



Original Research Article

KNOWLEDGE, ATTITUDE AND PRACTICES ON RABIES PREVENTION AND POST-EXPOSURE PROPHYLAXIS AMONG DOG BITE PATIENTS AT URBAN HEALTH TRAINING CENTRE IN WESTERN MAHARASHTRA

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ABSTRACT

Background: Rabies is a fatal viral disease that remains a significant public health challenge in India. Despite the availability of post-exposure prophylaxis (PEP), knowledge, attitude, and practices (KAP) regarding rabies prevention remain inadequate, leading to poor adherence to PEP. This study evaluates the KAP of dog bite patients to identify gaps and improve preventive strategies.

Objectives: To assess the knowledge, attitudes, and practices regarding rabies prevention and PEP among individuals seeking treatment at an urban health training centre of Government Medical College, Miraj, Maharashtra,

Materials and Methods: A facility-based cross-sectional study was conducted at the Urban Health Training Centre, Government Medical College Miraj. Data were analysed using MS Excel, applying chi-square tests to compare proportions between literate and illiterate participants, with $p < 0.05$ considered significant.

Results: Among 150 participants, 92.7% had heard of rabies but only 36.7% recognised its symptoms. Misconceptions were common (86.7% believed in human-to-human transmission). Although 86% sought healthcare promptly and 89.3% completed the anti-rabies vaccine schedule, only 32% knew the correct vaccine injection site. Cost and cultural beliefs hindered adherence: 25.3% managed wounds at home - illiterate respondents mainly applied traditional remedies (e.g., turmeric, neem-leaf paste, alum, limestone powder) or consulted religious healers, whereas literate respondents predominantly washed wounds with soap and water or used antiseptic ointment.

Conclusion: Despite high overall awareness, critical knowledge gaps and misconceptions persist, leading to delays and incomplete adherence to post-exposure prophylaxis (PEP). Strengthening community awareness, improving provider communication, and ensuring free and timely availability of anti-rabies vaccine and immunoglobulin are essential to improve adherence and meet India's NAPRE 2030 targets.

Keywords: Rabies, Post-Exposure Prophylaxis, Dog Bites.

INTRODUCTION

Rabies is a viral disease caused by RNA viruses belonging to the family Rhabdoviridae, genus Lyssavirus, which leads to acute progressive fatal encephalomyelitis. It is a highly morbid condition and is 100% fatal if untreated. Rabies is a zoonotic disease that spreads to humans and other animals

primarily through the saliva of infected animals via bites, scratches, licks on broken skin, or contact with mucosal surfaces such as the eyes, mouth, or open wounds. In India, dogs account for nearly 95% of human rabies cases, followed by cats (2%), jackals, mongooses, and others (1%).^[1]

Globally, dog-mediated rabies is responsible for an estimated 59,000 deaths annually, resulting in

approximately 3.7 million disability-adjusted life years (DALYs) lost each year.^[2] Asia accounts for the majority of these deaths (59.6%), followed by Africa (36.4%). According to the WHO, India reports the highest rabies mortality within Asia and globally, contributing 59.9% of deaths in Asia and 35% of global deaths.^[3] The National Rabies Control Program documented 6,644 clinically suspected human rabies cases and deaths between 2012 and 2020.^[4]

A study estimated the burden of rabies in India to be 2.74 rabies cases per 100,000 population annually. Additionally, the burden of animal bites has increased from 4.2 million in 2012 to 7.2 million in 2020, with varying incidence across states and union territories.^[5]

Rabies deaths can be prevented with timely and proper implementation of post-exposure prophylaxis (PEP). This includes: Local wound care/management, Active immunization with anti-rabies vaccine (ARV) and Passive immunization with rabies immunoglobulins (RIG).

In line with the National Action Plan for Dog-Mediated Rabies Elimination (NAPRE) by 2030, ARV and RIG are included in the essential drug list under the National Health Mission (NHM) to ensure free access at all healthcare levels.^[4] Consequently, a disease with a nearly 100% mortality rate can be effectively prevented through proper use of these resources.

Despite this, gaps in knowledge, attitudes, and practices (KAP) among the Indian population as well as healthcare professionals is a major obstacle to controlling rabies.^[6] Adequate knowledge of rabies prophylaxis guidelines is vital for efficient utilization of government resources and achieving the NAPRE goal of zero rabies deaths by 2030.

Although several KAP studies exist from other Indian states, data from Western Maharashtra are limited. This urban region, with increasing stray-dog density and rapid urbanisation, requires context-specific data to inform local rabies-control measures. The estimated annual economic burden of rabies in India exceeds ₹2,000 crore (\approx US\$ 250 million), underscoring the need for efficient preventive strategies.^[21]

This study aims to assess the knowledge, attitudes, and practices (KAP) related to rabies prevention, post-exposure prophylaxis (PEP), and healthcare utilization among individuals aged 18 years and

above who sought treatment for dog bites at an urban health training centre.

Objectives

1. To assess the knowledge, attitudes, and practices of dog bite patients regarding rabies prevention and post-exposure prophylaxis.
2. To identify gaps in knowledge, attitudes, and practices related to rabies and propose strategies for improving prevention and post-exposure care among dog bite patients.

MATERIALS AND METHODS

The present study targeted individuals aged 18 years and above who reported to the Urban Health Training Centre following a dog bite. A facility-based cross-sectional study was conducted from June to July 2025. Participants were enrolled using simple random selection of consecutive eligible patients attending the clinic until the calculated sample size ($n = 150$) was achieved.

The sample-size calculation used a reference prevalence of 74% (awareness of rabies) and the formula: $N = Z^2 \cdot (P \cdot Q) / e^2$, with a margin of error of 10%, resulting in an estimated sample size of 134.9. (rounded to 150).

Data collection method

Data was collected using a semi-structured questionnaire designed to assess KAP related to rabies prevention, PEP adherence, and healthcare service utilization. Participants with incomplete or missing responses OR Individuals who did not provide informed consent were excluded. The semi-structured questionnaire was pre-tested on ten patients from the same facility. Data entry and statistical analyses were performed using MS Excel. Chi-square tests were used to compare categorical variables between literate and illiterate groups, with $p < 0.05$ considered statistically significant.

Participants who reported managing the wound at home were asked to describe the measures taken. Responses were categorized as: (i) appropriate first aid (washing the wound with soap and running water), (ii) application of antiseptic or antibiotic ointment, (iii) use of traditional/home remedies (for example: turmeric, paste of neem leaves, red-chilli powder, alum, limestone powder), and (iv) consultation with a religious or traditional healer. Multiple responses were allowed and coded as reported.

RESULTS

Table 1: Demographic & general information of study population

Variable Groups with categories		Frequency	Percentage
Age	18 – 30 years	58	38.7
	31 – 45 years	38	25.3
	46 – 79 years	54	36
Sex	Male:	78	52
	Female:	72	48
Education	Illiterate:	13	8.67
	Literate:	137	91.33
Ration Card	Orange:	97	65
	Yellow:	38	25
	White:	12	8
	Other:	3	2
Family Type	Nuclear:	102	68
	Joint:	45	30
	Extended:	3	2
Dog Type	Stray:	128	85
	Domestic:	18	12
	Unknown:	4	3
Bite Nature	Unprovoked:	114	76
	Provoked:	36	24
Dog Traceability	Traceable:	87	58
	Untraceable:	63	42
Body Part Bitten	Lower limb:	108	72
	Upper limb:	30	20
	Other:	12	8
Bite Severity	Open wound:	82	55
	Scratch with bleeding:	45	30
	Others:	23	15

Table 2: Assessment of knowledge amongst the study population

Question	Illiterate (n=13)	Literate (n=137)	Total (n=150)	P-value
1. Heard of rabies?	10 (76.9%)	129 (94.2%)	139 (92.7%)	<0.05
2. Cause of rabies (virus)	7 (53.8%)	117 (85.4%)	124 (82.7%)	<0.05
3. Animals spreading rabies (dog)	11 (84.6%)	128 (93.4%)	139 (92.7%)	>0.05
4. Knows symptoms of rabies	2 (15.4%)	53 (38.7%)	55 (36.7%)	<0.05
5. Body fluid transmits rabies	3 (23.1%)	86 (62.8%)	89 (59.3%)	<0.05
6. All dog bites treated similarly	5 (38.5%)	102 (74.5%)	107 (71.3%)	<0.05
7. Seek healthcare immediately	7 (53.8%)	122 (89.1%)	129 (86.0%)	<0.05
8. Rabies leads to death	9 (69.2%)	113 (82.5%)	122 (81.3%)	>0.05
9. Rabies preventable by vaccine	6 (46.2%)	107 (78.1%)	113 (75.3%)	<0.05
10. ARV site (correct: upper arm)	1 (7.7%)	47 (34.3%)	48 (32%)	<0.05
11. ARV doses (correct: 5)	0 (0%)	39 (28.5%)	39 (26.0%)	<0.05
12. Knows ARV schedule	0 (0%)	56 (40.9%)	56 (37.3%)	<0.05
13. Pre-exposure vaccine awareness	1 (7.7%)	35 (25.5%)	36 (24.0%)	>0.05
14. Knew that tetanus prophylaxis should be given (TT/Td)	5 (38.5%)	94 (68.6%)	99 (66.0%)	<0.05
15. Rabies spreads via human bite	8 (61.5%)	122 (89.1%)	130 (86.7%)	<0.05

Table 2: Knowledge responses of study participants regarding rabies prevention (N = 150).

A great majority of people (92.7%) had heard of rabies, but only 82.7% knew that rabies is caused by a virus. Literate patients had significantly higher knowledge than illiterate ones for nearly all items. Only about a third (36.7%) could recognize symptoms of rabies. awareness was again much higher among the literate. Misconceptions persisted: nearly 87% incorrectly believed that rabies could be transmitted by a human bite, and only 59.3%

understood that certain body fluids can transmit the disease.

Approximately three-fourths (75.3%) knew that rabies can be prevented by vaccination. however, only 32% knew the correct injection site for anti-rabies vaccine, and just 26% knew the standard number of doses. Awareness of pre-exposure vaccination was low (24%), showing that preventive education is lacking in the population. Significant differences between literate and illiterate participants indicate the role of education in rabies knowledge.

Table 3: Assessment of attitude amongst the study population

Question	Illiterate (n=13)	Literate (n=137)	Total (n=150)	P-value
1. Owns a pet dog	3 (23.1%)	39 (28.5%)	42 (28.0%)	>0.05
2. Aware of pet immunization	4 (30.8%)	97 (70.8%)	101 (67.3%)	<0.05
3. Treatment essential post-bite	8 (61.5%)	123 (89.8%)	131 (87.3%)	<0.05
4. Re-vaccinate after prior ARV	3 (23.1%)	77 (56.2%)	80 (53.3%)	<0.05
5. Dogs suffer rabies	10 (76.9%)	123 (89.8%)	133 (88.7%)	>0.05
6. Suturing dog bite wounds	5 (38.5%)	30 (21.9%)	35 (23.3%)	>0.05
7. ARV completion important	9 (69.2%)	129 (94.2%)	138 (92.0%)	<0.05
8. Vaccinate pet animals	4 (30.8%)	94 (68.6%)	98 (65.3%)	<0.05
9. Kill rabid dogs with precautions	11 (84.6%)	120 (87.6%)	131 (87.3%)	>0.05
10. Religious treatment effective	4 (30.8%)	20 (14.6%)	24 (16.0%)	>0.05
11. Support rabies awareness campaigns	11 (84.6%)	132 (96.4%)	143 (95.3%)	<0.05

Table 3: Attitude-related responses of study participants regarding rabies prevention (N = 150).

Less than a third (28%) owned a pet dog, but among these, awareness of the need for pet immunization was much higher among the literate (70.8%) than the illiterate (30.8%). Most respondents (87.3%) considered post-bite treatment essential, but little over half (53.3%) understood the need for re-vaccination after prior immunization. Nearly 89%

agreed that dogs can contract rabies. While completion of the anti-rabies vaccine schedule was highly valued (92%), a significant minority (16%) still believed in religious or traditional treatment. Although almost all supported rabies awareness campaigns (95.3%), actual translation to responsible practices like pet vaccination (65.3%) lagged behind. These results illustrate a gap between rabies awareness and adoption of preventive behaviours, notably influenced by education.

Table 4: Assessment of practice amongst the study population

Question	Illiterate(n=13)	Literate(n=137)	Total(n=150)	P- Value
1. Time to healthcare (<6 hrs.)	5 (38.5%)	103 (75.2%)	108 (72.0%)	<0.05
2. Dog type (stray)	11 (84.6%)	117 (85.4%)	128 (85.3%)	>0.05
3. Bite nature (unprovoked)	10 (76.9%)	105 (76.6%)	115 (76.7%)	>0.05
4. Dog traceable	7 (53.8%)	80 (58.4%)	87 (58.0%)	>0.05
5. Body part (covered)	5 (38.5%)	92 (67.2%)	97 (64.7%)	<0.05
6. Site (lower limb)	9 (69.2%)	99 (72.3%)	108 (72.0%)	>0.05
7. Bite marks (1-2)	10 (76.9%)	113 (82.5%)	123 (82.0%)	>0.05
8. Category (open wound)	7 (53.8%)	76 (55.5%)	83 (55.3%)	>0.05
9. Treatment facility (Govt./Private)	8 (61.5%)	121 (88.3%)	123 (86.0%)	<0.05
10. Visited religious healer	4 (30.8%)	17 (12.4%)	21 (14.0%)	<0.05
11. Reported to healthcare (Same day)	3 (23.1%)	90 (65.7%)	93 (62.0%)	<0.05
12. Treatment advised	5 (38.5%)	113 (82.5%)	118 (78.7%)	<0.05
13. Cost (1000-5000 Rs.)	7 (53.8%)	89 (65.0%)	96 (64.0%)	>0.05
14. Took vaccine immediately	7 (53.8%)	118 (86.1%)	125 (83.3%)	<0.05
15. Complications (none)	12 (92.3%)	129 (94.2%)	141 (94.0%)	>0.05
16. Completed ARV schedule	8 (61.5%)	123 (92.0%)	134 (89.3%)	<0.05
17. Inj. into wound	2 (15.4%)	12 (8.8%)	14 (9.3%)	>0.05
18. Managed at home	8 (61.5%)	30 (21.9%)	38 (25.3%)	<0.05
19. Restrictions (avoid work/sunlight)	10 (76.9%)	92 (67.2%)	102 (68.0%)	>0.05

Table 4: Practice-related responses of study participants regarding rabies prevention and PEP (N = 150).

Nearly three-fourths (72%) sought healthcare within 6 hours of the bite, but this was much higher among the literate (75.2%) compared to the illiterate (38.5%). Only 62% reported the bite to a healthcare facility the same day, reflecting occasional delays in care. The majority (83.3%) received the anti-rabies vaccine promptly, and completion rates were high at 89.3%, especially among the literate, but optimal wound management (including rabies immunoglobulin) was low (9.3%). Of the 38 participants (25.3%) who reported managing their wounds at home, responses differed by education level. Among illiterate participants, the majority reported use of traditional/home remedies (including turmeric, neem-leaf paste, alum, limestone powder) or sought care from religious healers. In contrast,

literate participants more commonly practised appropriate first aid by washing wounds with soap and running water, and a proportion applied antiseptic ointment. These differences reinforce the influence of education on immediate wound-management behaviour. Almost 14% consulted religious healers from both groups. Cost of treatment was a notable barrier (64% spent ₹1000-₹5000) due to their first visit, and only a small minority completed all recommended parts of post-exposure prophylaxis. Most patients reported no complications (94%), but the persistence of gaps in timely care and evidence-based management, particularly among the less educated, highlights the need for focused interventions.

DISCUSSION

This cross-sectional study provides a detailed assessment of knowledge, attitudes, and practices (KAP) regarding rabies prevention and post-exposure prophylaxis (PEP) among dog bite patients in Western Maharashtra. Major gaps identified, such as incomplete PEP knowledge and adherence, reflect long-standing national and global concerns about rabies control in high-burden settings.^[1,2]

Rabies remains a critical public health risk in India, largely attributable to persistent gaps in community knowledge and actual preventive practices.^[1,2] The National Guidelines for Rabies Prophylaxis advocate standardized wound care, timely anti-rabies vaccine (ARV), and use of immunoglobulins (RIG).^[1] Nevertheless, only 86% of participants in our study sought healthcare promptly, and fewer than one-third were knowledgeable about the correct PEP schedule—outcomes that reflect national trends in suboptimal implementation.^[4] The National Action Plan for Dog Mediated Rabies Elimination (NAPRE) 2030 underscores a One Health approach, with a focus on mass canine vaccination, improved public health access, and behavioural communication.^[4]

The high rate of bites from untraceable stray dogs in this study supports NAPRE's priorities for multisectoral animal management and community engagement.^[4,8]

Dog-mediated rabies is responsible for approximately 59,000 human deaths annually worldwide, and India accounts for more than one-third of this burden.^[2,5] This underscores the importance of effective national strategies in India. Although this urban sample differs somewhat from the predominantly rural, paediatric populations studied elsewhere, the fundamental gaps in awareness of PEP and vaccination mirror patterns seen in both global and Indian data.^[2,5,12] The World Health Organization highlights that rabies elimination is possible through comprehensive vaccination, health education, and multi-sectoral collaboration.^[3] Indian health facilities have also experienced intermittent shortages of ARV and especially RIG, directly supporting our findings that cost and limited availability impede full PEP adherence.^[7]

A breadth of literature from India and abroad demonstrates that while basic rabies awareness is widespread, more detailed understanding - regarding appropriate wound management, PEP schedules, and immunoglobulin indications - is lacking, especially among low-literacy groups.^[9,10,11,12,14,15] Our findings on misconceptions about transmission and incomplete ARV schedules are echoed in studies from urban and rural India, as well as Africa.^[8,12,14,15] Reliance on religious or traditional healing further delays appropriate medical intervention, as was reported here and in KAP studies from India, Uganda, and Ethiopia.^[6,14,15]

Barriers such as limited PEP knowledge, out-of-pocket costs, and deficient community engagement continue to be widely reported. Although both anti-rabies vaccine (ARV) and rabies immunoglobulin (RIG) are officially provided free of cost under the National Rabies Control Programme, a substantial proportion of participants (64%) still reported out-of-pocket expenditure ranging from ₹1,000 to ₹5,000. This can be attributed to several practical factors. First, many patients sought treatment from private practitioners or pharmacies due to proximity, convenience, or perceived quality, incurring consultation and vaccine charges. Second, temporary stock-outs of ARV or RIG at government facilities occasionally compelled patients to purchase doses from the private sector. Third, indirect costs—such as transportation to the urban health centre, lost wages, and expenses on antiseptics or wound dressings—also contributed to this economic burden. These findings align with other Indian KAP studies that document similar expenditures, underscoring the need for improved supply-chain management, consistent public messaging about free availability, and financial protection for dog-bite patients.^[1,5,8,13] Repeatedly, the literature calls for expanded health education, mass vaccination, and robust follow-up mechanisms.^[4,12,17] The importance of a One Health approach and behaviour-change communication strategies are reinforced as essential steps for reducing KAP gaps and moving towards the zero-rabies death target for 2030.^[3,4,17]

Limitations and Further Research

Limitations include the single-urban-health-centre sampling, exclusion of children from the study, and possible recall bias. These are consistent with known limitations of KAP research in this field.^[10,12] Multi-population, multi-site studies will be crucial for ensuring that rabies elimination strategies meet national needs.

Recommendations

- Expand and tailor community education using literacy-appropriate and culturally sensitive materials
- Strengthen One Health and intersectoral cooperation for stray dog management, mass vaccination, and PEP infrastructure
- Guarantee consistent ARV and RIG availability across all healthcare levels
- Promote responsible pet ownership and sustained animal vaccination, with public-private or municipal engagement
- Incorporate digital and community-based monitoring for PEP adherence and timely reporting
- This layered response, anchored in national and global best practices, provides a roadmap toward closing persistent KAP gaps - and toward rabies elimination in India and globally.

CONCLUSION

The study highlights that although awareness of rabies is widespread, significant misconceptions and incomplete adherence to PEP persist. Illiterate participants frequently relied on traditional remedies, whereas literate participants practised recommended wound care and vaccination adherence. Strengthening community-based education, ensuring uninterrupted vaccine supply, and enhancing provider counselling are vital to achieve India's target of zero dog-mediated human rabies deaths by 2030 under the National Action Plan for Rabies Elimination (NAPRE).

Declarations:

Consent to participate: Written informed consent obtained from all participants.

Consent to publish: Participants informed about anonymised data use.

Funding: No external funding received.

Conflict of interest: None declared.

Ethical Approval & Consent:

Ethical approval for this study was obtained from the 'Institutional Ethics Committee of Government Medical College (GMC), Miraj & Padma Bhushan Vasantdada Patil Government Hospital (PVPGH), Sangli'; prior to commencement of the research with 'Reference No. GMCM/IEC/C/90/2025'. All procedures involving human participants were conducted in accordance with the ethical standards of the responsible committee and the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study. Participants were provided with information regarding the study objectives, procedures, potential risks, and benefits, and their voluntary participation was confirmed prior to data collection.

DAS Statement (Data Availability Statement):

The datasets generated and/or analysed during the current study are not publicly available 'due to institutional restrictions and the need to maintain participant confidentiality, as the data were collected from a government health facility' but are available from the corresponding author on reasonable request.

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