

## Can Immunization be an Effective Tool in Rabies Control?

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Rabies is an ancient classic, dreadful, agonizing and terrifying direct anthroponosis with fatal consequences both in humans and animals. It remains a major public health concern in the world, as it takes the life of over 55,000 people each year, and over 95% of human deaths are recorded in Africa and Asia. It is estimated that over 3 million Asians are bitten by rabid animals each year. In India alone, the death toll due to rabies is more than 25,000 people annually. The name rabies comes from the Latin word *rabidus*, which means mad, and also derived from the Sanskrit root *rabhas*, meaning to do violence. The disease is caused by rabies virus, a bullet shaped neurotropic RNA, which belongs to genus *Lyssavirus* and family *Rhabdoviridae*. The history of rabies goes back to year 1804 when Zinke succeeded to transmit the disease in healthy dogs by inoculating saliva from the rabid dogs. In the year 1821, Magendie and Breschet proved that saliva from a human patient can infect dogs, and thereby, the virus has the potential to cause disease in man and animals. Subsequently, Louis Pasteur, a French Biologist, Microbiologist and Chemist, conducted a series of experiments from 1881 onwards, and established that rabies virus was present in the brain of infected animals. He developed rabies vaccine from nervous tissues of infected rabbits, and in 1885, Pasteur used his first vaccine on a 9-year-old child, named Joseph Meister who was severely bitten by a rabid dog. A course of 13 injections was given and child could survive from rabies. The successful use of rabies vaccine to save the human life became a milestone in the field of vaccinology. Later, in 1919, Semple produced a phenol treated rabies vaccine. The rabies vaccination of animal was started in 1921.

Rabies is an acute, rapidly progressive fatal viral zoonosis, which is known to mankind for over 4000 years, and is transmitted by the bites of rabid animals. Disease is prevalent in about 150 countries of the world except Antarctica, Australia, Japan, Singapore and Maldives. Rabies is endemic in India but small islands such as Lakshdeep, Andaman and Nicobar are free of rabies. Dog is the principal transmitter of disease, as it accounts for more than 95 % cases of human cases. Several other animals such as fox, bat, raccoon, shunk, mongoose, shrew, bandicoot, wolf, and jackal can also act as reservoir of rabies virus. About 80% of rabid animals are found in rural areas.

Vaccination plays a pivotal role to check the disease transmission and thus helps in the prevention, control and eradication of infectious disease. It is important to mention that 45,000 pet dogs were vaccinated in four days time in Houston, USA to control rabies. It was very encouraging that in ten months period, rabies was eliminated from the area. Further post- exposure vaccination in case of suspected rabid dog bites also reduces incidence of rabies in humans as well as animals. Since the first rabies vaccine invented by Pasteur, several types of vaccines such as neural vaccines (Semple vaccine, Infant brain vaccine, Beta propiolactone (BPL) vaccine and non-neural vaccines (Live attenuated chick embryo vaccine, Duck embryo vaccine, Tissue culture vaccine from human diploid cell strain, Subunit vaccine) are developed. These vaccines can be used before exposure and also after exposure. Prophylactic vaccination is recommended for dog handler, animal attendant, veterinarian, kennel worker, laboratory personnel, hunter and cave explorer. In advanced countries, the neural and duck egg vaccines are replaced by cell culture vaccines for humans and animals. It is advised that antirabic vaccine should be administered when a person is bitten, scratched, licked by an animal that cannot be apprehended. The dosage of vaccine depends on the degree of risk the patient is exposed. Oral immunization is carried out in Europe to control rabies in wildlife. Can we plan to develop single dose oral vaccine that can confer lifelong immunity both in humans and animals? According to WHO, vaccination coverage of 70% of canine population can effectively reduce rabies transmission and prevent human rabies. Despite the fact that potent vaccines are readily available, rabies still carries a high fatality rate mainly due to high cost of vaccines and easy accessibility of post exposure prophylaxis in many poor resource counties. The Government in developing nations should allocate more funds and provide modern technology for the production of tissue

culture vaccine or sub-unit vaccine of rabies. Hence, it is emphasized that attempts should be directed to develop safe, effective and low cost single dose vaccine that can be easily affordable by poor resource nations to immunize the humans as well as animals to control this life threatening viral zoonosis from the globe.

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