

Original Research Article

Compliance to post-exposure prophylaxis among patients attending anti-rabies vaccination clinic in a tertiary health care centre in central India: a cross sectional study

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ABSTRACT

Background: Rabies is a fatal but vaccine-preventable disease. Prevention of rabies in exposed individuals is possible by providing them with the proper post-exposure prophylaxis. This study aims to assess the compliance to post-exposure prophylaxis in animal bite cases and factors associated with it.

Methods: A cross sectional study was conducted between September 2022 to November 2022 using a predesigned, pretested proforma to interview 300 patients attending anti-rabies vaccination clinic in a tertiary health care centre in central India.

Results: Majority of the patients 268 (89.3%) suffered category 3 animal bite and 32 (10.7%) patients suffered category 2 animal bite. 125 (41.7%) patients washed the wound with water, soap and applied antiseptic. 234 (78%) patients completed their last dose of anti-rabies vaccine (ARV) while compliance to Rabies Immunoglobulin (RIG) was seen in 167 (63.3%) patients of all cases requiring it. Out of all the patients who took Equine RIG, 7 (4.5%) showed hypersensitivity reactions. Significant association was found between compliance to ARV with type of animal and status of animal after 10 days; and compliance to RIG with gender, socio-economic status, type of animal and type of wound.

Conclusions: Compliance to ARV and RIG in our study was 78% and 63.3% respectively. Major reason for poor compliance to RIG was the price of immunoglobulin. Health education regarding significance of post-exposure prophylaxis is needed among the population.

Keywords: Anti-rabies vaccine, Compliance, Post-exposure prophylaxis, Rabies, Rabies immunoglobulin

INTRODUCTION

Rabies is a zoonotic, viral disease and once clinical symptoms appear, rabies is virtually 100% fatal.¹ Rabies is a fatal but vaccine-preventable disease. Rabies is classified as one of the Neglected Tropical Diseases (NTD). Rabies is caused by lyssavirus type 1. The virus enters the body through wounds or by direct contact with mucosal surfaces, it cannot cross intact skin. The virus may replicate in muscle or other local tissues after

exposure and gain access to motor endplates and motor axons to reach the central nervous system and infect the central nervous system (CNS). If a person does not receive the appropriate medical care after a potential rabies exposure, the virus can affect the brain, ultimately leading to death.² As per WHO estimates, India accounts for 36% of the global and 65% of the human Rabies deaths in the South East Asia region.³ In India, Rabies is transmitted commonly by dogs and cats (~97%), followed by wild animals (2%) such as mongoose, foxes, jackals,

and wild dogs, and occasionally by horses, donkeys, monkeys, cows, goats, sheep, and pigs. As per the National Rabies Control Program, between 2012 to 2020, 6644 clinically suspected Human Rabies cases and deaths have been reported as per the reports received from the states and UTs.⁴ The number of animal bites reported under the Integrated Disease Surveillance Project, has increased from 42 lakhs in 2012 to 72 lakhs in 2020.⁴ Prevention of rabies in exposed individuals is possible by providing them with the timely and complete Post-exposure Prophylaxis (PEP) which consists of: Extensive washing and local treatment of the bite wound or scratch as soon as possible after a suspected exposure; a course of potent and effective rabies vaccine that meets WHO standards; and the administration of Rabies Immunoglobulin (RIG), if indicated. Starting the treatment soon after an exposure to rabies virus can effectively prevent the onset of symptoms and death. In the 12th five year plan, the objectives of the National Rabies Control Program were to prevent human deaths due to rabies by capacity building, advocacy for scaling up inoculation of anti-rabies vaccine by ID route for Rabies and PEP, increasing awareness in the general community, strengthening surveillance of animal bites and Rabies cases and strengthening rabies diagnostics and intersectoral coordination.⁴ The objectives of this study are to assess compliance to anti-rabies vaccination among patients attending anti-rabies vaccination OPD, to assess compliance to rabies immunoglobulin in Category III animal bite cases, to assess hypersensitivity reactions after skin sensitivity testing with ERIG (Equine Rabies Immunoglobulin) and to study socio demographic and clinical profile of animal bite cases.

METHODS

A cross sectional study was conducted in the anti-rabies vaccination clinic, Indira Gandhi Government Medical College, Nagpur between September 2022 to November 2022 among patients fulfilling inclusion criteria until sample size was achieved. Animal bite cases attending anti-rabies vaccination clinic were included in the study. Exclusion criteria were patients not willing to give consent, patients coming for pre-exposure prophylaxis, patients with ARV immunization history within the last 3 months with its record and patients coming with rat/any other rodent bite.⁵ Informed consent was obtained from patients after explaining the purpose of the study. Data was collected by face to face interview method. A pre-designed pre-tested proforma was used for collecting

information regarding socio demographic details, information regarding the animal bite, post exposure prophylaxis management, compliance to anti-rabies vaccine, compliance to rabies immunoglobulin. As per WHO guidelines, post-exposure prophylaxis measures as per Categories of contact with suspect rabid animal is as follows : Category I touching or feeding animals, animal licks on intact skin (no exposure)- Washing of exposed skin surfaces, no PEP ; Category II- nibbling of uncovered skin, minor scratches or abrasions without bleeding (exposure)- Wound washing and immediate vaccination; Category III- single or multiple transdermal bites or scratches, contamination of mucous membrane or broken skin with saliva from animal licks, exposures due to direct contact with bats (severe exposure)- Wound washing, immediate vaccination and administration of rabies immunoglobulin/monoclonal antibodies. Patients who completed all prescribed doses of the 2 site intradermal regimen of Post-exposure prophylaxis of ARV were considered as compliant and patients who did not come for the last dose were considered non-compliant. Among patients requiring Rabies Immunoglobulin (RIG), those who took RIG were considered compliant and those who refused were considered non-compliant.

Sample size estimation

From a study conducted by Lilare et al taken as reference, taking prevalence of 73.5% with 5% absolute error, the sample size estimated was 299.⁶ The final sample size was rounded off to 300. Data collected was entered in MS Excel Sheet and analyzed using SPSS software Version 20. The qualitative data was expressed by number and percentage. The quantitative data was expressed in terms of mean and standard deviation. Chi square test was applied to observe the differences between proportions. p value <0.05 was considered significant.

RESULTS

Table 1 shows the socio-demographic profile of study participants. It was seen that mean age of patients was 33.29 (± 19.83). Majority of patients were males, that is 199 (66.3%). With regards to religion, the majority were Hindus 216 (72%) followed by Bouddha 53 (17.6%). 270 (90%) participants were literate, 16 (5.3%) were illiterate whereas 14 (4.7%) were children yet to join school. 286 (95.3%) belonged to a higher socio-economic class (Class I, II, III as per modified BG Prasad scale).

Table 1: Distribution of study participants according to their sociodemographic profile.

Socio-demographic profile	Number	Percentage (%)
Age (years)		
1-15	65	21.7
16-30	87	29.0
31-45	60	20.0
46-60	60	20.0
61-75	28	9.3

Continued.

Socio-demographic profile	Number	Percentage (%)
Gender		
Male	199	66.3
Female	101	33.7
Residence		
Urban	260	86.7
Rural	40	13.3
Religion		
Hindu	216	72.0
Bouddha	53	17.6
Muslim	26	8.7
Sikh	03	1.0
Christian	02	0.7
*Education		
Professional Degree	45	15.0
Graduate	08	2.7
Intermediate/diploma	81	27.0
High school	61	20.3
Middle school	35	11.7
Primary school	24	8.0
Pre-primary school	16	5.3
Illiterate	16	5.3
*Occupation		
Professional	23	7.7
Skilled worker	24	8.0
Semi skilled worker	75	25.0
Unskilled worker	35	11.7
Student	79	26.3
Retired	10	3.3
Homemaker	40	13.3
Socioeconomic Status (as per modified BG Prasad scale)		
Class I	10	3.3
Class II	163	54.3
Class III	113	37.7
Class IV	14	4.7

*14 (4.7%) patients were less than 3 years old and had not started school yet.

Table 2 shows clinical profile of study participants. 267 (89%) bites were due to dogs followed by 24 (8%) bites due to cats. 269 (89.7%) patients knew the status of the animal after 10 days and 31 (10.3%) did not. 268 (89.3%) patients belonged to Category 3 animal bite, followed by 32 (10.7%) patients who belonged to Category 2. Out of all the patients, 67 (22.3%) patients had a previous history of animal bite but only 4 (1.3%) patients had a record of completed vaccination including RIG administration.

Total 125 (41.7%) patients washed the wound with water, soap and applied antiseptic, whereas 47 (15.7%) patients did not wash the wound. All patients took the tetanus vaccine and 1st dose of ARV but only 234 (78%) patients took the last dose of ARV. 36 (12%) patients did not require rabies immunoglobulin (32 of Category 2 animal bite and 4 with record of vaccination after previous bite).

Among the total 300 patients, 36 patients did not have an indication for rabies immunoglobulin as 32 patients had

Category 2 animal bite and 4 patients had record of prior RIG administration. Price of immunoglobulin being high was the most common reason for not taking RIG among 47 (48.5%) patients followed by small wound size among 40 (41.2%) patients and animal being pet in 10 (10.3%) patients. Among the 167 patients who took RIG, 156 (93.4%) patients opted for ERIG and 11 (6.6%) patients opted for rabies human monoclonal antibody. Hypersensitivity testing with a test dose was done for all 156 patients taking ERIG and reaction on test dose was present in 7 (4.5%) patients.

Table 3 shows association of compliance to ARV with sociodemographic and epidemiological profile of patients. Chi square test was applied. There was significant association between compliance to ARV with the type of animal (p value 0.004) and status of animal after 10 days (p value 0.0001).

Table 4 shows association of compliance to rabies immunoglobulin with sociodemographic and epidemiological profile of patients. Chi square test was applied to check for significance. There was significant

association found between compliance to RIG with gender (p value 0.04), socio-economic status (p value 0.028), type of animal (p value 0.02) and type of wound (p value 0.007).

Table 2: Distribution of study participants according to their clinical profile.

Clinical profile	Number	%
Animal exposed		
Dog	267	89.0
Cat	24	8.0
Others [#]	09	3.0
Site of bite		
Lower limb	178	59.3
Upper limb	111	37.0
Head, neck, face	11	3.7
Type of animal		
Pet	127	42.3
Stray	156	52.0
Wild	17	5.7
Status of animal after 10 days		
Alive	250	83.4
Dead	19	6.3
Unknown	31	10.3
Nature of bite		
Provoked	83	27.7
Unprovoked	217	72.3
Category of bite		
II	32	10.7
III	268	89.3
Type of wound		
Abrasion	250	83.3
Laceration	50	16.7
Wound washing practice		
Washed with water, soap and applied antiseptic	125	41.7
Washed with water and soap	119	39.6
Washed and applied turmeric and oil	09	3.0
Not washed	47	15.7
Last dose of ARV taken		
Yes	234	78.0
No	66	22.0
Rabies immunoglobulin taken		
Yes	167	63.3
No	97	36.7
Reason for not taking immunoglobulin		
Price of immunoglobulin	47	48.5
Small wound size	40	41.2
Animal was pet	10	10.3
Hypersensitivity reaction on test dose with ERIG		
Present	07	4.5
Absent	149	95.5

#Others: Monkey-4, Pig-4, Mongoose-1. *36 patients did not have an indication for rabies immunoglobulin: 32- Category 2 animal bite, 4-had record of prior RIG administration.

Table 3: Association of compliance to last dose of ARV with sociodemographic and clinical profile of study participants.

Socio-demographic and clinical profile	Compliant number (%)	Non-compliant number (%)	Total (N=300)	X ² , dF, p value
Age (years)				
1-15	55 (84.6)	10 (15.4)	65	3.58, 4, 0.46
16-30	63 (72.4)	24 (27.6)	87	
31-45	47 (78.4)	13 (21.6)	60	
46-60	46 (82.5)	14 (17.5)	60	
61-75	23 (82.1)	05 (17.9)	28	
Gender				
Male	152 (76.3)	47 (23.7)	199	0.9, 1, 0.34
Female	82 (81.2)	19 (18.8)	101	
Residence				
Urban	205 (78.8)	55 (21.2)	260	0.81,1,0.36
Rural	29 (72.5)	11 (27.5)	40	
Education				
Literate	209 (77.4)	61 (22.6)	270	1.87,1,0.17
Illiterate	10 (62.5)	06 (37.5)	16	
Socio-economic status*				
High SES	226 (79.0)	60 (21.0)	286	3.7,1,0.053
Low SES	08 (57.1)	06 (42.9)	14	
Type of animal				
Pet	94 (74.0)	33 (26.0)	127	10.6, 2, 0.004
Stray	131 (84.0)	25 (16.0)	156	
Wild	09 (53.0)	08 (47.0)	17	
Site of bite				
Lower limb	139 (78.0)	39 (22.0)	178	3.6, 2 ,0.159
Upper limb	88 (79.3)	23 (20.7)	111	
Head, neck, face	06 (54.5)	05 (45.5)	11	
Status of animal after 10 days				
Alive	206 (82.4)	44 (17.6)	250	18.25, 2, 0.0001
Dead	09 (47.4)	10 (52.6)	19	
Unknown	19 (61.3)	12 (38.7)	31	
Category of bite				
II	23 (71.8)	9 (28.2)	32	0.78, 1,0.37
III	211 (78.8)	57 (21.2)	268	
Type of wound				
Abrasion	195 (78.0)	55 (22.0)	250	0, 1, 1
Laceration	39 (78.0)	11 (22.0)	50	

*High SES- Class I, Class II and Class III, Low SES- Class IV and Class V (according to modified BG Prasad).

Table 4: Association of compliance to RIG with sociodemographic and clinical profile of study participants.

Socio-demographic and clinical profile	Compliant, number (%)	Non-compliant, number (%)	Total (n=264)	X ² ,dF, P value
Age (years)				
1-15	38 (65.5)	20 (34.5)	58	4.69, 4, 0.31
16-30	54 (69.2)	24 (30.8)	78	
31-45	35 (66.0)	18 (34.0)	53	
46-60	28 (54.9)	25 (45.1)	53	
61-75	12 (54.6)	10 (45.4)	22	
Gender				
Male	102 (59.0)	71 (41.0)	173	3.98, 1, 0.04
Female	65 (71.4)	26 (28.6)	91	

Continued.

Socio-demographic and clinical profile	Compliant, number (%)	Non-compliant, number (%)	Total (n=264)	X ² ,dF, P value
Residence				
Urban	146 (64)	82 (36)	228	0.43,1, 0.51
Rural	21 (58.3)	15 (41.7)	36	
Education				
Literate	151(63.7)	86 (36.3)	237	3.34, 1, 0.06
Illiterate	05 (38.5)	08 (61.5)	13	
Socio-economic status*				
High SES	162 (64.8)	88 (35.2)	250	4.8, 1, 0.028
Low SES	05 (35.7)	09 (64.3)	14	
Type of animal				
Pet	62 (54.9)	51 (45.1)	113	7.1, 2, 0.02
Stray	99 (70.8)	41 (29.2)	140	
Wild	06 (54.5)	05 (45.5)	11	
Site of bite				
Lower limb	93 (58.9)	65 (41.1)	158	4.5, 2, 0.10
Upper limb	68 (71.6)	27 (28.4)	95	
Head, neck, face	06 (54.5)	05 (45.5)	11	
Type of wound				
Abrasion	130 (59.6)	88 (40.4)	218	7.07, 1, 0.007
Laceration	37 (80.4)	09 (19.6)	46	

*High SES- Class I, Class II and Class III, Low SES- Class IV and Class V (according to modified BG Prasad).

DISCUSSION

In this study, cases of animal bites were more in males than females, similar to findings of Sharma et al.⁷ We also found that the majority of patients that is 89% were exposed to dog bites, similar to the findings of Karmakar et al and Nishant et al but more than findings by Gadapani et al.⁸⁻¹⁰ In our study, lower limb was the most commonly injured site in 59.3% patients and similar findings were observed in a study conducted by Domple et al.¹¹

In the present study, 45 (15.7%) patients did not wash wound after bite as compared to study by Kawale et al where 3206 (53%) did not manage their wound.¹² In our study, it was seen that 78% of patients completed all doses of ARV which was similar to findings of Lilare et al and Jena et al.^{6,13} The compliance to ARV in our study was more than findings by Nishant et al, Titoria et al and Praveen et al.^{9,14,15} Compliance to RIG in our study was 63.3% which is in accordance with findings by Kawale et al and Datta et al.^{12,16} There was significant association between compliance to ARV last dose with the type of animal. Similar results were found in a study conducted by Shivasakthimani et al and Wadde et al.^{17,18} There was significant association found between compliance to RIG with gender, socioeconomic status, type of animal and type of wound. The findings were consistent with findings by Sahu et al where significant association was found between RIG compliance and gender and a study by Gaikwad et al where there was significant association between economic status and taking RIG.^{19,20}

CONCLUSION

Compliance to ARV in our study was 78%. Compliance to RIG in our study was 63.3% of all cases requiring Immunoglobulin. Major reason for poor compliance to RIG was the price of immunoglobulin. There was significant association found between compliance to ARV with type of animal and status of animal after 10 days. There was also significant association found between compliance to RIG with gender, socio-economic status, type of animal and type of wound. Hypersensitivity reaction on test dose was present in 7 (4.5%) patients of those who took ERIG.

Recommendations

Health education and creating awareness regarding fatality of disease and significance of immediate post-exposure prophylaxis after animal bite among the population. Counselling to patients attending anti-rabies vaccination clinic regarding completion of all doses of ARV regimen and taking rabies immunoglobulin when indicated to increase compliance. Awareness regarding pre-exposure prophylaxis among high risk groups. Increased availability and constant supply of anti-rabies vaccines and rabies immunoglobulin.

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