Prevention & Control of Leptospirosis in India: Human Health Initiatives

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Abstract

Leptospirosis is a zoonotic bacterial infection caused by Leptospira, with 10 pathogenic species and 250 serovars. It is prevalent in tropical and sub-tropical regions, especially in areas with heavy rainfall or poor sanitation. Transmission occurs through contact with urine of infected animals like rodents, dogs, and livestock. Symptoms range from mild (headaches, muscle pain, fever) to severe (lung bleeding, meningitis). Environmental factors and occupational risks increase susceptibility. Annually, leptospirosis affects over 1 million people globally, causing around 60,000 deaths. In India, it is under-reported, with significant outbreaks in coastal regions. National Leptospirosis Control Programme has been established to strengthen surveillance and laboratory support.

Keywords: Leptospirosis, Prevention, Zoonotic

Background

Leptospirosis is an important zoonotic bacterial infection caused by the bacteria spirochete of the genus Leptospira. There are 10 pathogenic species with approximately 250 pathogenic serovars.(1) The disease occurs worldwide and the majority of the cases are reported from tropical and sub-tropical weather conditions. Usually, the outbreaks of leptospirosis are inclined to occur in endemic areas where there is a heavy rainfall or areas with flooding, especially affecting the zones with substandard housing and poor sanitation conditions.(2) The spread of leptospirosis infection is through animal urine or soil and water contaminated by animal urine. The disease can spread through direct contact with urine or tissue of infected animals (through skin abrasions, intact mucous membrane etc), indirect contact (broken skin with infected soil, water, or vegetation ingestion of contaminated food and water), and droplet infection (inhalation of a droplet of infected urine). The agents responsible for spreading this disease are rodents, dogs, wild animals and domestic animals. Signs and symptoms can range from none to mild (headaches, muscle pains, and fevers) to severe (bleeding in the lungs or meningitis).(3)

Environmental factors such as heavy rainfall, pH of soil and occupational risks to farmers working in agriculture lands, sanitary workers and animal health care workers, handlers, and veterinarians are at higher risk of being affected by Leptospirosis.(4)

Burden of Disease

A. Globally: It is estimated annually more than 10 lakh cases are being reported with almost 60,000 deaths per year.(5) The annual incidence for leptospirosis in South East Asia region is estimated to be approximately 2.7 Lakhs with 14,000 deaths. The incidence of leptospirosis in developing countries is 10-100/1,00,000 cases per year.(6) According to the study, roughly 290 million disability adjusted life years are lost globally each year (UIs 125–454 million) from approximately 103 million cases recorded in a year. The study also estimated that the highest burden for leptospirosis was found in tropical regions such as South and South east Asia, Western Pacific, Central and South America, and Africa.(6)

B.In India: India has one of the most important coastal, agro-ecosystems in the world, with an 8,129-kilometre coastline and abundant natural resources. India has one of the highest humans and domestic animal population with close interaction between them which is responsible for emergence of Zoonotic diseases.(7) Many new zoonotic diseases have emerged as a result of rapid ecological changes in the area over the last decade, resulting in epidemics that have caused considerable morbidity and mortality in humans. One of them is leptospirosis.

The distribution and occurrence rate of leptospirosis have changed in direct relation to changes in the eco-system. Wasteland reclamation, afforestation, irrigation, crop reforms, and agricultural technology have all played a role. The areas that would have stayed free of the infection have become potentially endemic zones as a result of man-

made or natural changes.[8] As per the estimate, India is expected to report 0.1-1.0 million cases per year [5], but less than 10,000 cases are reported.[9] Only four states i.e., Kerala, Gujarat, Tamil Nadu and Maharashtra report more than 500 cases per year as per IDSP Disease Alert. Andaman, Andhra Pradesh, Assam, Goa, Delhi, Karnataka, Odisha, Puducherry and Uttar Pradesh also report cases. Due to a lack of awareness of the disease and a lack of suitable laboratory diagnostic capabilities in most regions of the country, leptospirosis has been under-reported and under-diagnosed in India.[10]

Current Scenario

A. Leptospirosis Cases in India: Currently the leptospirosis cases are reported through IDSP programme as suspected case (By health centre), probable case (Medical Officers) and confirmed case (laboratory) during 12th Five Year Plan. To address the rising burden of the disease government of India launched the Programme for Prevention and Control of Leptospirosis (PPCL) as Central Sector Scheme under the Umbrella of NHM. Lately the confirmed cases are reported in 22 out of 36 states and UTs. Leptospirosis outbreaks were reported only in Coastal areas. However, with advancement of laboratory facilities cases are being reported from other areas too. The outbreaks of leptospirosis have been reported from coastal districts of Gujarat, Maharashtra, Kerala, Tamil Nadu, Andhra Pradesh, Karnataka, Andamans& Nicobar, Dadar & Nagar Haveli, Daman & Diu & Puducherry from time to time. In addition, the cases have been reported from Goa and Odisha. The high burden of disease has been reported from Andaman & Nicobar, Gujarat (4 districts affected) Kerala (14 districts affected), Maharashtra (4 districts and Mumbai city affected), Karnataka (9 districts affected) and Tamil Nadu (2 districts and Chennai city affected).[11]

Leptospirosis is also being reported from non-endemic states wherever facility for diagnosis of such cases exists. During last 5-year (2015-20) total 21046 laboratory confirmed cases and 291 deaths reported from affected states along with 57 outbreaks till 2020 with Case Fatality Rate in endemic states ranges from 0% to 7% over the years. Total of 114 Districts (10 States) are affected in India since 2017. On an average 4753 cases are reported every year for leptospirosis and with average of 83 deaths.

Heavy rains and floods in India have resulted in massive outbreaks. According to a study done in Kerala, the increase in leptospirosis infections coincides with the rainy season. The study reported that leptospirosis has a seasonal trend and with high incidence from June to October and correlates with the meteorological changes like rainfall, temperature, humidity etc in the region.[12] In tropical, subtropical, and temperate climates, leptospirosis can be present in both urban and rural areas. Massive outbreaks are caused by heavy rains and floods. Leptospirosis cases are directly proportional to rainfall, rendering it a seasonal disease in temperate climates and a year-round disease in tropical climates.[13,14] There is an increase in cases during summer and monsoon and rainy season (June to September).[15] This relationship has been also found in the study conducted in Philippines[16], Maharashtra,[13] Kerala .[17]

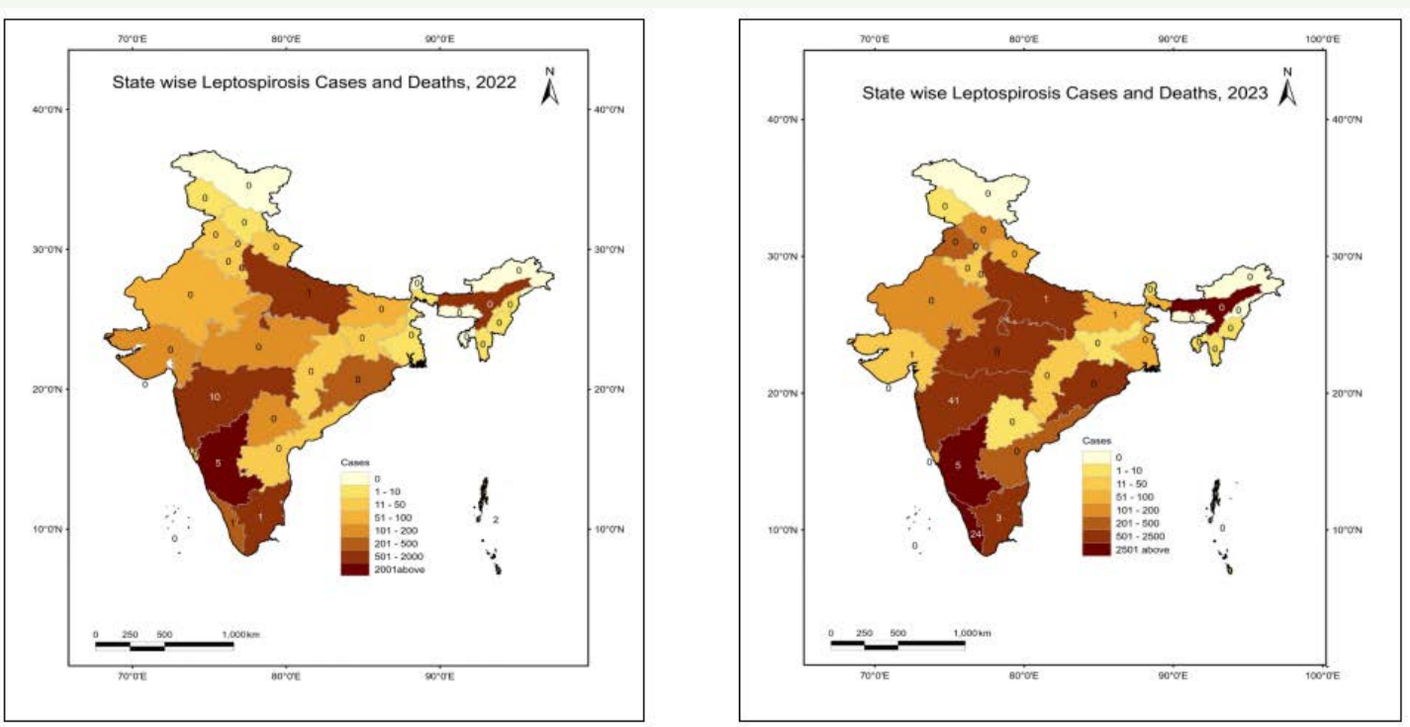

Figure 1: State wise Leptospirosis cases and deaths in 2022 and 2023

The prevalence of human leptospirosis has been documented in numerous states and UTs, intermittently or as epidemics, particularly during the rainy season in India. As a result, a public health programme for its prevention and control was required as part of the development of a comprehensive strategy for the control of all major infectious zoonotic diseases.

Programme for Prevention and Control of Leptospirosis

The objective to establish this Programme was to strengthen the disease surveillance and laboratory support so that the burden of disease must be monitored before and after intervention for control. National Centre for Disease Control has been designated as the Nodal agency for the implementation of the programme. Programme was implemented in the endemic states viz. Gujarat, Kerala, Tamil Nadu, Maharashtra, Karnataka and UT of Andaman &Nicobar Islands. Based on epidemiological analysis of IDSP data it was evident that cases are being regularly reported from States such as Uttar Pradesh, Assam, Goa and UTs of Dadra Nagar Haveli, Daman & Diu other than Programme states which were identified during 12th Five-Year Plan. Hence, Programme was expanded to include other 3 States and 1 UT. Currently the Programme is being implemented in 14 States/UTs (12 States and 2 UTs) in total 181 district.

Institutional Mechanism for programme implementation:
At Centre: The nodal ministry for the programme will be the Ministry of Health and Family Welfare. It is proposed to use the current NHM's mechanism of MSG & EPC for policy decisions. An existing National Technical Advisory Committee under the chairpersonship of DGHS to advise on all technical aspects of the programme.

The role of NCDC is to act as Coordinating Agency for implementation of Programme in the endemic states, release of funds to the programme states, training of core trainers – medical, paramedical and laboratory personnel, development of prototype IEC material, strengthening of diagnostic components, establishing inter laboratory quality control, monitoring and evaluation and periodic meetings to review the programme.

At State & district: The programme shall be implemented through the State Health Society. District Health Society will be the overall implementing agency for the implementation of the programme at the district level.

Following are the key strategies under the Programme:

A. Capacity Building - Trainings of health care professionals on case management, diagnosis, prevention, and control of Leptospirosis.

B. Strengthening of Surveillance activities for Leptospirosis-Leptospirosis surveillance is the key strategy for early detection and management of leptospirosis cases. It involves the collection of essential data to determine the leptospirosis situation, to monitor and evaluate the progress and impact of the intervention, to manage potential human exposures adequately, to calculate the cost-effectiveness of control efforts and to demonstrate absence and freedom of disease in a given area. The standard case definitions for leptospirosis surveillance through IDSP have been formulated.

C. Laboratory Strengthening for diagnosis of Leptospirosis in Humans- Diagnosis of Leptospirosis is vital for initiating prompt and appropriate infection control and public health measures. Early diagnosis can obviate the need for unnecessary treatment, medical tests. The programme provides financial support for the procurement of equipment and consumables to institutes which serve as Regional Reference Centre for Leptospirosis. Government Medical College Surat is being strengthened as Regional Leptospirosis Diagnostic Laboratory. The programme has also been successful in the creating diagnostics facilities/labs for confirmation of disease for rational treatment in endemic districts.

D. Advocacy for strengthening of patient management facilities- National Guidelines for Diagnosis, Case Management Prevention and Control of Leptospirosis (Year 2015) have been published under the programme and disseminated to States. In addition, detailed operational guidelines for ensuring implementation of prevention and control of leptospirosis also been circulated to States. Advisory has been issued from NCDC to States from time to time to undertake preventive measures, especially during monsoon season and flood events. States have also been provided guidelines on measures to be taken for chemoprophylaxis during outbreaks. States/UTs are also advocated through regular review meetings, field visits and through monitoring of programme to strengthen the patient management facilities especially for complicated cases of Leptospirosis as ICU facilities with ventilator support, dialysis etc.

E. Strengthening inter-sectoral coordination at State and district level for outbreak detection, prevention, and control of Leptospirosis-States are being advocated to undertake rodent control measures though State/municipal rodent control departments in endemic areas during each year before onset of monsoon in coordination with health department. Rodent control is part of intersectoral coordination and strategies for its

implementation lies with concerned stakeholders as mentioned in the guidelines. As on date approximately all states and UTs have formulated a state level zoonotic committee which has a member from Ministry of agriculture, veterinary institutes like IVRI, ICMR, CRI Kasauli, Wildlife Institute of India, etc. These state level zoonosis committees are entrusted to identify areas of collaboration with stakeholder's relation to zoonotic diseases, to oversee and monitor activities of joint technical working group and district level zoonoses committee, to issue guidelines and/or notifications as necessary on prevention and control strategies for zoonotic diseases etc.

F. IEC activities- To create awareness in general community for timely detection and appropriate treatment of patients it is proposed to create IEC prototypes (Audio & Video spots, pamphlet, poster etc.) and disseminate it through print and electronic media for wider dissemination. The IEC can be accessed on this link: https://ncdc.mohfw.gov.in/iec-material-on-zoonotic-disease/

Achievements under the Programme

The programme has made significant qualitative achievements such as:

A. Reporting of suspected and laboratory confirmed cases have increased over the years due to improved reporting mechanism, sensitization of officials and improved diagnostic capacity while case fatality rate has shown declining trend in the programme States and is under 15 % as per accepted standard (currently ranging from,0-7%).

B. State officials have now been sensitized to allocate the budget for Leptospirosis.

C. Health departments at state and district level have been advocated to collaborate with veterinary and agriculture department for rodent control and animal vaccination.

D. Technical support to states in terms of Guidelines for diagnosis case management prevention and control of Leptospirosis and Operational Guidelines, Prototype IEC material has been provided. Advisory is issued to States with heavy rain or flood affected areas and review meeting for sensitization and training of master trainers are carried out.

E. Prototype IEC material & Audio spots developed and disseminated to States.

F. Reporting formats finalized and aligned with the IHIP portal for improving real-time surveillance of Leptospirosis and Network of trained laboratory professionals has been created.

G. The programme states are given financial support through NHM PIP mechanism for activities like training, monitoring and surveillance, procurement of consumables and kits for diagnostic activities. The programme also supports financially in procurement of medicines as prophylaxis to control the infection.

H. As on date, all programme state has adequate stock of Doxycycline medicine.

Challenges Under the Programme

The programme had identified challenges such as large variety of serovars are circulating in animals, lack of trained manpower for diagnosis, inadequate coordination between the animal health and human health sectors, fragmented approach for leptospirosis control. Capacity Building- Training to laboratory staff, health workers, doctors need to be further strengthened in high endemic states. Intersectoral coordination between Animal Husbandry Department/Veterinary Department with the health department need to be strengthened. A central guideline for such collaboration needs to be evolved.

Conclusion

Leptospirosis is a disease with a high case fatality rate to the extent of 10 to 70% if left untreated. However, the mortality is preventable if detected and treated early with judicious use of chemoprophylaxis. There is an under reporting in the cases of leptospirosis in India and efforts are being undertaken to reduce this gap. As funds are being provided to the states from the financial year 2019-20, reporting is expected to improve over the next 2-3 years. Joint initiative of medical and veterinary department for outbreak prevention, risk mitigation, demarcation of high-risk spots is planned to further strengthening the Programme. The Programme is planning to conduct Reassessment of Endemicity of the states with respect to Leptospirosis and restructuring of the Programme by reprioritization of states based on endemicity of the states. It was also recommended by the NTAC- Meeting that Leptospirosis programme must be expanded in other States & UTs which are regularly reporting the Leptospirosis cases and these States and UTs will be supported through NHM. Intensive IEC and training of health care professionals needs to impart in all States. Emphasis needs to be given for early diagnosis, standard case management in Programme States.

In conclusion, Preventive efforts should be strengthened by using a multidisciplinary strategy that considers environmental factors as well as animal and human populations in order to limit the number of cases of

leptospirosis. Protective clothing and knowledge of climate-related drivers (floods, rainfalls) may help to limit the number of human cases. All precautions should be taken to protect individuals who are at risk. Early detection and treatment may help to lessen the severity of the condition as well as the number of hospitalizations and expenditures connected with them.

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Conflicts of Interest

No conflict of interest.

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