Brief Research Article

Cost of Rabies Post Exposure Prophylaxis in Different Healthcare Settings in Six States of India

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Summary

The expenditure for rabies postexposure prophylaxis (PEP) is substantial, especially for the poor who are affected the most. The present study was conducted to determine the cost incurred to a patient and the healthcare facility for providing PEP in different healthcare settings. A multicentric, health facility-based study was conducted from May 2017 to January 2018 in the six states involving 18 healthcare facilities. The study included 529 animal bite cases; most of them belonged to either category III (54.4%) or category II (43.1%) exposures and all of them received complete PEP. The total median cost incurred to the patients for complete PEP in the government health facility was INR 1400 (USD 22) and in private hospitals was INR 3685 (USD 58). The cost of PEP for the bite victims is considerable; therefore, it has to be provided free of charge at all healthcare facilities.

Key words: Animal exposures, antirabies vaccination, cost incurred, postexposure prophylaxis, rabies immunoglobulin

Rabies is a neglected zoonotic disease, which mainly affects the poor people living in remote rural areas and urban slums of the developing world. The World Health Organization (WHO) estimates that >59,000 human deaths occur globally every year. Over 95% of the global human rabies deaths occur in Asia and Africa. In India, estimated 20,000 human rabies deaths and 17.4 million animal bites occur annually.[1]

Rabies is a preventable disease through appropriate postexposure prophylaxis (PEP) for all animal exposures, i.e., wound washing with soap/detergent and water to remove the virus at the site of bite, followed by application of virucidal agents to reduce the viral inoculum at the wound site; complete course of postexposure vaccination to induce antibodies which prevents the risk of virus entering peripheral nerves; and wound infiltration of rabies immunoglobulin (RIG)/rabies monoclonal antibodies in all category III exposures to neutralize the virus at the wound site. Early and complete PEP will prevent rabies even after high-risk exposure to potential rabid animals.

The financial reach to PEP is a major limiting factor for exposed; the type and route of administration of antirabies vaccine (ARV), as well as the type of RIG used, significantly influence the cost of management. In addition to the expense of rabies biologicals, the amount of money spent for the physician and hospital, the loss of income, and the emotional and psychological impact of PEP are stupendous. The high cost of PEP also reduces patient compliance, which in turn reduces the effectiveness of PEP.

The cost of PEP is substantial for both the exposed victims and the government health facilities which provide PEP free of cost, for the needy. The estimated global expenditure for prevention and control of rabies is > US $ 1.6 billion.[2] In many developing countries, unfortunately, the life-saving rabies biologicals are often neither accessible nor affordable to the poorest sectors of society who are most at risk.[3] Animal exposures are quite high in the WHO's South East Asia Region due to large human and dog populations living in congested habitable areas; more than 1.4 billion people in this region are at risk. Therefore, it continues to be a major public health and economic problem throughout the region.[4]

In this regard, a countrywide, multi-centric study was conducted by the Association for Prevention and Control of

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Access this article online

Quick Response Code:

Website: www.ijph.in

DOI: 10.4103/ijph.IJPH_366_19

How to cite this article: Haradanhalli RS, Hanumanthaiah AN, Varadappa ST. Cost of rabies post exposure prophylaxis in different healthcare settings in six states of India. Indian J Public Health 2019;63:S44-7.

Rabies in India (APCRI) with the technical and operational support from the WHO, at the healthcare facilities in different settings of urban, rural, and government and private hospitals; to generate evidence on the cost for availing PEP by the exposed individuals. It can help in planning national rabies control program, and to provide the rabies biologicals free of cost to achieve the goal of zero dog-mediated human rabies by 2030.[5]

The multi-centric cross-sectional study was conducted from May 2017 to January 2018 at six selected states, ensuring geo-scatter distribution across different regions of the country, viz., Himachal Pradesh and Bihar (North), West Bengal (East), Kerala (South), Madhya Pradesh (Central), and Gujarat (West). From each state, three health facilities (government/private) were selected using simple random sampling technique from all the health facilities having antirabies clinic/providing PEP against rabies. Proportionate representation of rural/urban and government/private was maintained. Thus, a total of 18 healthcare facilities were included in the study.

The study subjects included all the animal bite victims attending the selected antirabies clinics, excluding those who had a history of previous exposure to animal bites or receiving any PEP or preexposure prophylaxis. Based on 77% compliance rate,[6] 95% confidence level, 5% error, and 15% drop-outs, the required sample size was calculated to be 514. It was decided to include 29 subjects (animal bite cases) from each facility for equal representation. Eligible subjects were recruited consecutively from each facility during data collection. Finally, 529 animal bite cases were studied.

Informed consent was obtained from each study subject after explaining the purpose of the study. Relevant data were collected by interview of the subjects/adult family respondent, and the details were recorded in the predesigned, pretested proforma, which included sociodemographic profile, characteristics of bites, and the PEP received. The cost incurred for availing PEP was also elicited in detail from the bite victims/respondents. The direct costs, i.e., amount spent on drugs, if any, i.e., for ARV, RIG, premedication, antiseptics and antibiotics, and hospital charges, were recorded; the indirect costs such as cost of travel to the patient and his accompaniment and loss of wages for both of them and any other cost involved were recorded. Since PEP was provided free of cost at the government hospitals, the average expenditure incurred by the government for providing PEP was also calculated, by interviewing the purchasing authorities of the rabies biologicals. The data received from all the centers were compiled in an Excel sheet and analyzed using the principles of descriptive statistics and costs were presented as median and interquartile range.

The study had the ethical clearance from Institutional Ethics Committee, Kempegowda Institute of Medical Sciences, Bangalore (Ref. No. KIMS/IEC/S15-2016 dated December 5, 2016).

A total of 529 animal bite cases were studied from 18 selected healthcare facilities (12 rural and 6 urban/15 governments and 3 private). Among them, 65.8% were from rural areas and 34.2% from urban areas. Majority of the bite victims were from the age group of 15–59 years (66.7%), followed by children <15 years (21.7%) and elderly >60 years (11.6%); most of the subjects (78.5%) belonged to below poverty line. The study data also showed that most of the subjects had category III (54.4%) or category II exposures (43.1%), who needs immediate PEP. All the animal bite victims received ARV, viz., 67.3% by intradermal route and 32.7% by intramuscular route; however, only 46.2% of the category III exposures received RIG because of short supply in government/nonaffordability in private. A study from government tertiary care hospital in South Karnataka conducted among 5327 animal bite victims also showed that 82% had category III exposures; among whom, only 29% received RIG because of short supply/nonavailability.[7]

The total median cost incurred to the patients for availing PEP in the government healthcare facility for both category II and III; where both ARV and RIG provided free of cost was INR 1400 (USD 22) with interquartile range of INR 1180–1584. Likewise, the expenditure made by government healthcare facility for providing both ARV and RIG free of cost by intramuscular route for all category III exposures, i.e., intramuscular rabies vaccination (IMRV) and equine rabies immunoglobulin (ERIG) for each category III exposure, was INR 1188 (USD 19) and for each category II exposure with only ARV was INR 640 (USD 10). Similarly, the total cost for government health facilities for intradermal rabies vaccination (IDRV) and ERIG for category III exposure was INR 676 (USD 10.5) and for category II exposure with only ARV was INR 128 (USD 2) [Table 1]. The cost of providing PEP by IDRV is significantly lower than that of IMRV ($\chi^2 = 25.76$, $P < 0.005$). A similar study conducted in the government hospital, Kerala, where PEP is provided free of cost also showed that the total cost of PEP borne by the government for giving PEP by intradermal route was INR 391.5 and for RIG was INR 893 per person, which was substantial.[8]

The present study also showed that, in the private healthcare facility, the total median cost incurred to the animal bite victims for availing PEP with IMRV and ERIG in category III exposures was INR 3685 (USD 58) with interquartile range of INR 2433–4155 and for category II exposures with only IMRV was INR 3034 (USD 48) with interquartile range of INR 2433–3755. None of the private healthcare facility was providing IDRV. The direct cost for procuring rabies biological is substantial, when compared to indirect cost in private setup [Table 2]. Likewise, another study from Bangalore also showed that the total median cost incurred by the bite victims for PEP in government hospitals was INR 585 with Q1–Q3 of INR 444–725 and the cost spent by the government was INR 1031; whereas the total cost incurred in private hospital was INR 5200 with Q1–Q3 of INR 4900–5701.[9] All these studies showed that the cost

Table 1: Cost incurred for postexposure prophylaxis in government healthcare facility (*n*=439)

Cost of PEP (INR)	Day 0 median (Q1-Q3)	Day 3 median (Q1-Q3)	Day 7 median (Q1-Q3)	Day 14 median (Q1-Q3)	Day 28 median (Q1-Q3)	Total median (Q1-Q3)
Direct cost (INR)						
Hospital charges	3 (2-200)	2 (2-118)	2 (2-77)	2 (2-77)	2 (2-77)	3 (2-10)
Other medicines and disposables	165 (150-200)	0	0	0	0	165 (150-200)
Total	170 (87-200)	2 (2-118)	2 (2-77)	2 (2-77)	2 (2-77)	178 (80-200)
Indirect cost (INR)						
Travel for the patient and attendants	50 (30-74)	50 (30-74)	50 (30-70)	50 (50-80)	50 (28-60)	250 (150-358)
Food for the patient and attendants	40 (20-100)	40 (20-100)	40 (20-100)	0 (0-30)	40 (20-60)	160 (80-390)
Loss of wages for the patient and attendants	200 (200-400)	200 (185-350)	200 (200-350)	0 (0-200)	200 (200-400)	800 (785-1700)
Total	260 (250-420)	260 (250-420)	260 (250-420)	50 (0-200)	260 (250-420)	1220 (900-1800)
Grand total	445 (350-520)	325 (250-400)	325 (250-400)	90 (50-120)	325 (250-400)	1400 (1180-1584)

PEP: Postexposure prophylaxis, INR: Indian Rupees, RIG: Rabies immunoglobulin

Table 2: Cost incurred for postexposure prophylaxis at the private health facilities (*n*=90)

Cost of PEP (INR)	Day 0 median (Q1-Q3)	Day 3 median (Q1-Q3)	Day 7 median (Q1-Q3)	Day 14 median (Q1-Q3)	Day 28 median (Q1-Q3)	Total median (Q1-Q3)
Direct cost (INR)						
Antirabies vaccine	325 (325-350)	325 (325-350)	325 (325-350)	325 (325-350)	325 (325-350)	1625 (1625-1750)
Rabies immunoglobulin	651 (465-930)	0	0	0	0	651 (465-930)
Hospital charges	160 (40-200)	160 (40-200)	160 (40-200)	160 (40-200)	160 (40-200)	750 (180-920)
Other medicines	195 (150-215)	0	0	0	0	195 (150-215)
Total	1150 (560-1610)	485 (365-550)	485 (365-550)	485 (365-550)	485 (365-550)	3104 (1180-3662)
Indirect cost (INR)						
Travel for the patient and attendants	50 (30-74)	50 (30-74)	50 (30-70)	50 (50-80)	50 (28-60)	250 (150-358)
Food for the patient and attendants	40 (20-100)	40 (20-100)	40 (20-100)	0 (0-30)	40 (20-60)	160 (80-390)
Loss of wages for the patient and attendants	200 (200-400)	200 (185-350)	200 (200-350)	0 (0-200)	200 (200-400)	800 (785-1700)
Total	260 (250-420)	260 (250-420)	260 (250-420)	50 (0-200)	260 (250-420)	1250 (900-1800)
Grand total	1452 (1095-1812)	646 (405-750)	665 (483-750)	490 (352-610)	665 (483-750)	3685 (2433-4115)

PEP: Postexposure prophylaxis, INR: Indian Rupees

of availing rabies PEP is significantly high, especially for the poor.

The knowledge, tools, and technology to eliminate human rabies are available and have proven to be effective. Successful interventions have eliminated dog-mediated human rabies in Western Europe, North America, Japan, South Korea, and parts of Latin America saving thousands of lives.[10] Therefore, rabies elimination is feasible using the existing tools, even in poor and endemic countries; they need a plan to put them into action, and a strategy to mobilize resources with political will to get rid of the disease. Therefore, effective PEP provided at free/minimal cost in all healthcare settings across the country should be considered as an exceptionally cost-effective investment for public health and for eliminating rabies by 2030.

Acknowledgment

We are grateful to Drs. Bernadette Abela Ridder and Lea Knopf from the WHO, Geneva, Switzerland, Professor M. K. Sudarshan, Project lead; WHO-APCRI Survey 2017 and Ritu Singh Chauhan, WHO, India Office, New Delhi, for extending all support and help to conduct this study. We are also thankful to the medical officers and the dog bite victims who provided the information to the study team. We also thank Dr. Ramya MP and Dr. Nitu Kumari, KIMS, Bangalore, for data management.

Financial support and sponsorship

This study was financially supported by WHO, India Country Office, New Delhi.

Conflicts of interest

There are no conflicts of interest.

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