THE SCIENCE WORLD
A Monthly e Magazine
ISSN:2583-2212
Jan 2024 Vol.4(1), 170-174

Popular Article

Oral Rabies Vaccine Opportunity and Challenges

[1]Pushpendra Baghel, [2]Pankaj Dhakarwal

[1]M.V.Sc. Scholar, Department of Veterinary Microbiology, Indian Veterinary Research Institute, Izzatnagar, Bareilly (U.P.), India

[2]Ph.D. Scholar, Department of Veterinary Microbiology, Indian Veterinary Research Institute, Izzatnagar, Bareilly (U.P.), India

https://doi.org/10.5281/zenodo.10496251

Abstract

Oral rabies vaccine (ORV) mostly used for wildlife, which causes barely human deaths but wild animals are responsible for transmitting rabies to dog. For getting rid of rabies from dog, we can use ORV as additional tool with parenteral vaccination. ORV have some advantages (No need to restrain the animal, elicit mucosal immune response, less laborious) over conventional vaccine, which we can explore to eliminate rabies caused by dog population. Modified live and vector-based vaccines are used for ORV purpose. The world is leading progressively toward zero human dog-mediated rabies fatalities by 2030 in which India plays a crucial role because India is responsible for almost one third of the rabies deaths. ORV can play a pivotal role in achieving it.

Keywords: Bait, Live modified vaccine, Oral Vaccine, Rabies, Vector based vaccine, Wild animals

Introduction

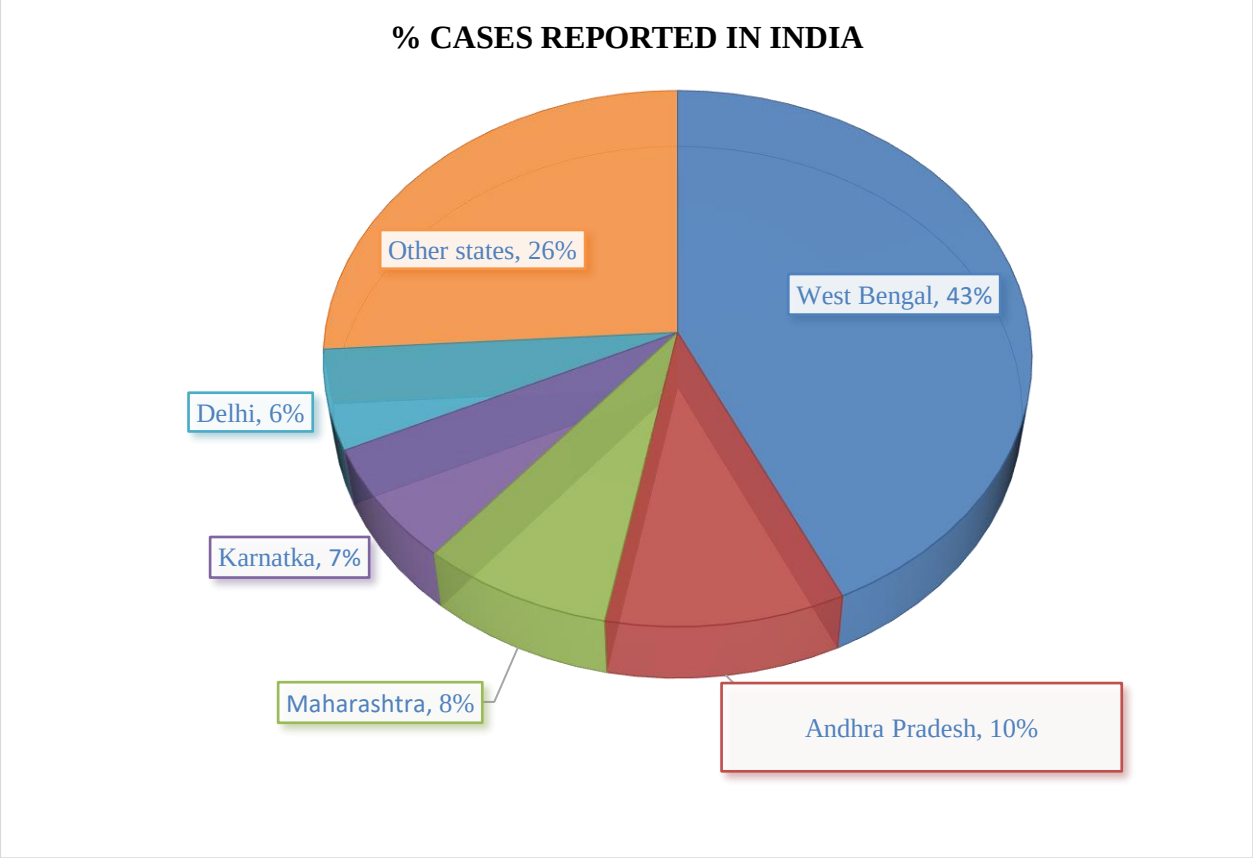
Domestic dogs are the most dangerous rabies reservoir species which raise the concern to global public health. Around 59,000 human rabies deaths worldwide happen each year, almost all of which are caused by domestic dogs. In 2015, the globe called for action by establishing a global target of zero human dog-mediated rabies fatalities by 2030. The World Health Organisation (WHO), the World Organisation for Animal Health (OIE), the Food and Agriculture Organisation of the United Nations, and the Global Alliance for Rabies Control launched the Global Strategic Plan in 2018 for the global elimination of dog-mediated human rabies deaths by 2030, which represents the first major effort to eliminate a classical zoonosis and poses unique challenges not encountered during previous disease elimination efforts. The

Published 12.01.2024

fragrance, taste, texture, and size of the ORV sachet are all likely to have a role in palatability and chewing to perforate the vaccine sachet. Vaccine sachet should release from bait during chewing for proper immunization.

Indian Statistical data on Rabies

India is believed to be responsible for 35% of global human rabies deaths, resulting in approximately 21,000 deaths per year and a 2.3 billion USD annual loss due to premature death, bite treatment, lost labour, livestock losses, and post-exposure prophylaxis. India has created a national strategy to eliminate rabies National Rabies Control Programme (NRCP) by 2030. Between 2005 and 2020, the National Health Profile (NHP) reported a total of 2863 rabies cases in India, with five states accounting for over seventy per cent of the overall burden (Graph 1). Human rabies is notifiable in India in 2021, ensuring accurate rabies incidence data, which is critical for developing and carrying out effective prevention and control strategies. Deaths outside of medical settings and a predilection for traditional healers for treatment could account for significant underreporting. To address these data restrictions, India has created an integrated health information platform (IHIP) to collect real-time data using mobile applications.



Graph 1, Data from the (NHP), a collection of state-by-state monthly health condition survey between 2005 and 2020

Published 12.01.2024

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

Types of ORVs

Type	Vaccine strain	Vaccine name & Manufacturer	Species	Countries in which distribution took place (Wildlife)	Countries in which dog trials have taken place
Modified Live (1st generation)	SAD Bern	Lysvulpen, Bioveta, Czech Republic	Red fox, racoon dog	Europe	Tunisia
	SAD B19	Fuchsoral, Ceva, France	Red for	Europe	Philippines
	RV-97	Sinrab, FGBI ARRIAH, Russia	Racoon dogs	Kazakhstan, Ukraine, Belarus, Russia	-
	VRC-RZ2	Kazakhstan laboratory	Corsac fox, steppe, wolf	Kazakhstan	Kazakhstan (laboratory)
	KMIEV-94	Institute of Experimental Veterinary, Belarus	Red fox	Belarus	-
Modified Live (2nd generation)	SAG 2	Rabigen Virbac, France	Red fox, racoon dog	France, Switzerland, Finland, Estonia, Italy, Germany, Belgium	India Tunisia Morocco
Modified Live (3rd generation)	SPBN GASGAS	Rabitec Ceva, France	Red fox, racoon dog	Germany	Haiti
	ERA G333	Prokov, Russia	Red fox, racoon dog	Russia	-
Vector based (Vaccinia virus)	V-RG	Raboral V-RG Boehringer Ingelheim, Germany	Racoon, coyote, grey fox, red fox, golden jackal, racoon dog	USA, Canada, France, Belgium, Luxembourg, Ukraine, Isarel, South Korea	Sri Lanka USA (laboratory)
Vector based (Adenovirus)	AdRG1.3	ONRAB Artemis Technologies Inc., Canada	Striped skunk, red fox, racoon	Canada, USA	USA (laboratory) China (laboratory)

Published 12.01.2024

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

Why dog require ORVs in India

To Develop Herd Immunity in Remote Population

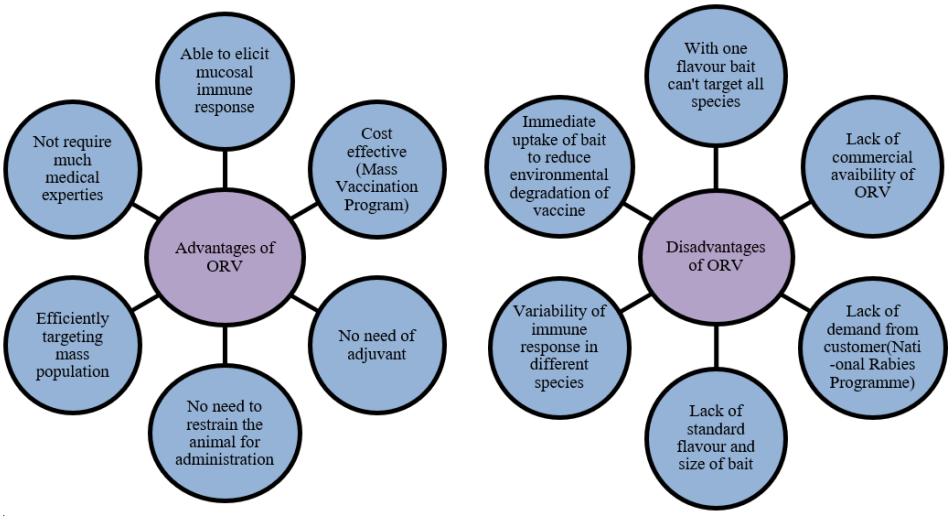
Main threat of rabies is by street dog population in India and capture-vaccinate-release strategy is used mostly to vaccinate them but due to various challenges unable to do mass vaccination, results in difficulty to achieve herd immunity.

For Competing Priorities in Dog Population Management

ORV would allow the vaccination of difficult-to-capture dogs without the need of handling, allowing for the intensive annual vaccination of stray populations without compromising the ability to capture dogs, which can be captured later for surgical sterilisation as part of dog population management efforts.

ORVs of Dogs

The successful vaccination of dogs using ORV, as in wildlife species, needs a bait construct designed to maximise the uptake and dissipate the vaccine suspension in the oral cavity. Baits that are ingested without perforating the sachet will not be immunised. Egg-based bait constructions were found to have high rates of absorption and perforation in studies conducted in India, Bangladesh, and Thailand. Egg-based bait structures also have the advantage of being culturally acceptable and having the ability for mass manufacture with minimal manufacturing skills. For the delivery of ORV in urban areas, the oral-bait-handout technique has been described. In this strategy, a vaccination team of two persons riding a bike can concurrently administer parenteral immunisation to dogs that can be handled for injection while also distributing baits to dogs deemed unhandy. Baits are thrown from a safe distance to canines chosen for ORV, taking care not to shock the dog. The vaccination crew observes the dog while the bait is consumed, and any unconsumed baits, vaccine packing, and bait leftovers are collected and disposed of carefully.



Published 12.01.2024

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

Conclusion

Despite having some disadvantage of ORV still need of hours is to introduce ORV as supportive with parenteral conventional vaccine to target wild animal and street dog. Although the goal of global elimination of human deaths from dog-mediated rabies by 2030 was just recently established, in this context ORV can play a vital role as a complementary tool. Although the goal of 2030 will require a comprehensive approach to improve surveillance, human postexposure prophylaxis, dog vaccination and dog population management, and awareness programs, the goal will be more feasible if all tools at our disposal are fully used. Perhaps the most underused of all tools in the fight against rabies is ORV of dogs. Although ORV can play a vital role as a complementary tool in the global elimination of dog-mediated human rabies deaths, and specific recommended activities should be pursued urgently to promote safe and cost-effective use of ORV.

References

1. Rubeshkumar, P., Majella, M. G., Jahan, N., Sakthivel, M., & Krishnamoorthy, Y. (2023). Secular trends of rabies in India, 2005–2020: importance of surveillance and implications for elimination strategies. *The Lancet Regional Health-Southeast Asia*.
2. Wallace, R. M., Cliquet, F., Fehlner-Gardiner, C., Fooks, A. R., Sabeta, C. T., Setién, A. A. & Müller, T. (2020). Role of oral rabies vaccines in the elimination of dog-mediated human rabies deaths. *Emerging infectious diseases*, *26*(12).
3. Yale, G., Lopes, M., Isloor, S., Head, J. R., Mazeri, S., Gamble, L. & Gibson, A. D. (2022). Review of oral rabies vaccination of dogs and its application in India. *Viruses*, *14*(1), 155

Published 12.01.2024