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Original Research Article

Knowledge and practice of rabies post-exposure prophylaxis and animal-bite management among postgraduate trainees and faculty at a tertiary hospital in Goa: a cross-sectional study

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ABSTRACT

Background: Rabies is almost uniformly fatal after symptom onset but preventable with timely wound care and post-exposure prophylaxis (PEP). Physicians across specialties must apply current guidance to avoid preventable deaths. This study was done to assess knowledge and self-reported practices regarding rabies prophylaxis and animal-bite management among postgraduate trainees (PGT) and faculty at a tertiary care teaching hospital in Goa.
Methods: A cross-sectional survey was conducted during September 2024 to October 2024 among PGT and faculty (excluding Community Medicine due to prior structured training in anti-rabies clinic protocols). A sample size of 220 was estimated using a single-proportion formula (p=0.833, d=0.05, 95% confidence) and selected by simple random sampling from an eligible roster (n=350). Participants received a self-administered online questionnaire after electronic consent. Responses were scored as correct/incorrect against the National Guidelines for Rabies Prophylaxis (2019). Descriptive statistics were reported as frequencies and percentages.
Results: Of 220 invited doctors, 146 responded (response rate 66%); 96 (65.8%) were PGT and 100 (68%) belonged to clinical departments. Correct responses were generally higher for rabies epidemiology than for clinical management domains, particularly wound management, RIG indications/dosing, pre-exposure prophylaxis, and management of re-exposure in previously vaccinated individuals (only 36/146, 25%, correct).
Conclusions: Substantial gaps were observed in practical rabies PEP decision-making and wound management despite relatively adequate epidemiologic knowledge. Regular, competency-based refreshers and protocol reinforcement across departments are warranted to support rabies elimination goals.

Keywords: Animal bite, Knowledge, Post-exposure prophylaxis, Practice, Rabies

INTRODUCTION

Rabies is a vaccine preventable, zoonotic, viral disease with almost 100% fatality once clinical signs appear. Any warm-blooded animal is known to be vulnerable to the virus, and it spreads to people through bites or scratches, the main transmission being through saliva. Other rare transmissions occur through inhaling contaminated aerosols, consuming raw or undercooked infected meat or through organ transplant. Dogs account for up to 99% of human rabies cases and deaths.[1]

The disease is prevalent in over 150 countries and territories across the globe, with endemicity in 9 countries of the South-East Asia Region, including India. Rabies is estimated to cause 59,000 human deaths per annum globally, with Asia and Africa taking up almost 95% of the disease burden, while India accounts for 36% of the

global deaths. Consequently, National Action Plan for dog-mediated Rabies elimination (NAPRE) was launched in India.[2,3]

In the absence of laboratory tools for diagnosis, clinical history forms the foundation of early detection. Immediate wound management and effective active as well as passive immunization within a few hours after contact with a suspected rabid animal can prevent the onset of rabies and death.[1]

Elimination of dog-mediated rabies as a public health problem is feasible through two approaches, both of which are addressed under National Rabies Control Programme (NRCP) in India. This includes vaccination of dogs and dog population management, prevention of dog bites, and ensuring universal access to post-exposure immunization. The newly introduced concept of "One Health Approach" aims to achieve the same through collaborative efforts of all stakeholders. Global Alliance for Vaccines and Immunisation (GAVI), alongside World Health Organisation (WHO), works towards improving access to effective and affordable anti-rabies vaccines in the most remote areas.[1,2]

Since prevention is the only measure, doctors, irrespective of their degree or specialty, hold an important role in management of animal bites. Various studies across India and globally have tried ascertaining the knowledge, attitude and practices towards animal or dog bite management in different medical fraternity, and found it to be poor in varying extents.[4-14]

With continued efforts in accordance to WHO and NRCP directives, Goa was declared Rabies-Free in 2021 with no indigenous rabies cases since 2018, until a rabies-related death occurred in 2023.[15,16] This shows that sustained clinical readiness remains critical, given ongoing risk of animal bites and the need to maintain progress toward rabies control. No previous studies reflected the level of knowledge about rabies in Goan medical fraternity and their practices; we therefore aimed to assess knowledge and self-reported practices regarding rabies prophylaxis and animal-bite management among postgraduate trainees and faculty at a tertiary care teaching hospital in Goa through present study.

METHODS

Study design and setting

A cross-sectional survey was conducted from September to October 2024 in a tertiary care teaching hospital in Goa, India.

Inclusion criteria

Postgraduate trainees (PGT) and faculty members (including contract and casualty medical officers) from clinical and non-clinical departments who gave verbal as well as electronic consent.

Exclusion criteria

Doctors from the Department of Community Medicine because they had received structured training in animal-bite management to operate the institutional anti-rabies clinic, which could bias knowledge estimates upward.

Sample size and sampling

Sample size was estimated using $\frac{(z_{1-\alpha})^2 p(1-p)}{d^2}$ with p=0.833 from a prior study, Z=1.96 (95% confidence), and d=0.05, yielding 214; we rounded up to 220.[4] Participants were selected by simple random sampling from a roster of 350 eligible doctors using a computer-generated random list.

Data collection tool and scoring

A pretested, semi-structured questionnaire was administered via Google Forms after electronic informed consent. Items assessed rabies epidemiology and guideline-based management of exposures, including categorization of wounds, wound care, vaccine regimens (intradermal/intramuscular), RIG indications/dosing, pre-exposure prophylaxis, and management of re-exposure. Each item was scored as correct/incorrect using the National Guidelines for Rabies Prophylaxis (2019) as the reference standard.[17]

Statistical analysis

Data was compiled in Microsoft Excel 2019 and analysed in SPSS version 14. Categorical variables were presented as frequencies and percentages.

Ethical statement

The Institutional Ethics Committee approved the study. Participation was voluntary and responses were anonymized.

RESULTS

Of 220 invited doctors, 146 responded (response rate 66%) and were included in analysis. Respondents included 76 (52%) men and 104 (71%) aged <30 years. PGT constituted 96 (65.8%) respondents; 110 (75%) reported ≤5 years of work experience, and 100 (68%) were from clinical departments. On an average 22 out of 45 questions were answered correctly across both domains.

It is evident from Table 1 that while there is no dearth of knowledge for most questions, less than 40% respondents were correctly aware that saliva transmits the virus through nicks and bites (38%), observation of suspected

rabid animal is not key to deciding whether to vaccinate the exposed individual or not (20%), that even pinpoint bleeding is counted as category III bite (31%), wound management strategies (11%), appropriate site and dose of ARV (34% and 18%), indication and dose of immunoglobulin (38% and 33%), beneficiaries and schedule for pre-exposure prophylaxis (16% and 36%), target year for NAPRE (38%), and that Goa had a rabies death in 2023 (22%). This reflects a low proportion of professionals being updated on the aspects that could influence their further management decisions.

Table 1: Item-level correct responses on knowledge of rabies epidemiology, prevention, and animal-bite management.

Statement	Correct response	No. (%) correct (n=146)
Causative agent of rabies	ssRNA virus (Lyssavirus)	104 (71)
Major reservoir	Dog	122 (84)
Commonest route of transmission	Saliva	56 (38)
Human-to-human transmission	Extremely rare; documented mainly via transplantation	72 (49)
Most dangerous site of animal bite	Head and face	117 (80)
Survival once symptoms develop	Virtually 100% fatal	128 (88)
Pathognomonic inclusion bodies	Negri bodies	119 (81)
Observation of biting animal and PEP regimen	PEP should not be delayed; observe dog/cat where applicable	29 (20)
Number of exposure categories	3	118 (81)
Category of wild animal bite	III	77 (53)
Category of minor abrasion with pinpoint bleeding	III	46 (31)
Components of wound management	Wound wash and antisepsis; avoid primary closure; RIG when indicated	16 (11)
Suturing guidance	Delay/avoid; if needed, minimal suturing under RIG cover	65 (44)
Type of ARV recommended	Cell culture vaccine	75 (51)
Appropriate sites of ARV administration	Deltoid (adults); anterolateral thigh (young children)	50 (34)
Correct routes of ARV administration	IM and ID	93 (64)
Updated Thai Red Cross regimen (ID)	2-site ID doses on days 0,3,7,28	84 (57)
IM dose for PEP in adults	As per product (commonly 0.5 mL or 1.0 mL IM)	26 (18)
Dose for children for PEP	Same as adults (volume per product)	84 (57)
Storage of opened ARV vial	As per open-vial policy; within specified hours under cold chain	69 (47)
Indications for RIG	Category III exposures and selected high-risk category II	56 (38)
RIG dose (HRIG)	20 IU/kg infiltrated into/around wounds	49 (33)
Beneficiaries of PrEP	High-risk occupations (lab staff, animal handlers, vets)	24 (16)
PrEP schedule (ID)	Days 0,7,21/28	52 (36)
National programme for rabies control exists	Yes	135 (92)
NAPRE target year	2030	55 (38)
World rabies day	28 September	88 (60)
Last reported human rabies death in Goa	[As per state records]	33 (22)

ssRNA-Single stranded RNA, PEP- Postexposure prophylaxis, PrEP- Preexposure prophylaxis, ARV- Antirabies vaccine, ID-Intradermal, IM- Intramuscular, HRIG- Human Rabies Immunoglobulin, NAPRE- National Action Plan for Rabies Elimination

Table 2: Item-level correct responses regarding self-reported practices for rabies prevention and animal-bite management.

Statement	Correct response	No. (%) correct (n=146)
Management of category I exposure	Wash exposed area with soap and water; no vaccine	75 (51)
Management of category II exposure	Wound wash + vaccine; tetanus prophylaxis as	80 (55)

Continued.

Statement	Correct response	No. (%) correct (n=146)
	indicated	
Management of category III exposure	Wound wash + vaccine + RIG; tetanus prophylaxis as indicated	91 (62)
Previously partially vaccinated patient with current bite	Complete PEP as for unvaccinated, as per guideline	75 (51)
Previously fully vaccinated patient with current bite	Two booster doses (e.g., day 0 and day 3) without RIG	36 (25)
Recommended duration of wound wash	At least 15 minutes	84 (57)
Advice to apply povidone-iodine/appropriate antiseptic	Yes	86 (59)
Advice to apply irritants (turmeric/salt/lime/spirit)	No	114 (78)
Tetanus prophylaxis for animal bites	As per tetanus immunization status and wound category	70 (48)
Rodent/bat exposure management in India	Rodent bites usually do not require PEP; consider unusual circumstances/expert advice	27 (18)
Health worker exposed to secretions of suspected rabies case	Risk assessment; PEP if mucosal/non-intact skin exposure	62 (42)
Category III bite in pregnancy/lactation	Give full PEP and RIG as indicated	77 (53)
Category II exposure in immunocompromised patient	Wound wash + vaccine; consider RIG and IM regimen as per guideline	49 (33)
Chemotherapy patient with cat scratch	Manage as high-risk; IM regimen recommended	34 (23)
Antibiotics when indicated	Yes	93 (64)
Delayed continuation after missed doses	Resume schedule as per guideline; do not restart unnecessarily	52 (36)
Bite by vaccinated pet	Assess risk; start PEP if indicated (do not rely solely on pet vaccination)	64 (44)

PEP- Postexposure prophylaxis, IM- intramuscular, HRIG- Human Rabies Immunoglobulin

When enquired about what practices they adopt for animal bite management, as is seen in Table 2, with the exception of correctly managing category II and III wounds (55% and 62%), recommended wound wash duration (57%), wound care in terms of application of antiseptic (59%), avoiding irritants (78%), and prescribing antibiotics when indicated (64%), most questions garnered either around or less than 50% correct responses.

DISCUSSION

The present study was conducted in a tertiary care setting in Goa among PGTs and faculty to ascertain the level of knowledge and correct practices regarding rabies and animal bite management. Most respondents were postgraduate students, aged less than 30 years and working in clinical departments for less than 5 years duration, similar to studies by Holla et al (2014) among postgraduates and faculty of medicine, surgery and paediatrics and Singh et al (2023) among postgraduates, medical officers, and interns in a Manipur college.[4,5]

A consistent pattern was apparent: higher proportion of accurate responses were noted for epidemiology-related than practical questions on animal-bite management. However, while the knowledge regarding case fatality rate was better in the current study, correct responses for wound management, correct dose of anti-rabies vaccine, indications of rabies immunoglobulin, and schedule and indication of pre-exposure prophylaxis ranged from 11-38%. Hardly over 10% could correctly describe wound management, including wound wash duration, TT administration and suturing, well below the correct responses received in studies among private allopathy and AYUSH doctors and interns, respectively, by Kotnis et al (2017) and Chowdhury et al (2013).[6,7]

Only about 80% of the participants knew there were 3 categories of animal bites but less than half could categorise them correctly. This was comparable to a study in AIIMS faculty and residents in Jodhpur (2014).[8]

Only about half the doctors were aware of type of vaccines in current use, much below the findings from Holla et al (2014) and Garg et al, who compared it between government and private doctors (2013).[4,9]

Merely 20% knew latest guidelines regarding duration of observation of biting animal and how it should not affect the updated Thai Red Cross regimen. Evaluation on the same was not found to be done before in any study.

Awareness of postexposure prophylaxis (57% correct responses) was comparable to many other studies, but there was very poor knowledge of pre and re-exposure schedules and beneficiaries.[4,6,8,10] Although 64% knew correct routes of ARV administration, only 34% knew the

correct sites. Compared to this, studies by Holla et al (2014) (70%), Chowdhury et al (2013) (74%), Kumar et al (2014) (53%), Garg et al (2013) (66%), and Nayak et al (2013) (45%) had better knowledge of the correct site.[4,7-9,11] 57% of them knew that the dose remains the same for all victims irrespective of age and physiological state, but only 18% knew the correct dose in the first place, performing poorer than respondents of studies by Garg et al (2013) and Singh et al (MBBS graduates vs AYUSH practitioners of Ambala, 2013).[9,12]

Only 38% respondents knew the correct indication, site, and dose of Immunoglobulin, much less than studies by Kotnis et al. (2017), Balaraju et al (2023) and Nayak et al (2013).[6,10,11]

One hundred and thirty-five (92%) respondents knew that a prevention programme for control of rabies exists in India, which could be considered a positive step towards achieving elimination. This aspect was previously unevaluated in any study.

Management of categorical bites was comparable to Singh et al (2023) and Jidge et al (2019) findings, but basic wound management practices were poor, especially in comparison to Balaraju et al (2023).[5,13,10]

Management of pregnant/lactating victims, chemotherapy and immunocompromised patients was adequately practiced by barely half the doctors, but was better than the study among Turkish general practitioners by Koruk et al (2011).[14]

Less than 50% respondents believed in giving postexposure prophylaxis to those bitten by a vaccinated pet, which was comparable to Holla et al (2014) and Balaraju et al (2023).[4,10]

The national guidelines were updated in 2019, emphasising on strict categorisation of wounds and appropriate management, including the importance of wound washing. Clarification has been provided on management in special exposures (immunocompromised states, wild animal, pre- and re-exposures).[17] Any MBBS graduate could help progress towards elimination with the simple knowledge on vaccination schedules and the fact that India is adapting the updated Thai Red Cross Regimen to reduce ARV wastage. The gaps found in the present study have direct implications for patient safety and for progress toward national and global elimination targets.[1,2]

This study has few limitations. Data was collected using an online self-administered form, which may allow consultation of external resources and could overestimate true knowledge. The response rate was 66%, raising the possibility of non-response bias. The study was conducted in a single tertiary care government institute and excluded Community Medicine doctors due to prior training, which limits generalizability to other settings and cadres.

CONCLUSION

While the postgraduates and faculty of Goa Medical College are well versed with rabies epidemiology, practical knowledge of animal bite management seems to be ranging from 18-78%. Sustained rabies prevention and elimination efforts get hampered by these. Strengthening practice-oriented competencies may require structured, periodic refresher training, standardized protocols in emergency and outpatient settings across departments, and reinforcement through institutional clinical pathways and posters at points of care.

Even though the model anti-rabies clinic functions under trained public health specialists, no doctor should shy away from the opportunity to update themselves frequently on animal bite management practices, together with AYUSH practitioners in rural and private settings. A similar study on the knowledge and practices adopted amongst their fraternity and other healthcare personnel would help understand the need to conduct such trainings.

The foundation for adoption of correct practices also lies in the appropriate training of medical undergraduates as a part of their curriculum, starting as soon as the theoretical aspects are addressed.

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