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Knowledge, Attitude and Practice Regarding Rabies and its Elimination Among Nursing Students in a Tertiary Care Hospital of Kolkata: A Cross-Sectional Study

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ABSTRACT

Rabies is a fatal disease which can be prevented adequately. Nursing personnel being a frontline health worker need to have adequate knowledge and possess sufficient skills for prevention of the disease. This study thus assessed knowledge, attitude and practice regarding Rabies and its elimination among nursing students in a tertiary hospital in Kolkata. This cross-sectional study was conducted among 128 nursing students of Lady Duffer in Victoria Hospital, Kolkata. Census method was used to select the all the eligible study participants. A pre-designed, structured questionnaire was used to collect the data from the participants. Data was analysed using SPSS. The mean age of the study participants was 21.66±3.12 years. 98.4% participants correctly identified the causative agent of the disease being a virus, while only 23.4% regarded the disease to be almost 100% fatal. Maximum study participants (n=107) reported hydrophobia as the most common symptom of rabies followed by fever and headache. Only 34% participants could correctly identify the name of the national health program while rabies elimination criteria by year 2030 was known by 43.8% participants. 15.6% had un favorable attitude towards prevention and management of animal bite cases. Appropriate wound management for Cat-I bite was provided by 23% participants, while the correct wound management, rabies vaccination and immunoglobulin infiltration were reported by only 2 participants. This study highlighted the critical gaps in the knowledge, attitudes and practices regarding rabies prevention and management among nursing students in Kolkata. Addressing these gaps through curriculum enhancements, practical training and awareness programs could improve their preparedness to contribute effectively to rabies prevention efforts and support national rabies elimination goals.

INTRODUCTION

Rabies, a viral zoonotic disease with nearly 100% fatality post-symptom onset, poses a critical public health threat, particularly in Asia and Africa. India, with one of the highest global rabies burdens, reports an estimated 20,000 annual deaths, primarily due to bites from rabid animals^[1,2]. Despite being preventable through timely administration of post-exposure prophylaxis (PEP), the disease's persistence highlights ongoing challenges in awareness, prevention and treatment accessibility. As primary healthcare providers, nurses are pivotal in rabies management, patient education and community outreach. Their knowledge and practices surrounding rabies can significantly impact public health outcomes, especially in areas with high incidence. However, studies indicate that healthcare professionals, including nursing students, often exhibit knowledge gaps and variable attitudes toward rabies prevention and management^[3]. For instance, research conducted in Maharashtra revealed moderate knowledge but insufficient preventive practices among nursing students, suggesting a need for enhanced rabies education within healthcare curricula^[4]. Globally, the World Health Organization (WHO) and the Global Alliance for Rabies Control (GARC) have established the "Zero by 30" initiative, aiming to eliminate human deaths from dog-mediated rabies by 2030^[5]. This goal emphasizes a One Health approach, requiring coordination across human, animal and environmental health sectors. Nursing students, as future frontline workers, play a significant role in this mission., their preparedness to address rabies cases and educate at-risk communities is essential for achieving rabies elimination goals. This study addressed the critical role nursing students play in rabies prevention and elimination efforts. In a densely populated city like Kolkata, which faces a high incidence of rabies cases and a substantial stray dog population, nursing students are likely to encounter rabies-related cases frequently in their clinical practice. Assessing their knowledge, attitudes and practices (KAP) is essential to identify educational needs and equip them for future responsibilities in rabies prevention and patient care. Existing literature predominantly focuses on the KAP regarding rabies among general practitioners and veterinarians, with limited data on nursing students. Yet, this demographic holds immense potential in delivering preventive health education and engaging in community outreach. Studies in similar high-risk settings have shown that healthcare students often lack critical understanding of rabies transmission, risk factors and appropriate PEP measures^[6,7]. These gaps could impair their ability to provide accurate patient guidance and limit their effectiveness in rabies management. Furthermore, healthcare workers' understanding of and adherence to the One Health approach are essential to achieving

rabies control. Nursing students well-versed in this concept can champion responsible pet ownership and rabies vaccination, collaborating across sectors to reduce transmission risks. Identifying gaps in nursing students' knowledge and attitudes can guide curriculum improvements and inform targeted interventions, ensuring they are well-prepared for their future roles in rabies elimination. By evaluating the KAP regarding rabies among nursing students in Kolkata, this study provided valuable insights into their preparedness for managing rabies cases and promoting preventive measures. These findings support the development of robust rabies education within nursing programs, aiming to strengthen rabies control and contribute to India's public health efforts toward the "Zero by 30" goal.

Objectives:

- To determine the socio-economic and demographic characteristics of nursing students at Lady Dufferin Victoria Hospital, Kolkata.
- To assess their knowledge, attitude and practice regarding rabies and its elimination among the study participants.

MATERIALS AND METHODS

This cross-sectional observational study was conducted from December 2023 to January 2024 among nursing students of Lady Dufferin Victoria Hospital which comes under the purview of the Urban Field Practice Area of Medical College, Kolkata. Those participants who did not give written informed consent and were absent throughout the study period were not included from the study.

Sample Size and Sampling Technique: In total, there were 150 nursing students currently pursuing nursing courses in the hospital. Census (complete enumeration) method was applied to select all nursing students in the hospital satisfying the inclusion criteria.

Study Tools and Technique: Pre-designed pre-tested semi-structured self-administered questionnaire was used for data collection. The questionnaire was first pre-tested among 30 nursing students in a different study setting who were not included in the final analysis. (Cronbach's alpha=0.72). Face and content validity of the questionnaire were checked by public health experts. It consisted of following domains.

- Socio-demographic characteristics like age in completed years, gender, religion, socio-economic status, place of residence.
- Knowledge, attitude and practice related questions regarding rabies and its elimination. Knowledge was assessed regarding the source and transmission of rabies, category of bite and accordingly its management. Attitude was

assessed by a six-item questionnaire and 50% of the attainable scores was considered as cut-off for favorable attitude.

Data Collection Procedure: Written informed consent was taken from the study participants prior to conduction of the study. There were briefed regarding the study and assured that the data collected would be kept confidential. The questionnaire was handed over to the study participants and after completing the questionnaire within 30 minutes, the questionnaire was returned to the investigators.

Data Analysis: Data was analyzed using Microsoft Excel (2019). Appropriate descriptive statistics were utilized as applicable. Continuous data were denoted as mean (\pm standard deviation) or median (interquartile range), whereas categorical data were presented as frequency with percentages. Appropriate descriptive statistics were applied wherever applicable.

Ethical Issues: The study was approved by the Institutional Ethical Committee for Human Research, Medical College, Kolkata (approval ID: 2200, dated 20/01/2024). Written informed consent was taken from the study participants. All the ethical principles as per Declaration of Helsinki were strictly adhered to.

RESULTS AND DISCUSSIONS

Socio-Demographic Characteristics of the Study

Participants: In total, 128 nursing students participated in the study. The mean age of the study participants was 21.66 ± 3.12 years. All the participants were females. Majority (83.6%) of the study participants were Hindus, while 75.8% (n=97) participants had higher secondary educational status. All the students were pursuing GNM courses and 61.7% (n=79) were in the 1st year of their academic curriculum. Approximately 60% of the participants lived in rural areas and 45.3% of the participants belonged to Class III socio-economic status. (as per modified BG Prasad scale 2023).

Knowledge Regarding Rabies Among the Study

Participants: 98.4% participants correctly identified the causative agent of the disease being a virus, while only 23.4% regarded the disease to be almost 100% fatal.

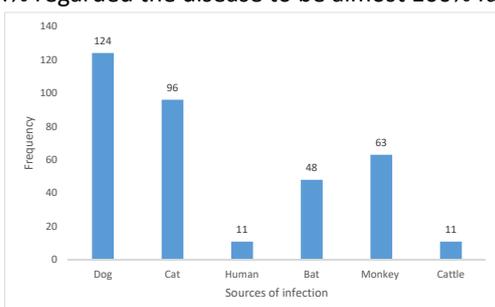


Fig. 1: Correct Responses in Knowledge Regarding Source of Infection (n=128)

The maximum response for the source of infection of rabies was reported to be dog (n=124) followed by cat (n=96).

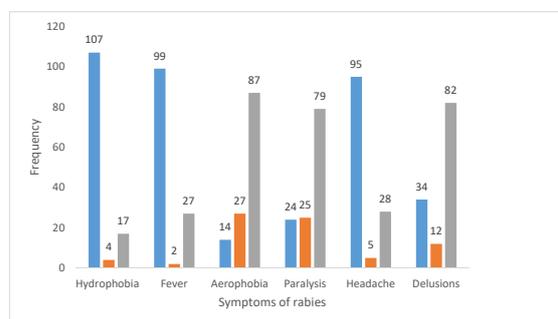


Fig. 2: Responses of the Study Participants Regarding Symptoms of Rabies in Humans (n=128)

Maximum study participants (n=107) reported hydrophobia as the most common symptom of rabies followed by fever (n=99) and headache (n=95). Regarding first aid management of animal bite victims, 88.3% of the participants knew correctly regarding washing with soap and water. Tetanus prophylaxis was known by 84.3% of the participants. However, 19.5% did not know that suturing is not recommended for the wound. For category I bite, wound management was identified as treatment of choice by 35.9% (n=46) participants. Regarding Category II bite, only 8 participants correctly identified wound management and vaccination as their choice. Similarly for cat-III bites, correct response of wound management, vaccination and immunoglobulin infiltration was reported by only 10 participants. Only 34% participants could correctly identify the name of the national health program of rabies while elimination criteria of the disease by 2030 was known by 56 (43.8%) participants.

Attitude Regarding Rabies Among the Study

Participants: Approximately 20 (15.6%) had unfavorable attitude towards prevention and management of animal bite cases.

Practice Regarding Rabies Prevention and Management Among the Study Participants:

Only 63 (49.2%) have provided management for animal bite victims in the past 6 months among which the majority have management bites from dogs and cats. Appropriate wound management for cat-I bite was provided by 23% of the participants, while the correct management of wound, rabies vaccination and immunoglobulin infiltration were reported by only 2 participants. The most common site of rabies injection as the deltoid muscle was reported by 3.1% of the participants whereas the infiltration of the immunoglobulin around the wound area was reported by only 17 participants. This study explored the knowledge, attitudes and practices (KAP) regarding rabies and its prevention among nursing students at a tertiary care hospital in Kolkata. The findings highlight

Table1: Responses in Knowledge Regarding Transmission of Rabies (n=128)

| Options | Yes N (%) | No N (%) | Don't Know N (%) | Remarks Correct responses given by N (%) |
|--|------------|-----------|------------------|--|
| Bite from an infected animal | 124 (96.9) | 0 | 4 (3.1) | 124 (96.9) |
| Scratch from an infected animal | 115 (89.8) | 2 (1.6) | 11 (8.6) | 115 (89.8) |
| Ingestion of contaminated food or drinking water | 21 (16.4) | 46 (35.9) | 61 (47.7) | 46 (35.9) |
| Contact with intact animal skin | 16 (12.5) | 45 (35.2) | 67 (52.3) | 45 (35.2) |
| Transmitted through soil | 4 (3.1) | 60 (46.9) | 64 (50.0) | 60 (46.9) |
| Licking of wound by an infected animal | 69 (53.9) | 20 (15.6) | 39 (30.5) | 69 (53.9) |

Table 2: Responses of the Study Participants for Knowledge Regarding Category of Bite According to Type of Wound (n=128)

| Options | Cat I N (%) | Cat II N (%) | Cat III N (%) | Don't Know N (%) | Remarks Correct responses given by N (%) |
|---|-------------|--------------|---------------|------------------|--|
| Nibbling of uncovered skin | 27 (22.7) | 5 (3.9) | 6 (4.7) | 88 (68.8) | 5 (3.9) |
| Single transdermal bite | 22 (17.2) | 30 (23.4) | 6 (4.7) | 70 (54.7) | 6 (4.7) |
| Licks on intact skin | 19 (14.9) | 13 (10.2) | 13 (1.2) | 83 (64.8) | 19 (14.9) |
| Minor scratches without bleeding | 53 (41.4) | 6 (4.7) | 5 (3.9) | 64 (50.0) | 6 (4.7) |
| Contamination of mucus membrane with saliva | 26 (20.3) | 12 (9.4) | 23 (18.0) | 67 (52.3) | 23 (18.0) |

Table 3: Attitude of the Participants Regarding Rabies Prevention (n=128)

| Questions | Strongly Disagree N (%) | Disagree N (%) | Neutral N (%) | Agree N (%) | Strongly agree N (%) |
|---|-------------------------|----------------|---------------|-------------|----------------------|
| Stray dogs are a major problem causing rabies in India | 6 (4.7) | 15 (11.7) | 22 (17.2) | 73 (57.0) | 12 (9.4) |
| Warm blooded animals are a major source of rabies infection | 4 (3.1) | 35 (27.3) | 53 (41.4) | 30 (23.4) | 6 (4.7) |
| Appropriate wound management with soap and water is essential for animal bite victims | 4 (3.1) | 7 (5.5) | 17 (13.3) | 53 (41.4) | 47 (36.7) |
| I would advise a person bitten/scratched by suspected rabid animal to seek treatment from a health facility | 3 (2.3) | 2 (1.6) | 13 (10.2) | 48 (37.5) | 62 (48.4) |
| Any suspected rabid animal in the locality should be killed immediately to stop rabies transmission | 24 (18.8) | 48 (37.5) | 38 (29.7) | 15 (11.7) | 3 (2.3) |
| Creating awareness among the general population can help in combating the spread of rabies | 5 (3.9) | 3 (2.3) | 14 (10.9) | 26 (20.3) | 80 (62.5) |

critical gaps in understanding and inconsistent practices among future healthcare providers, which could impact their capacity to manage rabies cases effectively. The high percentage (98.4%) of participants who correctly identified the causative agent of rabies as a virus suggests that basic knowledge of the disease is widespread. However, only 23.4% were aware that rabies is almost 100% fatal without timely intervention, a gap that may hinder urgency in managing rabies cases. This finding aligns with studies conducted in other parts of India and Asia, where healthcare students exhibit adequate foundational knowledge but lack deeper understanding of rabies' severity and fatality rate^[4]. The majority identified dogs as the main source of infection, consistent with global data that shows dogs are the primary transmitters of rabies^[5]. However, fewer participants recognized other potential carriers like cats, which suggests a need for more comprehensive education on rabies vectors^[6]. The knowledge gaps extended to the recognition of rabies symptoms and management protocols. While 88.3% knew that washing with soap and water is crucial in first aid for animal bites, a significant proportion did not understand that suturing the wound is generally not recommended, a misconception that could lead to improper wound management. Comparable studies have found similar misunderstandings among nursing and medical students, indicating a widespread need for clearer, more consistent training on rabies wound management protocols^[7,8]. A concerning observation was the limited knowledge on the management of bite categories, with only 35.9% identifying correct wound management for Category I bites. Awareness was even lower for Category II and III bites, with only 8 and 10 participants, respectively, selecting the correct combination of wound management, vaccination and

immunoglobulin infiltration. The correct management of animal bite wounds is critical in preventing rabies, especially in high-risk bites. Studies suggest that the lack of awareness in bite categorization and its appropriate response is common among healthcare students and can adversely affect patient outcomes, particularly in rural or under served regions^[9]. Approximately 15.6% of participants displayed an unfavorable attitude towards the prevention and management of animal bite cases. Attitude plays a vital role in rabies prevention as it affects compliance with post-exposure prophylaxis (PEP) and patient counselling. The presence of unfavorable attitudes may reflect a lack of confidence or perceived risk, possibly stemming from inadequate training or low exposure to rabies cases^[10]. Literature supports that enhancing healthcare students' understanding of rabies can improve their attitudes and increase compliance with rabies prevention measures^[11]. The practices reported by participants indicate a worrying discrepancy between knowledge and application. Less than half (49.2%) of the participants had managed animal bite cases in the past six months, with only 23% following correct management protocols for Category I bites. This gap between theoretical knowledge and practical application could be due to limited hands-on experience or training in managing rabies cases. Studies in similar contexts highlight that while healthcare students may have basic knowledge, practical training in rabies case management remains insufficient, impacting their readiness to handle real cases^[12]. Further, only 3.1% of participants knew the correct injection site (deltoid muscle) for rabies vaccination and only 17 were aware of the importance of immunoglobulin infiltration around the wound. These findings are consistent with other studies

showing low adherence to guidelines on rabies prophylaxis among healthcare providers, underscoring the need for improved clinical training and reinforced instruction on the specific techniques involved in rabies management^[13,14]. The knowledge, attitude and practice gaps identified in this study underscore the importance of enhanced rabies education within nursing curricula. Current rabies training may be insufficiently detailed, particularly in the areas of bite categorization, wound management, PEP protocols, and immunoglobulin administration. Incorporating practical, case-based rabies education and simulation-based training may better equip nursing students to manage rabies cases in clinical settings. Previous studies advocate for increased rabies-focused training in healthcare curricula, which has been shown to improve both knowledge and compliance with rabies management guidelines^[15]. Furthermore, only 34% of participants could identify the national health program for rabies and only 43.8% were aware of the elimination goals by 2030. Raising awareness of these programs is essential, as it fosters a sense of responsibility and a broader understanding of rabies elimination efforts. Implementing targeted interventions that emphasize the goals and strategies of rabies elimination programs could instill a proactive approach among future healthcare providers^[16]. Based on the findings, several recommendations can be made to improve KAP regarding rabies among nursing students. Firstly, the nursing curriculum should include more robust modules on rabies, with an emphasis on bite categorization, PEP protocols and wound management. Practical workshops and simulation exercises should be integrated to bridge the gap between theoretical knowledge and practical application. Additionally, exposure to real-life cases and collaboration with animal health professionals through the One Health approach may enhance students' understanding of rabies transmission dynamics and preventive measures^[17]. Secondly, periodic assessment and reinforcement of rabies knowledge through refresher courses or continuing education programs could help sustain and update nursing students' competencies in rabies management. Furthermore, educational campaigns focused on the national rabies elimination program and the "Zero by 30" goal could strengthen their commitment to rabies prevention and control, promoting a culture of awareness and proactive engagement in public health initiatives^[18].

CONCLUSION

This study highlighted the critical gaps in the knowledge, attitudes and practices regarding rabies prevention and management among nursing students in Kolkata. Addressing these gaps through curriculum

enhancements, practical training and awareness programs could improve the preparedness of nursing students to contribute effectively to rabies prevention efforts and support national rabies elimination goals.

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