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Research Article

Assessment of Post-exposure Prophylaxis Services for Animal Exposures in Healthcare Facilities of a Municipal Corporation

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A B S T R A C T

Background: In India, animal bites are common among the lower socio-economic group, who invariably go to the Government sector for post-exposure prophylaxis (PEP). This service depends on the availability of facilities and the knowledge, attitude, and practice of the service provider.

Objectives: To assess the PEP facilities available at the health centers, availability of rabies biologicals at these centers, and the knowledge, attitude, and practice (KAP) of PEP among medical officers.

Methods: A cross-sectional study was conducted at all 84 health centers of a municipal corporation to assess the available facilities and their supply logistics. The KAP of 88 medical officers working in these centers were assessed and the barriers in the administration of rabies immunoglobulin were recorded. The KAP data normality and correlation were tested using the Shapiro-Wilk test and Spearman's Rank correlation, respectively.

Results: PEP facilities were available at 66 out of 84 centers (78.6%). 18530 vials of anti-rabies vaccine were utilized, 25 centers had 7-20 days/year stock-out days, 4982 vials of equine rabies immunoglobulin were used in 6 (9.1%) referral hospitals, and 3 centers had stock-out days of 30-60 days/year. The rank correlation between knowledge, attitude, and practice ($r \leq 0.001$) was negative. The common barriers in rabies immunoglobulin administration were fear of adverse drug events, and the procedures being time-consuming and cumbersome.

Conclusion: The PEP services at the municipal corporation health centers have to be further improved to achieve the goal of eliminating rabies by 2030.

Keywords: Post-exposure Prophylaxis, Rabies Immunoglobulin, Municipal Corporation, Anti-rabies Clinics, KAP

Introduction

Animal exposure is a public health problem in India with approximately 17.4 million animal bites occurring per year.[1] The affected persons should receive post-exposure prophylaxis (PEP) as soon as possible at the closest medical institution in a rabies-endemic nation like India, where every animal bite is potentially a rabid exposure.[2]

The PEP entails washing the wound with soap, detergent, and water, then applying virucidal agents to lessen viral inoculum at the wound site; finishing the post-exposure vaccination course to induce antibodies that reduce the risk of the virus entering peripheral nerves; and infiltrating rabies immunoglobulin (RIG)/ rabies monoclonal antibodies (RMAb) into the wound in all category III exposures to neutralize the virus at the wound site. Even after a high-risk exposure to potentially rabid animals, PEP will prevent rabies, if done timely and thoroughly.[3,4]

In India, animal exposures are more common among lower socio-economic groups of the population, who invariably go to the Government sector for seeking health services.[5,6] The PEP provided in these health centers/ hospitals depends on the facilities available, logistics of supply of immune-biologicals, and the knowledge, attitude and practice (KAP) among the medical officers who provide these facilities to the bite victims.

The present study was conducted at the health centers/ hospitals of one of the biggest Municipal Corporations in India to assess the facilities available for post-exposure prophylaxis, supply logistics of rabies biologicals, and the knowledge, attitude and practice of the working medical officers at these healthcare facilities.

Materials and Methods

Ethical clearance was obtained from the KIMS ethics committee before the start of the study. The study was conducted from June 2020 to March 2021. Before the initiation of data collection, permission from the municipal corporation authorities was also obtained. The municipal corporation is having a population of more than 1.2 crores and covers an area of 800 square kilometers. The PEP services for animal bite victims are provided through 54 health centers, 24 maternity hospitals and 6 referral hospitals coming under the municipal corporation.

A cross-sectional study was conducted at all these 84 healthcare facilities. Each center was visited and permission was taken from the in-charge medical officer to conduct the study. The assessment of facilities available for PEP was done using the standard checklist, which included the availability of an animal bite register, wound washing facilities, local antiseptics, weighing machine, emergency medicines, cold chain equipment, rabies immunoglobulin, anti-rabies vaccines, disposables, and health education materials.

The data on the availability of rabies biologicals which included anti-rabies vaccines and rabies immunoglobulin were collected by interviewing the medical officers of the health centers or hospitals and seeing the records. The number of stock-out days and the remedial action taken from these centers were also recorded.

The knowledge and attitude (using validated Likert's scale) of 88 medical officers, who were working in these health centers or hospitals were assessed using a pre-tested, structured, self-administered questionnaire, after taking their written informed consent. An overall score of more than 75% was considered adequate. The practice related to PEP was assessed using an observation checklist, starting from taking the history, advice on the need for post-exposure prophylaxis, wound washing, classification of animal bite wounds, calculation of dosage and administration of rabies immunoglobulin, administration of anti-rabies vaccination (intramuscular/ intradermal), prescribing local antiseptics and antibiotics, whenever needed and educating patients regarding next doses of vaccine and importance of completing a full course of vaccination. The barriers in the administration of equine rabies immunoglobulin by the medical officers were also recorded.

The collected data were entered in MS Excel and analyzed statistically using SPSS version 21.0. Descriptive statistics like frequencies and percentages and inferential statistics like chi-square test were used. The data on knowledge, attitude, and practice were tested for verifying normality assumption using Shapiro-Wilk test. The correlation between KAP scores was computed using Spearman's Rank correlation and their differences were tested using Kruskal-Wallis test.

Results

A total of 18,508 animal bite victims were provided PEP in the study area during the study period of January to December 2021. Among the 84 health centers or hospitals of the municipal corporation, only 66 (78.6%) were providing PEP for animal bite victims and the remaining 18 centers, which were close to referral hospitals used to refer animal bite cases to the nearest facility.

Most of the PEP facilities were available at all the health centers or hospitals, except for the availability of rabies immunoglobulin, which was there only in 6 referral hospitals of the municipal corporation (Table 1).

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Anti-rabies vaccine was given to all animal exposures and 18,530 vials were used by all the health centers or hospitals, which were supplied either from the central supply or by local purchase. Most of them were administering the anti-rabies vaccine by intradermal route (85.9%) by updated TRC regimen which is approved by the Drug Controller General of India (DCGI) and recommended by the National Center for Diseases Control (NCDC) under the National Rabies Control Program.

Among the 66 study centers, 25 had an average of 15 stock-out days per year for anti-rabies vaccines, with a range of 7-20 days. These centers had taken remedial measures in the form of referring to other health centers or referral hospitals or medical college hospitals.

Equine Rabies Immunoglobulin (ERIG) was infiltrated into the wound in 2,792 animal bite victims with category III exposures and 4,982 vials of ERIG were used. 3 out of 6 referral hospitals had an average of 40 stock-out days per year for rabies immunoglobulin, with a range of 30-60 days. They had taken remedial measures in the form of referring to the nearby medical college hospitals.

The knowledge regarding the prevention of rabies was insufficient regarding the categorization of bite wounds (32.9%), calculating the dose of equine rabies immunoglobulin (52.4%), dilution of rabies immunoglobulin (57.9%), animals transmitting rabies (68.1%), number of doses of vaccines for complete PEP (71.5%), interpretation of skin sensitivity test for equine rabies immunoglobulin (75.0%), and technique of intradermal administration (50.0%). Similarly, the attitude score was low (< 75%) with regards to animals transmitting rabies, effectiveness of intradermal rabies vaccination, and method/ site of infiltration of rabies immunoglobulin. However, the attitude score was high with respect to the advantage of wound washing with soap and water to reduce the virus load in the infected wound, safety of the anti-rabies vaccine in pregnancy and lactation, proper route of administration of anti-rabies vaccine, and use of rabies immunoglobulin as a life-saving drug.

The PEP practice showed that only 54.4% of the medical officers categorized the animal bite wounds according to WHO classification, 75.7% of them advised on the importance of completing the full course of anti-rabies vaccination, 77.3% advised and gave rabies immunoglobulin for all category III bite victims, 89.4% advised and gave 0.5 ml of injection tetanus toxoid, and 89.4% prescribed local antiseptics and antibiotics and anti-inflammatory.

The normality distribution was assessed using Shapiro-Wilk test which showed that the knowledge scores were normally distributed ($p > 0.05$), but the attitude score ($p = 0.01$) and practice score ($p < 0.001$) were not. Hence, the correlation between KAP scores was computed using Spearman's Rank correlation and their differences using Kruskal-Wallis test, which showed that there was a significant difference between knowledge, attitude and practice ($\chi^2 = 169.58$, $p < 0.001$) (Table 2).

The rank correlation between knowledge and attitude was statistically significant with intermediate positivity, but the rank correlation between knowledge and practice, and attitude and practice had weak negative correlations which were not statistically significant (Table 3).

There were many barriers among the attending medical officers in infiltrating ERIG to all category III exposures in the present study (Table 4).

Table 1.Post-exposure Prophylaxis Facilities Available at the Study Centers (N = 66)

No.	Facility	Number	Percentage
1.	Animal bite register	66	100
2.	Cold chain equipment	66	100
3.	Weighing machine	66	100
4.	Disposables	66	100
5.	Wound washing facilities	66	100
6.	Antiseptics	66	100
7.	Anti-rabies vaccine	66	100
8.	Rabies immunoglobulin	06*	9.1
9.	Emergency medicines	66	100
10.	IEC Materials	66	100

Rabies Immunoglobulin was given at only 6 referral hospitals of BBMP

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Table 2.Comparison of Knowledge, Attitude and Practice of Medical Officers (N = 88)

Scores	Sample size	Median	Inter-quartile Range	Mean Rank	Chi-square Value*	df	p Value
Knowledge	88	6.0	4	80.28	169.585	2	< 0.001
Attitude	88	38.5	7	198.50			
Practice	66	6.0	2	73.79			

Chi-square value obtained through Kruskal-Wallis test

Table 3.Correlation between Knowledge, Attitude and Practice of Medical Officers (N = 88)

Parameters	Spearman's Correlation Coefficient	p Value
Knowledge and attitude	0.599	< 0.001
Knowledge and practice	-0.105	0.403
Attitude and practice	-0.025	0.842

Table 4.Barriers in Rabies Immunoglobulin Usage among Medical Officers (N = 88)

No.	Barriers	Number*	Percentage
1	Afraid of adverse drug reactions	55	62.5
2	Time-consuming	55	62.5
3	Unfamiliar/ not trained	46	52.3
4	Patients from other BBMP areas	46	52.3
5	Cumbersome procedure	41	46.5
6	Stock availability	35	39.7
7	Refer the severe bites to an expert center	20	22.7
8	Afraid of wound infection	15	17.1
9	Causes additional pain to the patient	14	15.9

Multiple responses

Discussion

India has made significant progress in rabies prevention. Under the 12th five-year plan, the National Rabies Control Program (NRCP), which includes both human and animal health components, was introduced.[7] The National Center for Disease Control (NCDC) is the focal point of the human health component and the nodal site for its execution. It implements the intradermal mode of vaccination administration and provides prompt and adequate PEP to all animal bite patients.[8]

Following the adoption of the NRCP, all municipal corporation hospitals and health centers offered post-exposure prophylactic treatments without charge. The provision of PEP services depends on a number of factors, including the availability of vaccine supplies, capacity to buy and provide vaccinations to government hospitals and health centers, and the knowledge of medical officials about PEP (KAP). The administration of rabies vaccinations in government hospitals is based on the logistics of competitive pricing and bidding processes.

According to the current study, all PEP sites had access to a vast majority of the necessary facilities, nevertheless, only 6 (9.1%) centers had the ability to administer rabies immunoglobulin. Only 58.6% of anti-rabies clinics (ARCs) across the nation that participated in a national multi-centric study on PEP facilities and services in 35 anti-rabies clinics offered local wound infiltration of rabies immunoglobulin.[9] RIG was only accessible in 33% of ARCs, according to another national multi-centric study conducted in India among six chosen government anti-rabies clinics.[10] These studies showed that the facilities for the provision of rabies immunoglobulin have to be further improved after providing proper training and supply so that it will not overburden only a few centers since they are also providing other healthcare facilities.

The study also showed that 25 (37.9%) centers had stock-out days for anti-rabies vaccines with an average of 15 days per year and 3 out of 6 (50%) anti-rabies clinics had stock-out days for ERIG with an average of 40 days/year. Likewise, a study from Mandya also showed that the anti-rabies clinic of the Government hospital reported vaccine stock-out days as

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81 days.[11] According to research on the performance of six animal bite treatment centers (ABTCs) in the Philippines in 2017, the government only met 73% and 30%, respectively, of the demand for ARV and ERIG.[12] Another multi-centric study from seven Indian states revealed that because it is a state-specific issue, the procurement, distribution, and availability of rabies biologicals significantly differ from state to state. Immunoglobulins and vaccinations were scarce in Manipur's districts while they were readily available at the PHC level in Gujarat. Only 9 of the 27 government healthcare facilities and 2 of the 8 private hospitals utilized immunoglobulins.[13] Since rabies biologicals can save lives, it is crucial to assure their constant availability in all government hospitals because a large majority of people who suffer from animal bites are poor and go there for medical attention.[14]

In the current study, the KAP of the medical officials about PEP was insufficient. The knowledge and attitude scores had an intermediate positive rank correlation that was determined to be statistically highly significant ($r = 0.599$, $p < 0.001$). This suggests that the knowledge and attitude scores are connected. However, there is only a slight negative connection between attitude and practice ($r = -0.025$, $p > 0.842$) and knowledge and practice ($r = -0.105$, $p > 0.403$). The negative correlation may be because even though the medical officers had good knowledge and attitude, making it a practice is lacking. Another multi-centric study on KAP of rabies prophylaxis among physicians at Indian animal bite clinics showed that there was a significant difference between knowledge, attitude, and practice ($p < 0.001$) among the studied physicians and the Spearman rank correlation showed that there was a moderate positive linear relationship between knowledge and attitude ($r = 0.667$, $p < 0.001$), poor positive linear relationship ($r = 0.220$) between knowledge and practice, and poor positive linear relationship between attitude and practice ($r = 0.334$).[15] Similarly, another study from Delhi showed that there were many lacunae in the knowledge and practices of doctors regarding animal bite management. Only 39.1% were aware of the intradermal rabies prophylaxis schedule, 48.4% were aware of the dosage, and 42.2% were aware of the site. 40.4% had knowledge of the post-exposure schedule in previously immunized patients, and the schedule of pre-exposure prophylaxis was known to only 47.8%.[16] These studies showed that knowledge and actual practice differ and knowledge is not always applied to actual practice. The practicing doctors should be motivated to follow correct practices through regular continued medical education (CME) programs, seminars, workshops, technical films, hands-on training, etc.

The present study also showed that the common barriers in the usage of equine rabies immunoglobulin were fear of adverse drug reactions and the procedure being more time-consuming (62.5%). On the other hand, the attending medical officers should understand that rabies immunoglobulin administration is life-saving in all category III bites and they should provide it to all those bite victims, irrespective of their personal barriers.[17,18]

Conclusion

The post-exposure prophylaxis services offered at the hospitals and health facilities run by the municipal corporation need to be significantly enhanced in every way. To achieve universal health coverage in accordance with SDG 3.8, eradicate dog-mediated human rabies by 2030, and provide early and complete PEP to all exposed to animals year-round, every health center must provide wound-washing facilities and ensure a continuous supply of life-saving rabies vaccines and immunoglobulins.[19,20]

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