

Review Article

National Action Plan for Eliminating Dog-mediated Rabies from India: The Way Forward

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A B S T R A C T

Rabies is a zoonotic disease, fatal to humans who are accidental dead-end hosts. It is caused by the viruses belonging to the genus *Lyssavirus* and is transmitted to humans by bites of infected animals. Rabies is endemic to India and accounts for 36% of the global rabies mortality. Proper bite wound cleaning and post-exposure prophylaxis with anti-rabies vaccine are currently the only two effective measures that can prevent the disease from progressing to encephalitis and an agonizing death.

India, being a high rabies burden country, has been putting in concerted efforts to prevent and control human rabies. The National Rabies Control Program (NRCP) was launched in 2014, and with the global call for the elimination of dog-mediated rabies by 2030, the "One Health" approach was adopted and The National Action Plan for Dog-mediated Rabies Elimination from India by 2030 (NAPRE) was launched in 2021. This is a joint endeavor by key stakeholders and government agencies.

The NAPRE has five key objectives: 1) To reduce the number of dog bites by 50% by 2025; 2) To increase the number of dogs vaccinated against rabies by 75% by 2025; 3) To reduce the number of human deaths attributed to rabies by 75% by 2030; 4) To strengthen the surveillance and monitoring system for rabies; and 5) To raise awareness about rabies prevention and control.

The NAPRE envisages the states to formulate their individual action plans, known as the State Action Plan for Dog-mediated Rabies Elimination (SAPRE) based on their specific needs. The initiatives to be undertaken under the NAPRE are outlined in the human and animal health components, which are being implemented by stakeholders at all levels. The National Rabies Control Program (NRCP) has implemented new initiatives to provide technical support to states to formulate their individual state action plans, strengthen rabies surveillance, strengthen rabies diagnostic facilities, promote operational research on rabies, and strengthen inter-sectoral coordination.

Keywords: Rabies, Endemic, NAPRE, NRCP, SAPRE

Introduction

Rabies is a fatal zoonotic disease caused by any of the viruses from the genus *Lyssavirus*. It is transmitted to humans by the bite of an infected animal, most commonly a dog. Humans are the dead-end hosts of rabies and no cases of human-to-human transmission have been reported yet. This disease presents as progressive encephalomyelitis resulting in an excruciating death. The WHO estimates that 95% of human rabies mortality occurs in developing countries of Asia and Africa.¹ The disease is also notoriously underreported in these countries due to limited access to healthcare and poor rabies case and mortality notification mechanisms.²

India's endemicity for rabies makes it accountable for 36% of global rabies mortality. Based on an estimated number of human cases, India is reported to have an incidence of 3.0 per 100,000 population.³ A large proportion of rabies mortality is reported in children below the age of 15 years, as the bites occurring in this age group are very often under-reported or unrecognized.⁴ Proper wound cleaning and anti-rabies vaccine (ARV) post-exposure prophylaxis (PEP) can prevent the further onset of rabies encephalitis and death.

National Rabies Control Program (NRCP)

Under the 11th five-year plan, the Government of India launched a pilot project in 2008 for the prevention and control of human rabies. The primary objectives of the project were to prevent human deaths due to rabies, enhance awareness in the general community, capacity building in terms of manpower, diagnostic facilities, surveillance, maintenance, and sensitization of other sectors. It was implemented in five cities - Ahmedabad, Bangalore, Delhi, Madurai, and Pune.

The experiences gained from the pilot project were used to formulate the National Rabies Control Program (NRCP). It was launched in 2014 under the 12th five-year plan. The NRCP is a nationwide program with the objective of preventing rabies-associated human mortality by advocacy, capacity building, increasing awareness, strengthening surveillance, and improving intersectoral coordination and rabies diagnostics.

The key activities undertaken by NRCP fall under the following:

1. **Capacity building:** Thousands of health professionals have undergone training in the management of animal bite cases and rabies post-exposure prophylaxis. These trainings have helped to ensure that health professionals have the knowledge and skills they need to prevent and treat rabies.
2. **Advocacy:** The NRCP advocates for scaling up the

administration of the anti-rabies vaccine via the intradermal route for rabies prophylaxis because of its cost-effectiveness over the intramuscular route.

3. **Awareness:** The NRCP works on increasing awareness in the general community about rabies and how to prevent it. The program does this through a variety of activities, including IEC (information, education, communication) campaigns, school-based programs, and community outreach events.
4. **Surveillance:** The NRCP has strengthened the case-based surveillance of animal bites and rabies. This helps in tracking the incidence of rabies in India and to identify areas where more interventions are needed. The NRCP collects data on animal bites and rabies cases through a network of sentinel hospitals and laboratories.
5. **Diagnostics:** The NRCP strengthens rabies diagnostics by supporting laboratories that can test for the virus. This helps to ensure that people who have been bitten by rabid animals can be diagnosed. It also helps to initiate a prompt multi-pronged emergency response by the health and veterinary departments to prevent animal and human rabies outbreaks. The NRCP has supported 14 laboratories across the country to function as regional rabies diagnostic centers.

National Action Plan for Eliminating Dog-Mediated Rabies from India (NAPRE)

The National Rabies Control Program was implemented in fragments across the country and saw uncoordinated efforts by the stakeholders. To address this gap, in 2015, the United Against Rabies Forum (UARF) was formed by the World Health Organisation (WHO), the World Organisation for Animal Health (OIE), the Food and Agriculture Organization of the United Nations (FAO), and the Global Alliance for Rabies Control (GARC). This collaboration aims to eliminate dog-mediated rabies by 2030. The UARF strives to achieve this goal by improving surveillance of cases of animal bites and rabies, providing vaccines and treatment to people who have been bitten by rabid animals, and educating the public about rabies prevention and treatment.⁵ India adopted this goal of UARF for the elimination of dog-mediated rabies by launching the National Action Plan for Dog-mediated Rabies Elimination (NAPRE) in 2021.

The lessons learned from the NRCP and UARF indicated that dog-mediated rabies elimination needed a coordinated effort from different sectors, with health, veterinary, wildlife, and municipal corporations being some of the key stakeholders. Hence "One Health approach" was adopted during the formulation of NAPRE with inputs from the Ministry of Fisheries, Animal Husbandry and Dairying (MoFAHD), the Ministry of Agriculture & Farmers' Welfare (MoAFW), the Indian Council of Agricultural Research

(ICAR), the Ministry of Panchayati Raj Institutions (MoPRI), the Ministry of Science and Technology (MoST), and the NITI Aayog with technical support from the WHO and GARC.

NAPRE has the following five key objectives:

1. To reduce the number of dog bites by 50% by 2025;
2. To increase the number of dogs vaccinated against rabies by 75% by 2025;
3. To reduce human rabies mortality by 75% by 2030;
4. To strengthen the surveillance and monitoring system for rabies; and
5. To raise awareness about rabies prevention and control.

NAPRE is based on the following three key principles:

1. **Prevention:** To improve PEP availability to all people in need and aim for its equitable distribution. PEP is a series of injections that can prevent rabies if administered promptly after exposure to the virus.
2. **Promotion:** To enhance the understanding and awareness of rabies through advocacy, awareness, and education. This includes raising awareness of the symptoms of rabies, how to avoid being bitten by a rabid animal, and what to do if you are bitten.
3. **Partnership:** It aims to provide a well-coordinated multi-pronged approach to rabies elimination with the involvement of stakeholders from the government and private sectors, international partners, and urban and rural communities. This includes working with local communities to raise awareness regarding rabies and to promote the use of PEP.

NAPRE has identified two core components to achieve the dog-mediated elimination of human rabies:

1. **Human health component:** This component aims to prevent rabies mortality in humans by ensuring prompt access to PEP for all cases of animal bites, enhancing surveillance of cases and mechanisms for swift public health system response.
2. **Animal health component:** The primary aim of this component is to achieve a minimum anti-rabies vaccination coverage of 70% among dogs in a defined geographical area annually for three consecutive years.

The NAPRE has been implementing various key strategies for the operationalization of these two core components. The strategic actions for the animal health component include the following:

1. Estimating the canine population;
2. Mapping of rabies risk zones;
3. Implementing strategic mass dog vaccination programs.
4. Management of solid waste;
5. Confinement and containment of suspected rabid animals;

6. Community involvement and operational research;
7. Evaluation of post-vaccination coverage;
8. Dog population management; and
9. Promoting responsible dog ownership;

The strategies being implemented for the human health component include:

1. Ensuring PEP for all cases of animal bite.
2. Training of healthcare professionals and their capacity building for the management of animal bite cases.
3. Improving surveillance systems to ensure prompt reporting and detection of animal bites and rabies cases in humans.
4. Developing communication plans, education, and information.
5. Intersectoral and inter-disciplinary coordination; and
6. Public-private partnerships.

NAPRE envisages the states to formulate their own action plans (SAPRE) based on their specific needs. The activities outlined in the human and animal health components are being carried out by all key stakeholders. States designate a state and district nodal officer (SNO and DNO) to coordinate with the central NRCP. The existing veterinary infrastructure of the Animal Husbandry Department, urban/rural governing bodies, NGOs, and municipal corporations are key stakeholders. Attention has also been given to strengthening laboratory facilities, both for the human and animal components of NAPRE. The vision is to develop rabies laboratory facilities at the national, regional, and state levels by the involvement and capacity building of existing laboratory facilities at medical colleges, infectious disease hospitals, or tertiary care hospitals.

New Initiatives Undertaken by NRCP

The NRCP has undertaken the following initiatives to achieve the target of “zero deaths by dog-mediated rabies by 2030”:

1. **Technical support for the development of SAPRE:** The NRCP is actively involved in aiding states in the development of their SAPRE by organizing workshops across states, which bring together different stakeholders involved in rabies elimination by adopting a “One Health” approach. Model anti-rabies clinics have been set up across different states of the country to strengthen the existing healthcare facilities in the management of cases of animal bites and suspected rabies.
2. **Strengthening surveillance:** The NRCP has been actively involved in advocacy with the states to make rabies a notifiable disease. This would improve surveillance of animal bite victims, surveillance of human rabies deaths, vaccine coverage, and availability. Currently, the Integrated Health Information Protocol (IHIP) of the Integrated Disease Surveillance Program (IDSP) portal reports on a limited number of parameters for rabies.

NAPRE aims to establish a joint rabies surveillance network along with an integrated data-sharing process for all agencies (local/ state/ central) by the development of a GIS (geographic information system)-enabled electronic monitoring system. The NRCP portal will provide essential and concurrent updates on cases of animal bites, animal rabies, human rabies, stock inventory of rabies vaccines, immunoglobulins, etc. to the states and other key stakeholders. The system will also assist in maintaining links between the wildlife, veterinary, and health sectors, which will help in sharing data in a systematic way as per the parameters agreed on in the NAPRE. This will aid in the improvement of the surveillance of rabies in India and to better coordinate the efforts of different stakeholders to prevent and control the disease.

3. **Strengthening diagnostic capacity for rabies:** NAPRE aims to strengthen the diagnostic capacity for rabies in India. This is being carried out by setting up rabies referral laboratories at the national, regional, and state levels. These laboratories provide antemortem and postmortem diagnostic facilities, such as direct fluorescent antibody tests, Sellers stain, and molecular diagnosis by PCR and ELISA. Laboratories for conducting ELISA-based anti-rabies antibody titer estimation are being set up at the district level. Additionally, the NAPRE provides training and capacity building for laboratory professionals through periodic and hands-on training workshops on rabies diagnostics. This will help to improve the diagnosis and management of rabies in India and ultimately contribute to the elimination of the disease.
4. **Operational/ applied research:** The NAPRE envisages promoting operational research on rabies by providing material resources and technical support to researchers in medical and veterinary colleges. Currently, the NRCP aims to estimate the rabies burden and incidence of animal bites, situational analyses on the ARV PEP and Human Rabies Immunoglobulin (HRIG) utilization and availability, and improve mapping and management of rabies biologicals.
5. **Strengthening intersectoral coordination:** The NAPRE is based on a “One Health approach”, which has been adopted successfully by countries across the world to eliminate rabies and other zoonotic diseases. The One Health approach is a collaborative effort between humans, animals, environmental health professionals, municipal bodies, and Panchayati Raj systems to address public health challenges. The “Rabies free cities” initiative is one such measure undertaken to establish strong advocacy among different stakeholders to achieve zero dog-mediated rabies cases in tier one and tier two cities in India.

Way Forward

Rabies, a zoonosis with high fatality can be easily prevented by prompt wound washing and ARV PEP in animal bite cases. In order to provide equitable access to life-saving ARV, the national list of essential medicines includes ARV and HRIG. To prevent any shortage in rabies biologicals, the NRCP works in close tandem with the pharmaceuticals, producing these biologicals, and with the Drugs and Vaccine Distribution Management System (DVDMS). Currently, efforts are being made for the provision of anti-rabies vaccine at the PHC level and the HRIG at the district and higher levels. Despite the concerted efforts, animal bite patients often incur high out-of-pocket expenditures to gain access to these life-saving biologicals, especially the HRIG. To prevent any catastrophic cost to animal bite victims, monoclonal antibodies (Mab) could be provided to these patients in cases of HRIG shortage or unavailability. Two Indian-manufactured Rabies Monoclonal antibodies (RMabs) have been licensed and are currently available in the market. These are easier to manufacture, have less stringent cold chain storage requirements, fewer adverse drug reactions, are cheaper compared to HRIG, with similar efficacy in phase 3 trials, and are approved by the WHO.⁶⁻⁸

With the adoption of the NAPRE and the “One Health” approach, joint efforts by key stakeholders are being made to achieve dog-mediated rabies elimination by the year 2030. The human health component for the prevention and surveillance of rabies cases has been in place since the inception of NRCP. Consistent efforts and advocacies are being undertaken to ensure the universal availability of no-cost PEP and HRIG. Campaigns for animal bite wound management and treatment compliance to PEP are being carried out throughout the country under the financial arch of NRCP.

The active involvement of the veterinary sector and the animal husbandry departments as key stakeholders in rabies elimination has been an important breakthrough towards achieving zero deaths due to dog-mediated rabies. More than 95% of the suspected rabies cases are due to dog bites, largely because of the 60 million stray/ free-ranging dog population in India.⁹ With an exponentially increasing population of stray and community dogs, the cases of dog bites will increase proportionally. To tackle this, animal birth control measures and mass dog vaccinations are being carried out by veterinary sector professionals.¹⁰ Establishment of a linkage between the surveillance systems of human and animal rabies is a felt need from professionals belonging to both these sectors. This would ensure prompt identification of rabid animals and prevention of rabies outbreaks.

A key area in NRCP is the management of cases of rabies encephalitis. Currently, most patients who develop

rabies encephalitis are either managed at home or in hospitals with negligible end-of-life care.^{11,12} Standard treatment guidelines for rabies case management should be formulated and these patients should be administered respectable palliative end-of-life care.¹³ This would require training of the healthcare professionals who manage these patients and reorganization of the infrastructure in hospital isolation rooms to admit patients with rabies encephalitis.¹¹ For professional training and capacity building, involvement of both medical and veterinary teaching institutions is required.

Conclusion

Rabies endemicity makes India contribute about 36% of the global rabies burden. The NRCP was established to reduce the burden of rabies in the country. With a global push to eliminate dog-mediated rabies by 2030, the NRCP stepped up and formulated the NAPRE with inputs from all key stakeholders. NAPRE has adopted the “One Health approach” by identifying and including other key stakeholders. A comprehensive monitoring system has been established to track the progress of the plan and ensure that it is on track to achieve its goals. Intersectoral coordination has proven to be a key component of our efforts towards rabies elimination. A dedicated implementation plan needs to be rolled out with professional leadership to end painful suffering due to rabies.

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