of the correct intramuscular schedule for rabies vaccination (Table 2).

**Table 2: Knowledge regarding rabies epidemiology, prevention and management (n=261).**

| Variables                                                                                                              | N (%) <sup>a</sup> |
|------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Epidemiology</b>                                                                                                    |                    |
| The animals spreading rabies                                                                                           | 244 (93.5)         |
| Unprovoked dog bite is more dangerous                                                                                  | 127 (48.7)         |
| Symptoms of rabies in dogs include hydrophobia, aggressiveness, paralysis, salivation or drooling and loss of appetite | 64 (24.5)          |
| Rabies affects brain in the human body                                                                                 | 247 (94.6)         |
| Bite on the face allows the fastest spread of rabies                                                                   | 211 (80.8)         |
| Rabies is transmitted by saliva                                                                                        | 178 (68.2)         |
| Chance of survival if rabies develops is 0%                                                                            | 187 (71.6)         |
| Symptoms of rabies in humans include hydrophobia, photophobia, aggressiveness, headache, vomiting, hallucinations      | 85 (32.6)          |
| Rabies can be transmitted via organ transplantation                                                                    | 142 (54.4)         |
| <b>Prevention and management</b>                                                                                       |                    |
| First step in the management of animal bites is wound care                                                             | 232 (88.9)         |
| Duration of washing wound is 10-15 minutes                                                                             | 196 (75.1)         |
| The wound cannot be sutured immediately after a bite                                                                   | 191 (73.2)         |
| IDRV schedule is 0,3,7,28 days                                                                                         | 151 (57.9)         |
| Effect of the complete course of IDRV lasts lifelong                                                                   | 71 (27.2)          |
| Re-exposure prophylaxis is needed after 3 months of the complete course of rabies vaccine                              | 58 (22.2)          |
| IMRV schedule is 0,3,7,14,28                                                                                           | 129 (49.4)         |
| Awareness of pre-exposure prophylaxis                                                                                  | 186 (71.3)         |
| Lab staff handling the virus, veterinarians and animal handlers all require pre-exposure prophylaxis                   | 239 (91.6)         |
| Indications of RIG are category 3, category 2 in immunocompromised and bites by wild animals                           | 179 (68.6)         |
| Rabies immunoglobulin should be taken following abrasion with oozing of blood.                                         | 83 (31.8)          |
| Rabies immunoglobulin is not indicated beyond 7 days after the start of vaccination.                                   | 104 (39.8)         |
| Pregnancy is not a contraindication for rabies post-exposure prophylaxis.                                              | 106 (40.6)         |
| Applying turmeric over the bite wound can't prevent rabies.                                                            | 205 (78.5)         |

<sup>a</sup> The frequencies represent the number of participants who gave the correct responses.

**Figure 1: Level of knowledge of study participants (n=261).**

Majority 82.4% (215) were of the opinion that health education of people regarding the care of dogs and prevention of rabies would be a good measure to reduce the incidence of rabies deaths and stray dog bites and other suggestions included mass immunisation of 80% dogs in the area and timely vaccination of persons with animal bites. The median score of the study participants was 19 (IQR 7). The study concluded that 1.53% (4) participants had lack of knowledge, 10.34% (27) participants had low level of knowledge, 36.41% (95) participants had medium level of knowledge and 39.08% (102) had sufficient level of knowledge and 12.64% (33) participants had high level of knowledge (Figure 1). Bi variable analysis was done to find the factors associated with the level of knowledge regarding rabies. The year of study was found to be significantly associated with the level of knowledge using Kruskal Wallis test (p value<0.0001).

## DISCUSSION

Rabies is one of the neglected tropical diseases (NTD) that mainly affects the poverty-stricken parts of the population. The emergency management of rabies exposure is post-exposure prophylaxis (PEP) which consists of extensive washing with water and soap for at least 15 minutes and

local treatment of the wound as soon as possible after a suspected exposure; a course of vaccination that meets WHO standards; and administration of rabies immunoglobulin or monoclonal antibodies into the wound if indicated. A crucial component of rabies vaccination programmes comprises education on dog behaviour and bite prevention for both children and adults which can reduce both the incidence of human rabies as well as the economic burden of managing dog bites.<sup>1</sup> In a study conducted by Deori et al, 97% were aware of the transmission mode of the rabies virus.<sup>7</sup> This is similar to another study in which 81.9% of participants knew the correct mode of transmission.<sup>8</sup> In contrast, our study revealed that only 68.2% of the participants were aware of the transmission mode of rabies. In another cross-sectional study done by Singh et al, less than half of the participants (41.29%) knew the danger sites of rabies.<sup>9</sup> In our study it was observed that 80.8% knew the danger sites of rabies. Another study observed that 82.3% of the participants were aware that the primary system affected by rabies is the central nervous system.<sup>10</sup> This was comparable to that observed in our study where 247 (94.6%) participants were aware of the same and in a study by Bhalla et al.<sup>11</sup> In a study conducted by Praveen et al, 60% of students knew that rabies was 100% fatal, while our study reported better results with 71.6% of the participants showing knowledge of the same.<sup>12</sup> Our study also observed that 54.4% of the participants were aware of transmission by organ transplantation, which was significantly higher than another study in which only 5.33% of the students knew about organ transplantation.<sup>13</sup> In a cross-sectional study among medical students of different years, 74.3% of participants knew that hydrophobia is a symptom of rabies in humans.<sup>14</sup> This was similar to our study in which 66.7% of medical students knew the same. However, Praveen et al. reported that 48% of students knew the symptoms of rabies in humans.<sup>12</sup> In our study, lower knowledge was reported with only 32.6% of participants knowing the same. In our study, about three-fourth of the participants knew the duration of washing the wound with water. This contrasted with the findings in an observational study which reported significantly lower results. In the same study, it was also revealed that 65% knew that the wound shouldn't be dressed.<sup>8</sup> This is with congruence to our findings and another study done by Chowdhury et al.<sup>15</sup> A study observed that 80.89% of students knew the correct intramuscular schedule.<sup>16</sup> This is similar to another one conducted among doctors in South India.<sup>17</sup> However, a striking gap was noted in our study in which only about half of the participants knew 49.4% are aware of the correct schedule of IMRV. Another study reported significantly lower knowledge regarding the same.<sup>18</sup> In yet another study, 87.26% of the participants knew the correct intradermal schedule.<sup>16</sup> In contrast, our study reported that only 57.9% of the participants knew the correct schedule. In a study conducted by Giri et al, 77.70% knew about pre-exposure prophylaxis.<sup>16</sup> This is similar to our study in which 71.3% knew about pre-exposure prophylaxis. When it came to the knowledge of the indications of pre-exposure prophylaxis, a study observed that 92.6% of the

respondents knew the same, which is similar to that recorded by our study also.<sup>17</sup> The indications of rabies immunoglobulin were known to very few participants in a study conducted by Nayak et al.<sup>19</sup> However in our study 68.6% of the participants knew the same. As regards knowledge about the contraindications of rabies post exposure prophylaxis, 66.7% of the respondents knew that pregnancy was not a contraindication.<sup>20</sup> However, a striking gap in knowledge was noted in our study with only less than half of the respondents being aware of the same. A study conducted by Tiwari et al reported that 96% of the respondents did not feel that traditional methods would be useful.<sup>21</sup> However, knowledge regarding the same was found to be lower in our study. While comparing the results and findings of this study with those conducted elsewhere in the country, wide variations could be observed at times. Notwithstanding, it could be seen that the general level of knowledge of the medical community is less than what would be desirable. This is a matter of grave concern, as it would have a direct impact on identifying rabies in affected people and administering appropriate treatment. Consequently, this lack of knowledge would have an adverse effect on the fatality rates. The important thing to note, however, is that structured training and education of medical students can easily rectify this lacuna, and thereby lead to better survivability for rabies victims. Dedicated, result-oriented training methodology is what would be required, to impart knowledge to the entire spectrum of healthcare workers, including medical students.

## CONCLUSION

The level of knowledge of the participants with regards to the schedule of vaccination and knowledge of symptoms of rabies, was observed to be less than what would be desirable. Structured training and education of medical students can rectify this lacuna, and thereby bring about significant reduction in fatality rates.

## ACKNOWLEDGEMENTS

Authors would like to extend our sincere gratitude to Dr. Nisha R. S., Professor and Head of Department of Community Medicine, Government T. D. Medical College, Alappuzha for her support and encouragement in carrying out this study. Authors are thankful to all the faculties of the department for their valuable guidance in completing this research project. Authors would also like to extend our heartfelt thanks to our study participants whose wholehearted cooperation transformed this study into reality. Many people, especially our colleagues and team members have made valuable contributions and suggestions on this study which inspired us and helped in accomplishing this task with ease.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*



## REFERENCES

1. Rabies. Available at: <https://www.who.int/news-room/fact-sheets/detail/rabies>. Accessed on 20 February 2023.
2. WHO expert consultation on rabies: third report. Available at: <https://apps.who.int/iris/handle/10665/272364>. Accessed on 20 February 2023.
3. Rabies. Available at: <https://www.who.int/southeast-asia/health-topics/rabies>. Accessed on 20 February 2023.
4. Eliminating rabies in India through awareness, treatment and vaccination. Available at: <https://www.who.int/news-room/feature-stories/detail/eliminating-rabies-in-india-through-awareness-treatment-and-vaccination>. Accessed on 20 February 2023.
5. Sekhon AS, Singh A, Kaur P, Gupta S. Misconceptions and myths in the management of animal bite cases. *Indian J Community Med*. 2002;27(1):9.
6. Sarkar A, Sudip B, Chintan B, Aniruddha G, Makwana N, Dipesh P. An assessment of knowledge of prevention and management of Rabies in interns and final year students of Shri M. P. Shah Government Medical College, Jamnagar, Gujarat. *J Res Med Dent Sci*. 2013;14:1.
7. Deori TJ, Jaiswal A, Debnath A, Sharma S, Phukan A. Awareness of rabies among MBBS interns of a government medical college of North India: a cross-sectional study. *Int J Community Med Public Health*. 2022;9(4):1692-6.
8. Das D, Vohra P, Mane P. Assessment of knowledge regarding rabies and its prevention among the medical students of government medical college, Nalhar, NUH. *Int J Sci Res*. 2021;7:48-50.
9. Singh AD, Rochwani R, Sagar I, Riya, Jain A. A cross sectional study to assess awareness regarding rabies amongst medical students of Rajindra hospital, Patiala, Punjab. *Int J Community Med Public Health*. 2019; 6(2):690-5.
10. Aggarwal A, Maroof KA, Bhasin SK. Rabies Literacy Amongst Medical Undergraduate Students in a Public Teaching Hospital in East Delhi. *J Res Med Dent Sci*. 2023;1(1).
11. Bhalla S, Mehta JP, Singh A. Knowledge and Practice among General Practitioners of Jamnagar city Regarding Animal Bite. *Indian J Community Med*. 2005;30(3):94.
12. Praveen G, Rajashekar HK. Knowledge, awareness and perception of medical college students on rabies and its prevention. *Int J Med Sci Public Health*. 1970;3(12): 1484.
13. Mali A, Solanki SL. Rabies. International Institute of Medical Sciences, Udaipur. *Int J Med Sci Public Health*. 2018;10(6).
14. Tiwari A. Assessment of knowledge regarding rabies and its prevention among the medical students of Government Medical College Rajnandgaon, Chhattisgarh, India. *Int J Community Med Public Health*. 2018;5(4):1397-401.
15. Chowdhury R, Mukherjee A, Naskar S, Lahiri S. A study on knowledge of animal bite management and rabies immunization among interns of a government medical college in Kolkata. *Int J Med Public Health*. 2013;3(1):17.
16. Giri MR, Ajay B, Krishna K. Awareness of medical students on Human rabies and its prevention: A Study conducted in PRM Medical College, Baripada, Odisha. *J Pharm Negat Results*. 2023 Feb 6;709-12.
17. Holla R, Darshan B, Guliani A, Unnikrishnan B, Thapar R, Mithra P, et al. How familiar are our doctors towards Rabies prophylaxis- A study from coastal south India. *PLoS Negl Trop Dis*. 2017;11(10): e0006032.
18. Lahiri S. Rabies. *J Pak Med Assoc*. 2023;2:2012.
19. Nayak RK, Walvekar PR, Mallapur MD. Knowledge, Attitudes and Practices regarding Rabies among general practitioners of Belgaum City. 2013;6.
20. Kadam M, Shinde A. A cross sectional study on awareness of animal bite management and rabies immunization among general practitioners in a metropolitan city of India. *Int J Sci Res*. 2022;2:50-2.
21. Tiwari HK, Vanak AT, O'Dea M, Robertson ID. Knowledge, attitudes and practices towards dog-bite related rabies in para-medical staff at rural primary health centres in Baramati, western India. *PLOS ONE*. 2018;13(11):e0207025.

**Cite this article as:** Nair AA, Thankamoniamma PM, Gayathri LK, Pinheiro C, Shajahan A, Eranippurath AMP, et al. Rabies and its prevention: are our medical students well informed? *Int J Community Med Public Health* 2023;10:3660-4.