Original Article

Factors influencing delay in initiating post-exposure prophylaxis for rabies prevention among animal bite victims: A cross sectional study

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Abstract

Background and Aims: The aim of this study was to identify the delay and the factors associated with delay in initiating post exposure prophylaxis. **Methods:** A consecutive sampling method was proceeded, and 199 patients attending the anti-rabies clinic with a history of animal bite reported at SMHS Hospital were the subjects of the study. **Results:** Majority of the patients (72.36%) reported a delay within 6 h after exposure, 18.59% within (6-48) h and 9.04% after 48 h of exposure. **Conclusion:** Increasing the number of accessible anti-rabies clinics as well as increasing the awareness among general public about timely post exposure prophylaxis in the community are some of the factors that need to be implemented.

Keywords: Post-exposure prophylaxis, prevention and control, rabies

Introduction

Rabies is a communicable viral disease that is usually fatal following the onset of clinical symptoms. In 99% of the cases, domestic dogs are responsible for rabies virus transmission to humans but this virus can transmit through domestic as well as wild animals. It spreads to people via animal bites or scratches, with the saliva being the common medium. Rabies is a central nervous system disease, and nearly always is fatal for humans and most other mammals, which is caused by the host infection with the rabies virus. Rabies virus is a single-stranded, negative sense, neurotropic RNA virus that belongs to the Lyssavirus genus of the Rhabdoviridae family.[1]

Rabies is present on all continents, except for Antarctica. The majority of human deaths (95%) occurs in the Asian and African regions. Although a wide range of effective vaccines and immunoglobulins have been invented for the treatment of rabies infection, they are usually not readily available or accessible to those in need.[2]

Although rabies is a fatal disease, it can be prevented by timely and appropriate post-exposure prophylaxis (PEP), which is almost 100% effective in preventing death from rabies.[3,4] In the case of potential rabies exposure, the World Health Organization (WHO) recommends immediate washing of the wound, administration of anti-rabies vaccine and infiltration of purified rabies immunoglobulin in and around the wound for severe categories of exposure.[5] Despite being a vaccine-preventable disease, rabies is still a significant public health problem in many developing countries within Asia and Africa.[6] Globally, canine rabies causes around 60,000 human deaths, over 3.7 million disability adjusted life years (DALYs) and 8.6 billion USD economic losses annually.[7] About 75% of these economic losses are due to premature death and costs associated with seeking treatment.[8]

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In India alone, eighteen to twenty thousand human deaths occur from rabies each year. Many of these deaths occur among children, and their deaths usually occurring outside medical facilities, meaning their deaths go unrecorded.[5]

The primary and secondary level of healthcare is of utmost importance to focus with regard to Rabies since animal bite victims reported in primary and secondary level health care lack some measures which can help in protecting and preventing deaths due to rabies. One important among them being the timely administration of PEP. Therefore, in addition to an understanding of the epidemiological distribution of animal bites, it is necessary to explore the factors leading to delays in PEP initiation.[9] High vaccine costs, ignorance and inadequate availability of primary health services limit the use of PEP in low-income countries.[10,11] Other factors such as lack of transport, referral to other health centers also delay the initiation of treatment. Delay has been seen to vary from hours to days. This study was conducted to see the delay in initiating PEP and the various factors contributing to this delay. This study helps us to identify the factors associated and thus can help to reduce the delay by making people aware about PEP through health education, thus reducing the mortality.

Education on dog behavior and bite prevention, ensuring high proportion of the domestic dog population is vaccinated are some of the effective ways of extension of the rabies vaccination programme and can reduce the incidence of human rabies as well as the financial burden of treatment.[12] Increasing awareness of rabies prevention and control in communities includes awareness on responsible pet ownership regarding how to prevent dog bites, and immediate care after a bite. Engagement and ownership of the programme at the population level increases the reach and acceptability of key messages.[2]

Table 1: Distribution of socio-demographic and clinical characteristics of animal bite victims.

Factors for delay		Time of reporting			
		<6 h	(6-48) h	>48 h	Total
Gender	Male	104 (68.4%)	32 (21.1%)	16(10.5%)	152(100.0%)
	Female	40 (85.1%)	5 (10.6%)	2 (4.3%)	47 (100.0%)
Residence	Urban	99 (91.7%)	9 (8.3%)	0 (0.0%)	108 (100%)
	Rural	45 (49.5%)	28 (30.8%)	18(19.8%)	91(100%)
Distance from hospital	Less than 10 km	95 (91.3%)	9 (8.7%)	0 (0.0%)	104 (100%)
	More than 10 km	49 (51.6%)	28 (29.5%)	18(18.9%)	95 (100%)
Educational status	Literate	126 (80.8%)	21 (13.5%)	9 (5.8%)	156(100%)
	Illiterate	18 (41.9%)	16 (37.2%)	9 (20.9%)	43 (100%)
Monthly income (INR)	Less than 10 000	0 (0.0%)	19 (65.5%)	10(34.5%)	29 (100%)
	More than 10 000	144 (84.7%)	18 (10.6%)	8 (4.7%)	170(100.0%)
Site of bite	Head/neck	5 (71.4%)	2 (28.6%)	0 (0.0%)	7(100.0%)
	Hands/arms	43(71.7%)	10 (16.7%)	7 (11.7%)	60 (100.0%)
	Trunk	2 (100.0%)	0 (0.0%)	0 (0.0%)	2 (100.0%)
	Legs/thighs	94 (72.3%)	25 (19.2%)	11 (8.5%)	130(100.0%)
Type of animal	Dog	131 (89.7%)	13 (8.9%)	2 (1.4%)	146(100.0%)
	Cat	9 (22.0%)	18 (43.9%)	14(34.1%)	41 (100.0%)
	Others	4 (33.3%)	6 (50.0%)	2 (16.7%)	12 (100.0%)
Category of bite	II	56 (53.8%)	31 (29.8%)	17(16.3%)	104(100.0%)
	III	88 (92.6%)	6 (6.3%)	1 (1.1%)	95 (100.0%)

Methods

The study was hospital-based cross-sectional study conducted in the anti-rabies clinic of a tertiary care hospital of Kashmir. A consecutive sampling of 199 patients with a history of animal bite were recruited in the anti-rabies clinic. This study was conducted during December 2018.

A semi-structured, pre-tested questionnaire was used to collect information from the patients regarding the time interval between exposure and initiation of anti-rabies PEP, socio-economic status of the family, and other risk factors associated with the delay in initiation of vaccine. The delay was defined as the initiation of PEP more than 6 h after animal bite.

The data was entered in a Microsoft Excel spreadsheet and analyzed by SPSS. Fischer's Exact test was used to find out association between delay in PEP and risk factors associated with it. A *P* value of < 0.05 was considered as statistically significant.

Written informed consent was taken from all the patients including illiterate persons who were first explained about the study and in the case of patient less than 18 years of age, it was obtained from their parents/guardians. In case of children between 7-12 years verbal assent was obtained, and for children between 12-18 years written assent was obtained. The accompanying guardians/parents as well as the victim were interviewed in case of children less than 18 years.

Ethics

Ethical approval was given by the institutional ethics committee of the Government Medical College, Srinagar, J&K Approved 20-06-2020.

Results

A total of 199 patients with a history of animal bite attending the anti-rabies clinic were interviewed. 91 of the patients were from rural area and one hundred eight were from urban area. 76.38% (152) of the patients were males and 47 were females. Children less than 18 years were 26.13%, and 6.53% were above 60 years in the samples taken.

Majority of the patients had a history of dog bite 146 (73.34%), followed by cat bite 41 (20.60%) and others 12 (6.03%). Almost half of the patients had category III bite 95 (47.74%) and 104 (52.26%) had category II bite. Majority of the patients 144 (72.36%) reported within 6 h delay after exposure, 37 (18.59%) reported within (6-48) h delay and 18 (9.04%) reported 48 h delay after exposure. All Category III patients were given rabies immunoglobulin against a payment routinely as per the protocol at the said clinic. Age was not associated with delay in time and showed a weak inverse correlation with delay with a Spearman's correlation coefficient of -0.094 and with a *P* value of 0.188.

Table 1 depicts the various factors associated with delay in the initiation of PEP. Delay was significantly seen in patients from rural area with distance of more than 10 km from the hospital, and monthly income of the family was less than INR 10 000 with less degree of exposure (category II) of the patients. Delay in initiation of anti-rabies PEP was not significantly associated with sex of the studied subjects. About 11 (5.5%) of the patients were unaware about the PEP, 17 (8.5%) lack of money, 4 (2.0%) had no person to accompany, 7 (3.5%) were referred to other health center, 3 (1.5%) lack of transport, 4 (2.0%) reported work delay and 9 (4.5%) reported lack of immunoglobulin as reasons for delay in initiating PEP.

Table 2 shows the reasons for delay of more than 6 h mentioned by the patients ($n = 55$) for their inability to come for prompt PEP. Out of the 55 patients, 17 (31.0%) patients cited lack of money as the reason for delay of more than 6 h followed by unaware about the PEP dose in 11 (20.1%) patients who received their PEP after 6 h.

Table 3 depicts the binary logistic regression which was used to find the association between the gender, residence, education status, category of bite, type of animal and delay in reporting for PEP

Table 2: Reasons for delay in initiating PEP

Potential reasons for inability to receive prompt PEP in animal bite cases	*n* (%)
Work	4 (7.2)
Unaware about the PEP	11 (20.1)
Unavailability of a person to accompany	4 (7.2)
Lack of money	17 (31.1)
Referral to other health centre	7 (12.7)
Lack of transport	3 (5.4)
Lack of Immunoglobulin at periphery	9 (16.3)
TOTAL	55

PEP: Post exposure prophylaxis

Table 3: Association between factors influencing delay in PEP

	OR	95% CI for OR		*P*
		Lower	Upper	
Gender				
Female	0.105	0.020	0.550	0.008
Male	Ref*			
Residence				
Rural	31.517	7.825	126.942	0.000
Urban	Ref*			
Education status				
Illiterate	4.559	1.413	14.705	0.011
Literate	Ref*			
Category of bite				
Category of bite-III	0.063	0.016	0.243	0.000
Category of bite-II	Ref*			
Type of Animal				
Others	14.810	4.361	50.286	0.000
Dog	Ref*			

at the anti-rabies clinic. Females who were bite victims had lesser chances of delay as compared to males. Similarly, rural population had more delay as compared to urban population, illiterate population also had more delay as compared literate. The category III bite victims had lesser odds of delay as compared to Category II. Victims who were bitten by an animal other than dogs were found to have higher odds of delay as compared to victims bitten by a dog, and all associations were found statistically significant.

Discussion

Around 100 years of research has been conducted so far into the prevention, control and elimination of rabies with safe and efficacious vaccines developed for use in human as well as in animals. Dogs are considered to be the major reservoir for rabies, and although lots of advances have been made towards the elimination as well as control of canine rabies in many parts of the world, rabies continues to kill tens of thousands of infected victims every year in Africa and Asia. Policy has been made, which is directed to a global target of zero human deaths from dog-mediated rabies by 2030 and also global elimination of canine rabies.[11] Rabies is a fatal disease, which can be prevented by timely post exposure prophylaxis. PEP should be easily available, affordable to everyone. This study mainly focuses on identifying the delay in time and the factors associated with delay in initiating PEP, so that these delays could be reduced which in turn will reduce the mortality from rabies.

The introduction of intra-dermal rabies vaccination regimens has made PEP more available and affordable.[13,14] India still accounts for more rabies deaths than any other country in spite of the government's effort to provide free rabies vaccine.[15,16] Males and children under 15 years have a higher mortality rate of rabies, and most of the deaths occurred in rural areas.[17]

The victims in our study were mainly bitten by stray dogs. The most effective way to prevent human rabies is the vaccination of dogs, but faced with some challenges, mass vaccination of dogs is difficult to be implemented in developing countries.[18-20]

About 27.6% of the patients delayed the prompt initiation of PEP. There are several factors that impede the prompt initiation of PEP administration after animal bite. Our study mainly highlights these factors so that the health services provided by the government can be timely utilized by the people.

The main victims of these risk factors are the vulnerable group of the population. Children along with the aged and females often are unable to access to the health center without the company of males, which sometimes leads to a delay of diagnosis and treatment.[20]

In this study, delay showed an increasing trend with age, which is obvious among the working population and the elderly. For working population, the delay happened, when they have to spend some time to get out from their work. And lack of financial, physical and psychological support is the major reason accounting for the delay in the elderly population.[21]

Most of the patients in our study came from rural areas far from the hospital, and they had to travel a long distance before they can receive PEP. Long distance (more than 10 km) from the vaccination institutions was significant reason for delay in receiving PEP. There is no availability of Immunoglobulin that is state subsidized at any level in the state which includes the rural health care as well as the center where the study was conducted, Therefore, inevitably the patients used to come the center and purchase the Immunoglobulin from market outside the hospital and it being not available even in private sector in rural areas. Similar findings have been reported by Hampson *et al.* in Tanzania.[14] The study shows that people inhabit in remote areas in developing countries have difficult in accessing to the public health services.[16] More transportation cost and time have to be spent before receiving PEP for people living in a longer distance from the health, which is also seen in our study. The necessity of referral to other health centres before receiving PEP from a government health center, and transportation of anti-rabies vaccination added to the delay of the people from a longer distance. Also Considering the poor transportation between the villages and the cities, it is difficult for people coming from rural areas to reach nearest health center.[22]

Lower economic status in the study also showed a significant correlation with the delay in time. Unawareness about timely vaccination was also seen as an important reason for delay in our study. Majority of the patients came for vaccination on advice of health personnel or family and friends. Studies shows unawareness about correct management practices are prevalent even in the urban areas of India.[19,23,24] The above-mentioned factors have been cited as indirect costs for receiving PEP in studies done elsewhere.[10] These factors affect timely vaccination in spite of the availability of affordable PEP.

Limitations of the study: Due to the short duration of the study and lack of any reliable retrospective data we were unable to establish, if there exists any seasonal trend in animal bite cases or in the delay in receiving PEP. Since it was a hospital-based study, the results cannot be generalized to the community. Those who suffered from animal bite, but unable to come for vaccination at the hospital could not be studied at all, so the reasons for being unvaccinated could not be determined. But reasons for delay in getting vaccinated may act as indirect indicator for those unvaccinated. The variables like income and residence had collinearity due to which income was taken out from regression analysis and therefore they couldn't not be evaluated.

Conclusion

Although vaccines availability in India has been improved

considerably, several socio-cultural, distance and finance related factors still hinder the timely PEP utilization. These disparities in health care utilization can be result from diverse factors. Extending the OPD working hours for Anti-rabies clinics, increasing the number of accessible anti-rabies centres and increasing awareness among general public about timely PEP are some of the factors that need to be implemented.

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Conflicts of interest

There are no conflicts of interest.

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