

Adopt a village, rural rabies prevention project: A 'one health' experiment in India

M K Sudarshan^{1*}, D H Ashwath Narayana¹, N R Ramesh Masthi¹, M L Satyanarayana², Praveen Kulkarni¹, S N Madhusudana³, B.C. Ramakrishna⁴, Gangaboraiah¹

¹Department of Community Medicine, Kempegowda Institute of Medical Sciences, Bangalore, 560 070, India.

²Department of Pathology, Veterinary College, Hebbal, Bangalore, 560 024, India.

³Department of Neurovirology, National Institute of Mental Health and Neurosciences, Bangalore, 560029, India.

⁴Karuna animal welfare organization, Veterinary college campus, Hebbal, Bangalore, 560 024, India.

**Corresponding author: mksudarshan@gmail.com*

ABSTRACT

Aim: To assess the feasibility of implementing "one health" to prevent human rabies and control animal rabies in a rural community in India.

Study design: Health services research in a rural setting.

Place and duration of study: A medical college and a veterinary college along with an animal welfare organization delivered a wide array of "integrated services" in three villages viz. Kumbalagodu, Thagachikuppe and Gerupalya near Bangalore, India comprising of 10,220 population for a period of two years from December, 2009 to November, 2011. The nearby three villages of Ramohally, Vinayakanagara and Bhimanakuppe with a population of 6,023 formed the control group, with no intervention.

Methodology: This consisted of baseline and end line surveys; rabies awareness campaigns; clinical and laboratory surveillance; rabies post-exposure prophylaxis (PEP) in humans; pre-exposure rabies prophylaxis (PrEP) by intradermal route in school children and others; mass dog vaccination and deworming; and sero-surveillance.

Results: The veterinary : medical manpower was 1: 11; dog : man ratio was 1: 23. The information, education and communication materials developed and used were outdoor wall

paintings (11), indoor annual wall calendar (2000), school book labels (1000); game charts(16); wall posters(65); training aid (15) ; rabies educational DVD(1). Twenty four volunteers and 370 school children were educated about rabies and its prevention. There were 102 local cable television transmissions on rabies prevention. The incidence of animal bite was 19 per 1000 persons per year and 69 people received rabies PEP. PrEP was given to 368 school children and others. Sixty one human serum samples were analyzed by rapid fluorescent focus inhibition test. Sixteen veterinarians and others were trained to use direct rapid immunohistochemical test for rabies diagnosis and the same was used to confirm 6 animal deaths in the field. There was no case of human rabies during the project period. The total economic cost of the project was 2.7 times more than financial cost.

Conclusion: A blend of integrated medical and veterinary services including animal welfare could be delivered through a "one health" approach. Based on this success a "system model" is evolved to propagate its replication in other rural communities across the country.

Key words: rabies, prophylaxis, dog vaccination, surveillance, one health, health services research, system model

1. INTRODUCTION

Rabies is a zoonotic disease caused by a RNA virus and usually transmitted to man following the bite of a rabid animal. The disease is almost always fatal both in man and animals as there is no cure once the signs and symptoms appear. The animals involved in the transmission of rabies include dogs, cats, mongoose, foxes, ferrets, raccoons, skunks, wolves, bats and other mammals. In India, the most common vectors are the dogs (96%), cats (2%) and others (2%) like mongoose, foxes, etc(1). India has the highest burden of human rabies deaths of 20,000 (36%) annually of the global incidence of about 55,000 (2) and about 17 million animal bites each year (3). In Asia, Thailand, Philippines and Sri Lanka have successfully reduced the burden of human rabies and controlled dog rabies by effectively integrating medical and veterinary services popularly known as "one health approach "(4). But in India there is very little "cooperation and coordination" between medical and veterinary services. Besides there is no system or mechanism for integrating the two sectors for prevention and control of this disease. There are two separate ministries, one for preventing rabies in humans' viz. public health and the other for controlling rabies in animals' viz. agriculture and animal husbandry. Also rabies is a neglected disease, i.e. a disease of low priority both in public health and veterinary sectors. The

other impeding factors include vastness of the country and the three tier system of governance i.e. Central or Federal Government, State or Provincial Government and local self government i.e. in urban areas Municipalities or Civic Corporations and in rural areas known as ZillaParishats (ZP). Besides mythology, historically and socio- culturally dog is a much loved animal and also revered in some communities! Hence, attempts to control the ever growing dog population have not been successful. However, recently from 2007 to 2011 a "National Pilot Project on Human Rabies Prevention" was implemented by Government of India in five cities which attempted to bring together both medical and veterinary sectors for preventing the disease in humans(5). In this background, it was considered necessary to do a "health services research "(6) and demonstrate "a model" in a rural area of India to prevent rabies in humans and control it in dogs through integration of medical and veterinary services including animal welfare. Hence, this "one health" experiment was conducted in three villages, near Bangalore , Karnataka, a southern state of India.

2. MATERIAL AND METHODS

A medical college, a veterinary college including an animal welfare organization came together for this purpose. The Department of Community Medicine, Kempegowda Institute of Medical Sciences and Department of Pathology of Veterinary College, Bangalore along with "Karuna" an animal welfare organization (AWO) integrated for this project work. The project was implemented in three villages vizKumbalagodu, Thagachikuppe and Gerupalya comprising of 10,220 population for the duration of two years from December, 2009 to November, 2011. The nearby three villages viz. Ramohally, Vinayakanagara and Bhimanakuppehaving a population of 6,023 formed the control group, with no intervention.

The activities were conducted over a two years period from December, 2009 to November, 2011. The core project team comprised of two faculty members from medical college, a medical officer and field staff; from veterinary college, a faculty member and a veterinarian and from the AWO, a veterinarian and field staff.

The various community level activities conducted include live stock census, base line & end line door to door household surveys; training and orientation of formal and informal village leaders, women self help groups, medical and veterinary personnel, school teachers and others; development of socio-culturally acceptable rabies information, education and communication (IEC) materials like posters on rabies post-exposure prophylaxis (PEP), responsible pet ownership, training aid for village level volunteers, chart on snake and ladder game, indoor annual wall calendar, school book label, outdoor wall painting, rabies video and its transmission

through cable television net work, use of folk dance, public rallies, drawing competitions in schools; providing rabies pre-exposure prophylaxis (PrEP) by intradermal route and its sero-surveillance ; PEP through both intradermal(ID) and intramuscular(IM) routes as feasible; clinical and laboratory surveillance for rabies in animals and humans, training of veterinarians in rabies diagnosis using direct rapid immunohistochemical test(dRIT) ; animal welfare work consisting of mass dog vaccination, collaring, deworming and sero-surveillance. The project was periodically monitored by both national and international observers.

3. RESULTS AND DISCUSSION

An overview of activities done under the project is shown in table-1. It was found that the veterinary manpower as compared to medical manpower, in the ratio of 1:11 was grossly inadequate. The live stock of cow, buffalo, sheep and goat in the community are known hosts of rabies in the region and dogs & cats the common vectors of the disease. The dog: man ratio of 1:23 was more as compared to national figures of 1: 36 (3) . This made the people more prone to dog bites and consequently an higher incidence of animal bite in the project villages.

The rabies IEC materials were developed based on the results of baseline survey and socio-cultural acceptance. The outdoor wall paintings depicting the message of rabies and its prevention were done with the consent of the head of the household on the walls of those houses that are strategically located giving a clear view to the community for easy readability. The indoor domestic annual wall calendars having 12 pages one for each month are popular in the villages. These calendars generally display the day, date, list of important local festivals, events, etc for every month. Such calendars were specially printed having twelve rabies education messages one for each month. One calendar was provided to each household. The rabies prevention messages were effectively communicated through these calendars to household members.

The school children have a set of books to use for one year and each book on the front cover has a self adhesive label which provides for writing the name, class and other details of the pupil. Such labels were printed with an additional message of rabies prophylaxis and given to school children through their teachers in the class rooms. Similarly, the snake and ladder chart is a popular indoor game which is played with dice; the snakes represent the "bad practices in rabies prevention" and the ladder "good practices in rabies prevention". The school children learnt about rabies prevention while playing snake & ladder game.

The thick paper board wall posters having rabies prophylaxis messages were fixed at strategic places in the community halls, schools, health centres, grocery shops, etc and were a good source of rabies information to the community. After training village level volunteers in rabies prophylaxis a well designed and tested rabies education aid was provided to them for educating the community. The educational sessions on rabies conducted in the schools not only benefitted the students but also the teachers. The drawing competition held in the schools at the start & end of the project on the theme of "Rabies prevention" was successful in improving the awareness. A documentary video film (DVD) on rabies in local dialect (Kannada) prepared by Rabies in Asia Foundation was shown in the schools and also through local cable television network for community education. The folk dance was another popular medium used for improving community awareness about rabies and its prevention. The two world rabies days (WRDs), 28th September, of 2010 and 2011 were successfully used to hold public rallies and other rabies awareness activities in the villages.

The training of veterinarians, village level volunteers and others on rabies prophylaxis held in separate batches was quite successful. This subsequently ensured timely and appropriate rabies PEP in the community which was confidence building and reassuring. The PrEP was provided to school children using Injection Rabipur (purified chick embryo cell vaccine) by ID route .This was found to be safe and immunogenic. (7).

The animal welfare campaign for responsible pet ownership, dog collaring, mass dog vaccination and deworming were well received. Mass vaccination of dogs in the community was done using Injection Nobivac R(Inactivated rabies vaccine). Mass deworming was done by using Tablet Plozin (Praziquintel 50mg, Pyrantelpamoate 144mg & Fenbendazole 500mg) orally for owned dogs and injection Ivermectin (0.5ml for puppies & 1 ml for adults) subcutaneously for stray dogs. To assess the immunogenicity of this vaccination the sera samples of the dogs were tested for antirabies antibody using RFFIT. This was found to be immunogenic following annual booster dose.

The animal welfare campaign for responsible pet ownership, dog collaring, mass dog vaccination and deworming were well received. Presently, many veterinary institutions in India for laboratory diagnosis of rabies still routinely use "seller's stain" and demonstrate "Negri bodies" in the brain of the suspect animal. In this project, for the first time the local veterinarians were trained to use dRIT, a simple field based test developed by CDC, Atlanta, USA, for diagnosis of rabies in animals (8). Later the test was successfully used for diagnosing rabies in

six large animals in the field. Incidentally, there was no case of human rabies during the project period.

Following implementation of various public health and veterinary activities there was a significant improvement in the knowledge, attitude and practices (KAP) of people on rabies prevention in the study villages as compared to the control villages ($P=0.001$) (7).

The financial cost of the project was US \$ 31,604 and the economic cost was US \$ 85,958. The economic cost was 2.7 times more than the financial cost. This was due to resource mobilization in terms of personnel, supplies and expertise at the local and community level. The distribution of the cost of the activities was awareness and education (25%); veterinary ((22%), training and capacity building, (19%), monitoring and evaluation (19%) and medical component (15%).

Lastly, though population and area of coverage of the project was small, still was suitable for this experiment to test the implementation of an array of public health and veterinary activities. The activities could be blended well and made acceptable to the community.

4. LESSONS LEARNT

The intersectoral coordination between the departments of public health, veterinary health, school education, local self government, women and social welfare was key to success.

2. The laboratory diagnosis of rabies in dogs was not possible as dog deaths were not reported by the community despite educating them about the importance of rabies surveillance in the dogs. This is because dogs are not of economic value to the community.

. The rabies education materials must be cost-effective, long lasting based on local traditions, conditions and interesting especially to school children. 4. The laboratory diagnosis of rabies in dogs was difficult

Lastly, it is sincerely hoped that the lessons learnt from this project would be of some help in formulating rabies prevention and control strategies in India as now a " National Rabies Control Programme" is under way by Government of India during the twelfth five year plan (2012-17).

5. CONCLUSION AND RECOMMENDATION

Based on the activities done, results shown and experience gained a "system model"⁽⁹⁾ was evolved. (Figure -1). This in conclusion is the message of the project for other medical and veterinarians in the country and for the attention of all those involved in prevention and control of rabies.

DEFINITIONS.

Health services research. The systematic study of the means by which biomedical and other relevant knowledge is brought to bear on the health of individuals and communities under a given set of conditions.

One health. Is a concept that promotes partnership between human and veterinary medicine. The development of strategies for implementing "one health" involves important steps toward our understanding of how to control, and ultimately, prevent zoonotic disease transmission, which would improve the health and lives of both animals and humans. Schools of medicine, veterinary medicine, and public health should embrace the "One Health" concept and prepare their students to meet the challenges of the future.

Financial cost. Money spent on goods and services.

Economic cost. Financial cost plus estimated monetary value of donated goods and services.

COMPETING INTERESTS. Authors have declared that no competing interests exist.

APPROVALS AND CONSENT

The project was approved by the institutional ethics committee of Kempegowda Institute of Medical Sciences. The approval of State Government of Karnataka was obtained for the different activities done in the community. The consent of the formal leaders of the village, school teachers, heads of the households, parents / guardians of the school children was taken.

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AUTHORS CONTRIBUTIONS

This project was a collaborative work of all the authors. MKS put forth the idea, mentored, monitored the project work and prepared the manuscript. DHAN did the coordination and liaison work and prepared the project report. NRRM planned and supervised the field work. MLS was responsible for the veterinary component of the study. PK was the medical officer and postgraduate trainee who organized the field work. SNM conducted the laboratory training and responsible for sero-surveillance. BCRK was responsible for mass dog vaccination, deworming and animal welfare work. GB performed data and statistical analysis. All authors have read and approved the final manuscript.

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Table 1: Adopt a village, rural rabies prevention project: An overview and activities done

Socio-demography

Number of Villages	3
Number of households	2043
Total human population	10,220
Medical manpower (medical-4; paramedics-5; traditional - 2)	11
Veterinary manpower (live stock inspector)	1
Live stock census (dogs-446; cats-56, cows-348, buffalo-45, sheep-165 & goat-275)	1335
Dog: man ratio	1:23

Rabies awareness and education materials developed and used/ displayed/distributed
(In local dialect, Kannada)

Number of outdoor wall paintings (on the prominently located houses)	11
Number of annual wall calendars (in local dialect) distributed to households	2000
Number of book labels distributed through school teachers amongst school children	1000
Number of snake and ladder game thick charts given to schools (for children to play in schools)	16
Number of thick Posters displayed/fixed on the walls (in schools and community centres)	65
Rabies training aid (for village level volunteers)	15
Rabies DVD (in local dialect, Kannada; 15 minutes duration)	1

Rabies awareness and education activities

Number of veterinarians and other health staff trained in rabies prophylaxis	40
Number of village level (rabies) volunteers attended training programme on rabies	24
&its prophylaxis	
Number of rabies education sessions conducted in the village per month	14

324	Number of rabies education sessions conducted in the schools per month	5
325	Number of school children attended rabies education sessions	370
326	Number of Drawing competitions (start& end of the project) for school children	6
327	Rabies DVD shown (in local dialect, Kannada) (number of times shown in schools-6;	102
328	local cable television network -96)	
329	Use of folk dance	1
330	Use of public rally	2
331		
332	Rabies prophylaxis in humans	
333	Incidence of animal bite/exposure per 1000 persons per year	19
334	Number of rabies PEP given	69
335	Number of rabies PrEP given (school children-323, vets& pet owners-45)	368
336	Number of rapid fluorescent focus inhibition test (RFFFIT, antirabies antibody test) done	61
337	Rabies prophylaxis in animals	
338	Mass vaccination of dogs (primary - 262; one month booster - 183; annual booster-243)	688
339	Number of RFFIT (antirabies antibody test) done	148
340	Rabies surveillance	
341	Number of veterinarians (15) and others (1) trained in dRIT (sessions held - 2)	16
342	Number of dRIT done	06
343	Incidence of animal rabies	06
344	Incidence of human rabies	Nil
345	Costing of the project (2 years duration)	
346	Total financial cost	USD 31,604
347	Total economic cost	USD 85,958
348		
349		

Fig.1: Adopt a village project: “One Health” Experiment

A model for rabies prevention and control in a rural community in India

