

## THE SILENT BITES: A WAKE-UP CALL FOR RABIES AWARENESS

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### ABSTRACT

Rabies is an acute, progressive, and fatal zoonotic disease caused by viruses of the genus *Lyssavirus*. The disease primarily spreads to humans through the bite of infected animals, most commonly dogs, and continues to cause tens of thousands of deaths annually, especially in Asia and Africa. Despite the availability of effective vaccines and post-exposure prophylaxis (PEP), rabies persists as a major public health problem due to poor awareness, limited access to healthcare, and inadequate vaccination coverage of reservoir hosts. Advances in diagnostic methods, modern vaccines, and monoclonal antibody therapies are contributing to better prevention and control. The adoption of a coordinated One Health approach, emphasizing mass dog vaccination, timely human prophylaxis, and community education, is essential for achieving the global goal of rabies elimination.

**KEYWORDS:** Rabies, PEP, One Health, Prevention and Control

### INTRODUCTION

Rabies, a viral zoonotic infection, is categorized among the 'Neglected Tropical Diseases (NTDs)' by the World Health Organization (WHO). In nearly 99% of human rabies cases, dogs act as the primary source of transmission. Children aged between 5 and 14 years are often the most affected group. The disease can infect a wide range of mammals such as dogs, cats, livestock, and wild animals. Geographically, Asia and Africa suffer the greatest burden—together contributing to more than 95% of global rabies deaths. Asia records approximately 35,000 deaths annually, while Africa accounts for about 21,000, the majority linked to dog-mediated rabies. Although estimates of human fatalities vary—ranging from 14,000 to 55,000 or even up to 74,000—less than 1,500 of these cases are officially reported each year. Nevertheless, rabies remains a disease that can be completely prevented through prompt administration of post-exposure prophylaxis (PEP) in humans, improved community awareness to reduce risks, and large-scale vaccination of dog populations.

### RABIES

Human rabies, often referred to as 'Hydrophobia' due to the characteristic fear of water observed in affected individuals, represents one of the oldest known zoonotic diseases. The earliest recorded mention of rabies is traced back to the pre-Mosaic Eshmun code of Babylon, dating to the twenty-third century BC. The rabies virus belongs to the order *Mononegavirales*, a group defined by viruses with non-segmented, negative-sense RNA genomes. Within this order, it is placed under the genus *Lyssavirus* of the family *Rhabdoviridae*, which is distinguished by its strong neurotropism, frequently resulting in fatal consequences.

### HOW RABIES IS TRANSMITTED

#### Animal Bites (Most Common Route)

The leading mode of transmission is through the bite of a rabid animal, where infected saliva is directly introduced into tissues.

#### Direct Contact with Body Fluids

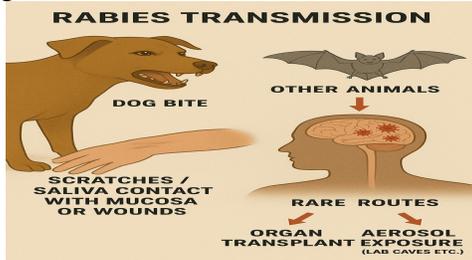
Rabies exposure takes place when saliva, cerebrospinal fluid, tears, or nervous tissue from a suspected or confirmed rabid animal/person comes in contact with open wounds, transplanted tissues, or mucous membranes.

### Contamination of Wounds

Another frequent pathway occurs when virus-laden saliva enters through scratches, abrasions, or existing wounds on the skin.

### Airborne Transmission (Rare)

In exceptional situations, rabies infection has been reported after inhalation of aerosolized virus particles—most commonly in laboratories handling live virus or inside caves inhabited by large bat colonies.



### CLINICAL SIGNS

The incubation period is normally 4-8 weeks, but can range from 5 days to 7 years. Bites to the face, neck, and head are more likely to cause a quick incubation time.

Rabies developments in five different stages: 1) Incubation, 2) Prodrome, 3) Acute neurologic period, 4) Coma, 5) death.

#### Incubation Period

- It usually lasts 3–12 weeks, but in some cases may be as short as 5 days or as long as over 2 years.
- The closer the bite is to the brain, the faster symptoms are likely to develop.

#### Prodrome Stage

- Early, flu-like symptoms start to show.
- Common signs include:
  - Fever ( $\geq 38^{\circ}\text{C}$  /  $100.4^{\circ}\text{F}$ )
  - Headache, body weakness, feeling unwell
  - Anxiety, irritability, or mood changes
  - Sore throat and cough
  - Nausea, vomiting, and stomach upset
  - Tingling, pain, or discomfort at the bite site (very characteristic)
- This stage lasts 2–10 days, with symptoms gradually worsening.

#### Acute Neurologic Phase

- This is the most dramatic stage with severe nervous system involvement.
- Key symptoms include:
  - Confusion, disorientation, and agitation, partial paralysis or muscle weakness, involuntary muscle twitching, neck stiffness, spasms, difficulty breathing,

hyperventilation, excessive salivation, sometimes with foaming at the mouth. **Hydrophobia (fear of water)** – due to painful spasms when trying to swallow hallucinations, nightmares, insomnia, priapism (persistent erection in males), sensitivity to light (photophobia)

- At this point, the disease rapidly worsens.

#### Coma Stage

- The patient may fall into a deep coma.
- Breathing becomes irregular and may stop without a ventilator.
- Once coma develops, death usually follows within hours to days.

#### Death (Rare Recovery)

- Almost all patients die once they reach this stage.

### PREVENTION AND CONTROL

#### Human vaccination

Includes pre-exposure (for high-risk groups like vets, wildlife workers, dog catchers) and post-exposure schedules.

#### Bite management

Wash and flush the wound immediately, followed by PEP and local infiltration of Rabies Immunoglobulin (RIG).

#### Vaccine development

Progressed from Pasteur's early treatment to advanced cell culture vaccines.

#### Dog vaccination

Controlling rabies requires vaccinating ~70% of dogs, though in some areas 35% coverage may suffice.

#### Public health education

Key measures include awareness programs, responsible pet ownership, routine vet care, and avoiding contact with wildlife.

#### Domestic animal control

Includes vaccination and licensing, stray control, reporting and isolating bite cases, and public education.

#### Stray animal management

Stray dogs, cats, and ferrets should be impounded for at least 3 days to check for exposure and allow owner claims. Owned pets should have IDs and be leashed.

#### Isolation of exposed animals

Any unvaccinated animal exposed to rabies should be considered infected. Unvaccinated livestock (like cattle and horses, commonly affected) should be euthanized.

#### Wild animal rabies control

Prevent human and domestic exposure by limiting wildlife contact. Public education and use of oral rabies vaccines (ORV) for wildlife (via bait) can help control spread in certain areas.

**Post-exposure prophylaxis (PEP)**

Timely PEP in humans and mass dog vaccination help break the transmission cycle.

**Table 1:** Categories for Post-Exposure Prophylaxis (PEP)

Category of Contact	Description	Post-Exposure Prophylaxis (PEP) Measures
Category I	Touching or feeding animals, animal licks on intact skin (no exposure)	Wash exposed skin, no PEP required
Category II	Nibbling of uncovered skin, minor scratches or abrasions without bleeding (exposure)	Wash wound and immediate vaccination
Category III	Single or multiple transdermal bites or scratches, contamination of mucous membrane or broken skin with saliva, direct contact with bats (severe exposure)	Wash wound, immediate vaccination, and administer rabies immunoglobulin/monoclonal antibodies

**Do's After a Rabid Dog Bite**

- Immediate wound washing
- Clean the bite or scratch thoroughly for at least 15 minutes.
- Use soap and running water; if available, apply povidone-iodine or another antiseptic.
- This helps reduce the number of viral particles at the site.
- Visit a doctor or healthcare facility without delay.
- Do not wait for symptoms to appear, as rabies is nearly always fatal once they start.

**How to Prevent Yourself**

1. Observe all wild animals from a distance. Rabies: wild animals may look docile, but don't get close to them.
2. Teach children to never touch wild or stray animals or animals they don't know, even if these animals seem friendly.
3. Never keep wild animals as pets. Wild animals may cause injury or spread diseases such as rabies to caregivers, other people, and domestic animals.
4. Report potential rabies wild animals to the relevant authorities
5. Do not touch the bat with bare hands.

- **Quarantine & diagnosis:** Outbreak control begins with confirming rabies diagnosis and quarantining affected areas. The state veterinarian defines the vaccination zone.
- **Large-scale vaccination:** First response in high-risk areas; aim to vaccinate  $\geq 70\%$  of animals quickly. If not possible, conduct multiple campaigns within a year.
- **Cordon vaccination:** Creates an immune barrier (20–30 km wide) around rabies-free zones, borders, and wildlife reserves to prevent reinfection.
- **Ring vaccination:** When a single case appears, vaccinate  $\geq 70\%$  of dogs within a 20–30 km radius to contain spread.
- **Door-to-door vaccination:** More costly and time-consuming but ensures better coverage. Example: 1998 campaign in Mpumalanga vaccinated 6,498 dogs in 30 villages.
- **Central-point vaccination:** Annual or routine drives where owners bring pets to set locations. Coverage (20–80%) depends on planning, publicity, and timing after outbreaks.
- **Oral vaccination:** Wildlife rabies control using bait vaccines (e.g., SAG2). Successfully applied in Europe and tested in South Africa.

**Rabies Control Strategies**

**VACCINES AND VACCINATIONS**

Vaccine type	Characteristics	Route of administration	Target population
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Inactivated rabies vaccine	The rabies virus is inactivated via various chemical	Intramuscular injection	Human and animal
Live attenuated rabies	It is a less virulent form of rabies, but still capable of replication in host cells	Intramuscular injection or oral administration	Primarily, animals and humans are still in some parts of the world,
Recombinant-vectored vaccine	Contains attenuated vectors expressing the rabies virus glycoprotein	Intramuscular injection or oral administration	Animals and humans are restricted to clinical trials

### Pre-exposure prophylaxis:

Pre-exposure prophylaxis, or PrEP, is a safe vaccine that can be given to children either alone or in combination with other vaccinations. In order to prime the patient's immune system, the PrEP vaccine series consists of three intramuscular or intradermal injections, which are given on days 0, 7, and 28 according to a regular schedule. In the event of a rabid animal bite, this vaccine aims to enable the immune system to demonstrate recall when exposed to the virus.

### Postexposure Prophylaxis

In order to minimize disruption for patients who frequently travel large distances for treatment, the WHO recommends both ID and IM immunization regimens. The vaccination should be given in various locations and limbs for multisite regimens.

The following are the regimens for patients with normal immunological function:

- On days 0, 3, and 7, a 2-site intradermal was given.
- Days 0, 3, 7, and 14–28: 1-site instant messaging (Essen regimen, same as United States regimen).
- Day 0: 2-site IM; Days 7 and 21: 1-site IM (Zagreb regimen)

### CONCLUSION

In India, a significant public concern is the management of rabies, a zoonotic virus illness. In India, the development of more affordable rabies vaccine techniques for both humans and animals is essential to preventing and controlling the disease. With the cooperation of national and international health agencies, various rabies control initiatives were started in a separate state. Also, everyone in the community needs to be informed about rabies. The One Health idea is crucial to India's rabies prevention and control efforts.

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