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The Aims and Objectives of APCRI :

1. To bring out regularly a bulletin of the association, which will cover the various scientific aspects of Rabies and will keep us updated regarding newer developments on this fatal disease. It should be the aim of the Editor to maintain a simple yet practical approach in the discussion on various topics.
2. To organize workshop/seminars/symposia/CME programmes on this subject in different parts of our country. These programmes will be organized in collaboration with the local branches of Indian Medical Association, Indian Academy of Pediatrics, Association of Community Medicine, Association of Physicians of India, and other non-government organizations.
3. To undertake a national epidemiological surveillance to study the true figure of rabies deaths in our country so that we know the real extent of this disease and its distribution in our country.
4. To work for improvement of stray dog control measures with a humane approach and strict implementation of laws of licensing of pets by municipal authorities and routine immunization.
5. To lay emphasis on the practice of proper post-exposure treatment procedure and increase vaccine coverage.
6. To appeal to all authorities for the gradual phasing out of nerve tissue vaccine and its replacement by cell culture vaccine as early as possible in the Government hospitals and health centers.
7. To appeal to the medical community regarding the importance of serovaccination therapy of category III (WHO) cases and work for availability of safe and cheap rabies immunoglobulins at a subsidized rate from government sources.
8. To undertake multi-centric studies in the Government as well as private Rabies treatment centers regarding the pattern of bites, types of biting animals, categorization of exposure, type of therapy and proper follow-up.
9. To invite and involve veterinary medical personnel, public health nurses and social service workers in this group and to form a rational protocol of working together towards the cause of rabies prevention.
10. To establish relation with research groups in WHO and other important centers and organizations, both inside and outside the country who have dedicated and distinct work and contributions to this subject.



President's Message

It is heartening to note that within a short span of six months APCRI has successfully organized three Executive Committee meetings and has prepared a road map for the next two years what it intends to do. One of my main objective and goal is to make APCRI a national Rabies control organization, as the name suggests, and not confine it to a particular city or region of the country. APCRI should also involve all members through out the country working on Rabies whether they are Veterinarians, Clinicians, Medical professionals etc. and have mutual respect for everyone whether he is a clinician treating a bite victim or a Professor in the Medical or Veterinary College.

The Zonal Representatives are going to be given more independence and responsibility to ensure that they work on behalf of APCRI in their respective areas. It is also envisaged that dependence on industry to carry out the activities should be overcome by finding other sources of revenue to the organizations and towards this end there are already measures in place which I will outline in my next message.

Meanwhile we need also to prepare for the Annual Conference in Kolkata in July.

Date: 31st January, 2012

Place: Bangalore

Dr. S. Abdul Rahman

President, APCRI



Secretary General's Report

Dear members

Let me express my sincere gratitude to each and every member of APCRI, who have made APCRICON 2011 a big success and also for giving me the wonderful opportunity to organize three annual national conferences of APCRI in a row-Thiruvananthapuram (2009), Delhi (2010) and Chennai (2011).

The landmark WHO-APCRI National Survey conducted in 2003 revealed many facts about the situation in our country. Almost 10 years have lapsed since this survey was conducted and there is a change in the situation in our country. More animal bite victims have access to Rabies biologicals which are available in the government sector apart from the private sector. Use of CCVs, IDRV and RIGs has helped in prevention of Human Rabies to a great extent in our country. **There is a need to re-assess the situation in our country.**

Since July, we had three EC meetings, 28th at Hyderabad on 14th August 2011, 29th in Delhi on 10th December 2011, 30th on 22nd January 2012 at Kolkata and also 12th Special GB meeting at IMA Convention centre, New Delhi on 11th December 2011. All these meetings were conducted under the dynamic leadership of our new President, Dr. S. Abdul Rahman with the support from Dr. G. Sampath, immediate past president and Dr V Srinivas Rao, our treasurer.

I thank Dr. Sumit Poddar, Zonal representative East & the organizing secretary APCRICON 2012. and Dr. Amlan Goswami, Editor for taking up the challenge of organizing the APCRICON 2012 on 7th and 8th July in Kolkata.

Right now, I am busy organizing the National Conference of Indian Public Health Association, IPHACON 2012 at Kochi, Kerala, from 9th to 12th February 2012, where we will be putting up a stall and there will be a special session on animal bites with international experts, Dr. David A Warrell, Dr. Mary J Warell and Dr. M.K. Sudarshan highlighting the cause of rabies prevention and control. Let us continue to work together to achieve the goal of a **Rabies free India.**

Date: 31st January, 2012
Place: Thiruvananthapuram

Dr. Thomas Mathew
Secretary General, APCRI



From the Editor's Desk

Dear Colleagues,

Greetings to all readers of the APCRI Journal. I am very happy to present you with this issue of the APCRI Journal, Volume XIII, issue 2, January, 2012.

The APCRI Journal is being published continuously for the last 14 years, beginning in 1999. Since 2006, it has an ISSN, and is regularly published two times a year, and is mailed to all APCRI members and other interested groups and officials. The Journal has an international circulation. I am trying to get the APCRI Journal indexed.

The Journal of any professional and scientific organization is the medium through which everyone can get relevant information about the academic and scientific activities of that organization. It is most essential for creating interest about academic and scientific activities in that organization amongst its members.

I hereby thank all the contributors for their articles. Without an abundant supply of articles, no editor can bring out a journal. I take this opportunity to once again request the scientific community for articles on Rabies and related topics for publication in the "APCRI Journal", in future.

The Editorial is written by the Editor and he alone is responsible for it. Any grievances can be addressed through "Letters to the Editor".

I thank the corporate houses of **Zydus, Ranbaxy and Novartis** for their Advertisements. I also thank **Dr.S. Abdul Rahman** , President APCRI, **Dr. Thomas Mathew**, Secretary General APCRI, and **Dr. V. Srinivas Rao**, Treasurer APCRI for helping me to bring out this issue of the APCRI Journal.

This issue of the APCRI Journal is a step in the endeavor of the APCRI to fight the menace of Rabies by increasing the awareness about Rabies in all sections of the society. Let us all commit ourselves for the elimination of human rabies from India.

Date: 31st January, 2012
Place: Kolkata

Dr. Amlan Goswami
Editor, APCRI

Editorial

Current Scenario of Intra Dermal Rabies Vaccination in India

In India, Intra Dermal Rabies Vaccination (IDRV) started on 19th May, 2006. Credit should be given to Dr. M. N. Siddiqui and the Health Department of the Govt. of Uttar Pradesh for making it possible. In fact, there were no official guidelines available at the time when it was started. In fact, the history of mankind has many examples of pioneering acts by very courageous persons. Dr. M. N. Siddiqui is a pioneer and he is our hero. Then onwards IDRV has been implemented in different Indian States, one after another in, Orissa, Andhra Pradesh, Karnataka, West Bengal, Tamilnadu, Himachal Pradesh, Kerala and many more. In fact in every few months one more state recognized its benefit and started using it. IDRV is being given in some ARCs of Govt. hospitals and Autonomous Institutes only.

Dr. M. N. Siddiqui was the first person to use IDRV in regular Anti-Rabies Clinics of the Government, without even a National or State Guideline, for the vaccines being used for IDRV, in place. **The Drugs Controller General of India [DCGI] had issued its first directive in February 2006, permitting the use of IDRV in certain clinics fulfilling certain criteria. The package inserts of the vaccines had at that time no mention of IDRV usage.**

Dr. S. N. Madhusudana was the first person to do clinical trials on IDRV in India, from the late eighties onwards, initially at CRI Kasauli and later at NIMHANS where he was working. He started publishing his works from the early nineties onwards at regular intervals. He started using IDRV at CRI Kasauli in the late eighties, about 20 years before Dr. Siddiqui started to use it in a regular ARC set-up.

After the discontinuation of the use of Semple Vaccine (NTV) in 2005, the availability of adequate amount of TCVs for use in Govt. Hospitals and Health centers in India was a problem in many states for sometime. The states starting to use IDRV did not face vaccine shortages.

Where only, the ESSEN [IM] schedule was used for post-exposure prophylaxis against rabies, the crisis was more acute. **The number of vials of vaccine required for a full course of vaccination was more, when the ESSEN [IM] schedule of vaccination was used. When, the modified “TRC ID” schedule [2-2-2-0-2-0] was used, the total requirement of vaccine vials was much less than that for the “ESSEN” schedule.**

Not All, vaccines produced in INDIA are at present fit for ID usage as per facts revealed in the ICMR study

evaluating the TCVs produced in India against a TCV pre-approved for IDRV by WHO and manufactured outside India [Verorab], This study was done in 2003- 2005 under a directive from the **Drugs Controller General of India [DCGI] prior to giving its approval for use of IDRV in India..** The “WHO Expert Consultation on Rabies”, Technical Report Series 931, and the directives from the DCGI, from time to time also do not approve all TCVs for IDRV usage.

The WHO had approved IDRV in 1992, about 19 years ago. It is considered as an ethical and cost-effective replacement of NTV.

The Drugs Controller General of India [DCGI] has issued directives from time to time regarding the regulatory guidelines for Intra Dermal Rabies Vaccination [IDRV] in India after detailed consultations with Experts Group, the Competent Authority, and the ICMR. The Drugs Controller General of India [DCGI] has allowed the use of only four of the eight commercially available vaccines against rabies [which can be used by IM route], to be used by the ID route also.

The Drugs Controller General of India [DCGI] directive has mentioned that the vaccines to be used for IDRV should have a minimum potency of 2.5 IU per vial of single IM dose. Some vaccines come with 1ml diluent and some with 0.5 ml diluent. The dose of each ID shot has been specified to be of 0.1 ml of the permitted vaccines after re-constitution with the diluent provided. The potency per each ID dose of 0.1 ml will be 0.25 IU per dose for some vaccines and 0.5 IU for some others. **However, in the ICMR study evaluating the TCVs produced in India against a TCV pre-approved for IDRV by WHO and manufactured outside India [Verorab], done in 2003- 2005 under a directive from the Drugs Controller General of India [DCGI] prior to giving its approval for use of IDRV in India, the potency of all vaccines used was above 5 IU per vial of single IM dose. Currently, in the Indian market almost all TCVs available have a potency of more than 5 IU per vial of single IM dose, though their labels mention of a potency of being greater than 2.5 IU per vial of single IM dose.**

The modified “TRC ID” schedule [2-2-2-0-2-0] is the only route approved by the DCGI. The dose of each ID shot has been specified to be of 0.1 ml of the permitted vaccines.

The ID route has been permitted to be used in selected anti-rabies clinics having an appropriate number of adequately trained staff for ID inoculation. These centers should be able to maintain cold chain for vaccine storage and be able to ensure adequate supply of suitable syringes and needles for administration by the ID route. These centers should be well versed in the management of open vial and safe storage practices.

Unfortunately, it has come to the notice of many experts that reconstituted vaccine vials are not being kept in a refrigerator when the clinic is open. They are kept on top of cooler bottles, directly under a ceiling fan, or merely in a thermocol box, with or without cooler bottles. With frequent opening of the boxes the temperature of the vaccine vials rise much above 8 degree centigrade [The upper limit of the required storage temperature].

In the race to start ID vaccination it is very important to remember that the **Intra Muscular (IM) route is the preferred route for anti-rabies vaccination using modern TCVs or modern Avian vaccines in the immune compromised persons, persons on immunosuppressant drugs or therapy and on chloroquine therapy. Persons suffering from Diabetes Mellitus of a long duration, persons having malnutrition, and many other medical illnesses, where the patients are expected to have a poor immune response, the use of ID route for post-exposure prophylaxis against rabies, can be very risky.**

Centers using IDRV, should also have provision for IM vaccination by ESSEN IM schedule in selected cases

If ID dose is given sub-cutaneously (SC) then there is a possibility of poor immune response due to low antigen load. This may be life threatening. WHO recommends in cases where the characteristic change in the skin over the injection site has not appeared, the patient should receive another dose of vaccine at a site nearby where the characteristic change in the skin over the site of the shot, appears. It has come to the notice of many experts that this is not being implemented in many ARCs using IDRV. This is very dangerous.

It has come to the notice of experts that in many centers the staffs are not knowing that they are using IDRV. The staffs, including doctors, are saying that they are using "Sub-Cutaneous Rabies Vaccination". This is very dangerous.

It has come to the notice of many experts the fact that many IDRV centers in reputed teaching

and in non-teaching institutions are not cooperating with APCRI when they are being approached for collecting blood samples of patients on specified dates for the purpose of monitoring the effectiveness of IDRV. There is a great need for a survey evaluating the proper implementation of IDRV in India and its effectiveness in reducing the "Burden of Rabies in India", at present.

In the race to bid for the Govt. supply tenders, some manufacturers, whose registered packs contained only ONE 0.5ml ampoule of diluent, started supplying TWO ampoules of 0.5ml diluents, overnight. They did it to mislead the tender committees, that their vaccine also comes with ONE ml of diluent and as a result, its use should be economical. This is an unscientific act, and is not permitted by law. **Whenever, the diluent's volume is increased or decreased, some characteristics of the vaccine changes. It becomes a new drug, and as a result has to undergo fresh clinical trials, before it can be accepted as being safe for human use.**

Currently, some pharmaceutical companies are importing & marketing rabies vaccines without carrying out an appreciable number of authentic clinical trials in reputed centers in the country. Some of these vaccines are being procured by some State Govt. institutions for use in their ARCs. **This means that unsuspecting patients are being treated with untried vaccines and some are also using these vaccines for IDRV. This is very dangerous.**

As an offshoot of the IDRV program, certain faulty implementation of Rabies Post-exposure prophylaxis is going on in some hospitals and its surrounding areas. In the ESSEN [IM] protocol of one vial of rabies vaccine is to be administered by IM route on D0, D3, D7, D14 and D28, the D14 dose is omitted. **This becomes a new schedule, being used to treat actual patients, without any clinical trial, and without any regulatory approval, and not recommended by any one of the manufacturers in their package inserts. This is a very dangerous act.**

The use of Rabies Immunoglobulins [RIGs] has not picked up to the desired level. RIGs are being used in only some centers. The use of RIGs is also not proper. There is a deficiency in the training of doctors and staff manning ARCs. **APCRI's Manual on Rabies Immunoglobulin (RIG) Administration, February, 2009 will be very useful for the doctors working in the ARCs.**

All changes are very good if they can provide more safety and efficacy to the patients. However, changes which endanger the lives of the unsuspecting patients seeking treatment are not desirable. I believe that in the long run truth will prevail.

Special Report

Rabies in the SAARC region: Report of an intercountry meeting

B J Mahendra

The **South Asian Association for Regional Cooperation (SAARC)**, founded in December 1985, is an organization of eight South Asian nations (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan & Sri Lanka) and is dedicated to economic, technological, social, and cultural development emphasizing collective self-reliance. The Rabies in Asia (RIA) foundation convened an informal meeting of rabies experts from both medical and veterinary sciences from these countries from 24th to 26th February, 2011 at Mysore, Karnataka State, India to review and assess the current scenario of rabies in this region and to call for actions for addressing these issues in the future. In all twenty six rabies experts from Afghanistan (3), Bangladesh (2), Bhutan (2), India (6), Maldives (1), Nepal (2), Sri Lanka (2), RIA Foundation (5), World Health Organization, WHO (3) and others (23) which included stake holders from the pharmaceutical companies (11), regional medical and veterinary institutions (13) participated in the meeting. Only the representation from Pakistan was unable to attend due to administrative reasons.

Rabies in the SAARC region

According to WHO, globally an estimated 55,000 persons die of rabies annually. Of these 31,000 (56%) are from Asia and 24,000(44%) from Africa. In the SAARC region about 25,000(45%) are known to die of rabies every year of which 20,000(36%) are from India (Table-1). An estimated 1.5 billion people are at potential risk of rabies infection and about 4 million people receive anti-

Table 1
Human rabies cases in the SAARC region

Countries	Reported human cases	Estimated human cases	Cases per 100,000 Population	% of dog bites
Afghanistan	N/A	2000-3000	5.70	N/A
Bangladesh	200	1500-2000	1.50	95%
Bhutan	2 (2008)	<10	0.28	99%
India	?	18,000-20,000	2.00	>95%
Nepal	35 (2008)	100-150	0.21	98.5%
Pakistan	?	2000-5000	1.30	>90%
Sri Lanka	51 (2008)	<100	0.26	95%

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Table 2
Human rabies vaccine production and use in the SAARC region

SAARC countries	ARV demand (Doses)	ARV production (Doses)	Remarks
Afghanistan	100.00	Nil	Import from outside
Bangladesh	400.00	30000 (NTV)	Still produces NTV but willing to produce TCV
Bhutan	10,000	Nil	Import from outside
India	10,000.00	15,000,000 (TCV)	Only country with commercial TCV production
Nepal	200,000	Nil	Import, trial batches of TCV produced
Pakistan	300,000	350,000 (NTV)	Still produces NTV but willing to produce TCV
Sri Lanka	200,000	Nil	Import from outside

rabies vaccination, despite this the rabies deaths are mostly due to negligence, ignorance and inadequate availability of primary health care services. Among the eight countries, only Maldives is free of rabies and Sri Lanka has made substantial progress in reducing human rabies mortality to such a low level that it now plans to make the island nation rabies free by 2016. .

With regard to the availability of rabies vaccines for human use (Table-2) except for India other countries depend on import of modern rabies vaccines. Pakistan is the only country in the region which still produces and uses nerve tissue vaccine.

The situation of rabies in the animal population in the region is that the dog mediated rabies continues to be the major public health problem. Due to lack of proper surveillance there is no clear information about the problem of rabies in the animal population. The existence of a large unvaccinated and uncontrolled stray dog population, opposition from the communities to eliminate them and a lack of well planned dog population

management and organized dog vaccination programme has led to further compounding of the problem, more so in the urban areas. However, the scenario is different and far better in the island nations of Sri Lanka and Maldives. In Sri Lanka the department of health has made vast inroads in controlling the dog population and vaccinating them and cats too. In Maldives there is a strict vigil on the import of animals and their quarantine.

Efforts of SAARC and World Health Organization

Considering the magnitude of rabies problem and the need for coordinated activities for rabies elimination in SAARC Region, SAARC Secretariat and the Government of Sri Lanka hosted a SAARC level workshop on rabies elimination in 2003 which recommended formulation of regionally coordinated rabies elimination activities under the auspices of SAARC Secretariat. As per recommendations of the SAARC Rabies consultation held in 2003, it is right time to propose a regionally coordinated rabies elimination project which aims at elimination of rabies as a public health problem. WHO Regional Office for South East Asia Region is in the process of finalizing a regional strategic framework for elimination of human rabies and supporting member countries to strengthen rabies control activities including promotion of cost-effective intradermal rabies vaccination. Its details are as follows:

Period: 10 years (2011-2020) (Table 3)

Preparatory Phase (Four years)

Reduce human rabies cases by 50%. Funding requirement: USD 20 million (Five million per annum); possibly from SAARC Development Fund and contribution from donors.

Table 3
Cost estimate for implementing rabies elimination programme in the SAARC region (Preparatory phase)

Sl. No.	Activities (USD in millions)	Estimated budget	% of total
1.	Legal framework for rabies elimination	0.5	2.5
2.	Advocacy, awareness and education	3.0	15.0
3.	Surveillance and response	1.0	5.0
4.	Laboratory diagnosis and sero-surveillance	1.0	5.0
5.	Human rabies prophylaxis	4.0	20.0
6.	ABC/Anti-rabies campaign	8.0	40.0
7.	Wildlife rabies control	1.0	5.0
8.	Operational research	0.5	2.5
9.	Project management	1.0	5.0
	Total	20.0	100.0

Final Phase (Six years)

Eliminate rabies as a public health problem. Funding requirement: USD 90 million (15 million per annum) to be explored at international level through resource mobilization plan.

Conclusions and Recommendations

The rabies situation at global, regional and country level and possible modalities of regionally coordinated rabies elimination programme were discussed. Several scientific presentations were made to update knowledge on rabies prophylaxis, rabies control and dog population management. Besides availability of vaccines and immunoglobulin for prevention, existing control programmes and surveillance systems, were considered and consequently the following conclusions were made and based on these certain relevant recommendations have put forward.

Situation analysis

- The magnitude of rabies problem and epidemiological situation differs from country to country. The epidemiological pattern is similar but not necessarily identical.
- Each country is trying to execute rabies control activities in isolation and dog rabies control and dog population management are a matter of concern.
- Policy makers and funding agencies are not convinced that rabies can be eliminated.
- Pakistan is still producing and using nerve-tissue vaccine which needs to be replaced by modern rabies vaccine.
- Legal framework for rabies control is weak and its enforcement is questionable where rabies control act is in place.
- Many countries share open border and movement of dogs is common. Rabies control is not effective in cross-border areas in the absence of cross-border collaboration.
- Rabies is a common problem which requires well planned and coordinated approach for successful control and subsequent elimination.

Strengths and merits

- There are success stories and good practices in SAARC countries which can be shared.
- The SAARC region can produce quality rabies vaccines and biologicals for human and animal use.
- Expertise and resources are available which can be utilized for execution of regionally coordinated activities.

- Multiple partners and professional organizations are active in a number of countries.
- SAARC countries recognize the need for a regionally coordinated programme which will consolidate anti-rabies drive in the region.

Conclusions

- Elimination of human rabies is an international public good. The proof of the feasibility of rabies elimination has been demonstrated through implementation of regionally coordinated rabies elimination programmes. A SAARC level workshop on rabies elimination held in 2003 in Colombo recommended formulation of regionally coordinated rabies elimination activities under the auspices of SAARC Secretariat.
- Advocacy, awareness and education is important for prevention of human and animal rabies and World Rabies Day should be utilized to improve public awareness particularly in rural areas.
- Availability, accessibility, affordability of modern rabies vaccines, rabies immunoglobulin and appropriate treatment of dog bites/rabies exposure should be ensured at all levels.
- Standard rabies diagnostic tests should be available in all SAARC countries and quality control system in place.
- Rabies elimination programme focused mainly on anti-rabies vaccination with humane dog population management are largely justified by the future savings of human rabies prevention programme.
- Rabies control is a multidisciplinary and multidimensional activity; participation of medical and veterinary professionals from government and academic institutions, civic and local bodies, NGOs, INGOs, animal welfare organizations are crucial.
- Rabies elimination is an ideal mission to move forward 'One Health' concept.

Recommendations for SAARC countries

- Nerve-tissue vaccine to be replaced by modern rabies vaccine by 2012.
- Rabies in man and animals to be made a notifiable disease in all SAARC countries.
- Establishment of rabies diagnostic centers using modern technology.
- Intersectoral cooperation to be initiated in the form of rabies task force involving all stakeholders.
- Mobilization of funds through international agencies and organizations for rabies project.
- Dog population management studies to be undertaken.
- Starting education programmes involving Government and NGOs.

Recommendations for SAARC Secretariat

- Ensure political commitment for regionally coordinated programme for elimination of human rabies transmitted by dogs in SAARC Region.
- Establish a SAARC Rabies Center to guide rabies elimination programme.
- Mobilize financial resources to launch regionally coordinated rabies programme and consider the use of SAARC Development Fund at the initial stage.

Acknowledgement

I sincerely express my gratitude to Dr M K Sudarshan, President RIA Foundation for his initiative to conduct the meeting, his effort to write this article and for his constant and consistent encouragement. I also thank Dr S N Madhusudana and Dr D H Ashwathnarayana for all their support.

I take this opportunity to thank my department colleagues who have strived to make the meeting a success.

Please Visit

**The APCRI web site at www.apcri.org
for all information about APCRI**

Original Article

A critical appraisal of usage of rabies immunoglobulin in an anti-rabies clinic in India*M.K.Sudarshan¹, D.H.Ashwath Narayana² and Girianna Gowda³

Rabies is a practically 100% fatal viral encephalomyelitis. It is transmitted to man mostly following bite by a rabid dog or cat. In India annually an estimated 20,000 human rabies deaths occur consequent to about 17 million animal/dog bites¹. Following bite by a rabid animal, administration of a modern rabies vaccine using a regimen approved by World Health Organization (WHO) stimulates production of neutralizing antirabies antibodies by the patient's immune system. Protective levels of these antibodies are seen 7 to 14 days after the first dose of vaccine. Adequate serotitres can be expected in all the vaccinees by day 14. When the bites are on the head, neck, face & hands, the incubation period will be shorter. Thus, such patients are vulnerable to develop rabies during this window period of 7 to 14 days despite the timely and full course of any antirabies vaccine and wound care. The rabies immunoglobulins (RIGs) are readymade antirabies antibodies which provide passive immunity and thus offer immediate protection. Hence, administration of RIGs, after thorough cleansing of wounds, following severe (category III) exposure to rabies is life saving as their timely and proper administration neutralizes the virus in the wound and aborts the risk of developing rabies.

According to WHO all of the RIG, or as much as anatomically possible (but avoiding possible compartment syndrome), should be administered into or around the wound site or sites. The remaining immunoglobulin, if any, should be injected intramuscularly at a site distant from the site of vaccine administration. RIG may be diluted to a volume sufficient for all wounds to be effectively and safely infiltrated².

These guidelines are followed by Government of India³ and professional bodies like Association for Prevention and Control of Rabies in India⁴. However, some experts consider systemic administration of RIGs as wasted⁵. At a recent expert consultation of WHO, the usefulness of systemic administration of RIG was debated and recommended that new in-vitro and in-vivo research be encouraged to determine the quantity of RIG (in IU) required on site, with or without distal parental RIG administration⁶.

Hence, this study was conducted with the objective of finding out the ratio of volume of RIG injected into/around the wound/s (local infiltration) to the volume of RIG injected by intramuscular (systemic) route. In this context, the data from the antirabies clinic of Kempegowda Institute of Medical Sciences, Bangalore, a centre specialized for

**Table-I:
Details of exposure to rabies**

Sl. No.	Exposure to rabies	No.	%	
1	Total cases	6664	100	
	Category III (severe exposure) cases	3109	46.6	
	Biting animal/rabies exposure	3109	100	
	Dog	2918	93.8	
	Monkey	98	3.2	
2.	Cat	45	1.5	
	Wild animals	23	0.7	
	Exposure to rabid cow's milk/ secretion	19	0.6	
	Exposure to case of Hydrophobia	6	0.2	
	Profile of Patients/subjects	3109	100	
	Sex			
	Male	2182	70.2	
Female	927	29.8		
3.	Age Groups (in years)	0-4	418	13.5
		5-14	907	29.2
		15-44	1207	38.8
		45-64	434	13.9
		65+	143	4.6
4.	Type of animal bite wounds / injuries (multiple responses)	3345	100	
	Abrasions / scratches	1589	47.5	
	Lacerations	1284	38.4	
	Transdermal bite / puncture	330	9.9	
	Cuts	138	4.1	
	Avulsions / fractures	4	0.1	
5.	Distribution of wounds (multiple responses)	3366	100	
	Lower limbs	1763	52.4	
	Upper limbs	961	28.5	
	Head / neck	421	12.5	
	Trunk	207	6.2	
	Genitalia	14	0.4	

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*This paper was presented at the third rabies in Asia conference (RIACON) organized by Rabies in Asia foundation from November, 28-30, 2011 at Colombo, Sri Lanka

Table-2
Usage of RIGs in persons exposed to rabies

Sl. No.	Usage of RIGs	No.	%
1	Rabies exposed persons who received RIGs	3109	100
	ERIG	2904	93.4
	HRIG	199	6.4
	Refused / could not afford / referred to Govt. hospital	4	0.6
2.	Volume (in ML) of RIGs received		
	Children (<15 years)	1323	-
	Mean	2.85ML	-
	Range	0.4 to 10.00 ML	-
	Adults (>15 years)	1780	-
	Mean	7.89ML	-
3.	Volume (in proportion) of RIGs used by different routes of administration		
	ERIG	2904	-
	Local infiltration only	-	73.5
	Local infiltration plus systemic injection	-	25.8
	Systemic injection only	-	0.7
	HRIGs	199	-
	Local infiltration only	-	74.6
	Local infiltration plus systemic injection	-	23.0
	Systemic injection only	-	2.4

administration of RIGs, was analyzed for 3 years duration from July, 2008 to June, 2011. In this centre the dosage of RIG required for each patient was calculated as per the guidelines of the manufacturer. When the calculated dose of RIG was not adequate sterile normal saline was used as diluent to make up for the volume sufficient to infiltrate all wounds.

A total of 6664 cases of rabies exposures were treated during this period and of these 3109 (46%) were categorized as "severe exposures" or belonging to Category III. This lower percentage/proportion of category III exposures is due to the fact that many trivial and minor exposures come for consultations and counseling and others visit /referred from outside centres come to receive vaccine only. Majority (93%) of these were due to dog

bites. The victims were mostly males (70%), adolescents and adults (57%). The bite wounds were mostly abrasions/ scratches (47%) & lacerations (38%) and found on the upper and lower limbs (81%) (Table-1). In about 93% cases ERIG was used, in 6% HRIGs and the remaining (~1%) could not afford / referred/refused RIG. In children (<15 years age) the mean volume of RIG used was 2.85 mL per patient and in adolescents/ adults (>15 years) 7.89 mL. In these cases about three fourths (≈ 74%) of the total dose/ volume of RIG was used exclusively for local infiltration of wounds, 25% injected both locally and systemic and 1% injected by only systemic route (Table-2).

In conclusion, the usage of RIGs was found to be in accordance with the current recommendations of WHO. Besides it shows that only about one fourth (25%) volume of the total dose of RIG was injected systemically or the ratio of local: systemic administration of RIG was 3: 1.

Acknowledgments

The authors thank the post graduates of community medicine viz. Drs. Ramesh Holla, V.Veena, U.Malatesh, AR Rachana and interns Drs. Kavitha, Jawad, Manoj, Manjusha, Mona, Manjula, Shantanu and Abhinav for compiling and collating the data.

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Original Article

Awareness regarding Rabies and its prevention among first year Medical College students of Mandya Institute of Medical Sciences Mandya.

Vinay M*, Sheethal M P **, Mahendra B J ***

Introduction

Rabies is a viral zoonotic disease that is spread to humans through contact with infected saliva by bites, licks or scratches. The main route of rabies transmission to humans is the bite of rabid animals (mostly dogs). Most of the deaths occur in the absence of post exposure prophylaxis. An estimated 55,000 human rabies deaths occur annually in Asia and Africa¹. 20,000 humans die annually in India due to rabies².

Effective treatment soon after exposure to rabies can prevent death. Post exposure prophylaxis consists of local treatment of wound, administration of rabies immunoglobulin (if indicated) and vaccination.

The large number of deaths due to rabies can be attributed to the fact that in spite of availability of effective post exposure prophylaxis, people are not aware of the various aspects of the disease and its prevention³. The present study was undertaken to assess the knowledge regarding rabies among 1st year medical students.

Objectives

1. To assess the knowledge regarding rabies among first year medical students
2. To evaluate the knowledge of first year medical students regarding post exposure prophylaxis following an animal bite
3. To know the perception of the first year medical students regarding prevention of rabies in the community

Materials & Methods

This study was conducted at Mandya Institute of Medical Sciences. 98 first year MBBS students were enrolled, all of whom were approached with a pre-designed and pre-tested questionnaire regarding various aspects of rabies and its prevention. Data was collected from 91 students who consented to participate in the study. The data was analyzed using MS excel software and T test.

Results

91 of the 98 first year medical students of MIMS Mandya, participated in the study.

Of the 91, 85 (93.40%) knew that rabies is caused by virus, the rest were of the opinion that rabies was caused by a bacteria. 45 (49.45%) knew that 20,000 people die annually due to rabies in India, while 18 (19.78%) and 28 (30.76%) thought that the annual mortality in India was 30,000 and 10,000 respectively.

89 students (97.80%) knew that rabies is transmitted through the bites of an animal and only 6 (6.59%) and 4 (4.39%) knew that it could be transmitted by scratch and lick also. All the students interviewed knew that rabies is transmitted by dogs. 23 of the respondents (25.27%) knew that it is also transmitted by cats. 8 (8.79%) students felt that it is transmitted by monkeys and rodents, 5 (5.9%) thought that it is transmitted by cows, mongoose and bats. 3 (3.29%) students felt that it is transmitted by horse, pigs, wild animals and all mammals.

43 (47.25%) students knew that death is inevitable once a person gets rabies. 61 (67.03%) students knew that the symptom of rabies is hydrophobia and aerophobia, 18 (19.78%) students thought that person with rabies will behave like an animal, 14 (15.38%) felt that person with rabies becomes mad and 2 (2.19%) felt that person with rabies will appear asymptomatic.

Regarding the immediate measures that should be done to the bite wound, 63 (69.23%) felt that the bite wound should be washed, and of these 51 (56.04%) respondents felt that the wound should be washed with soap and water and 12 (13.18%) felt that it should be washed with water only. 52 students (57.14%) knew that an antiseptic has to be applied to the bite wound. 61 (67.03%) knew that the bite victim should consult doctor immediately. 17 (18.68%) felt that the bite wound should be bandaged and 15 (16.48%) students felt that a tourniquet should be applied above the wound. 3 (3.29%) students were of the opinion that irritant has to be applied and 3 (3.29%) knew that the wound should not be bandaged.

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23 (25.27%) students knew that 5 vaccine injections should be taken when bitten by an animal, 4 (4.39%) thought 10 injections should be taken and 50 (54.94%) felt that 14 injections is to be taken, 10 (10.98%) felt only 1 injection is enough. None of them were aware of the rabies immunoglobulin. 43 (47.25%) were aware that a person bitten by an animal should also receive tetanus injections if not vaccinated earlier.

With regard to their perceptions on the various measures that should be taken to prevent rabies from occurring in the community, 43 (47.25%) felt that animals should be vaccinated, 33 (36.26%) were of the opinion that various awareness activities to be undertaken regarding the prevention of occurrence of rabies, 21 (23.07%) felt that they should stay away from street dogs, and 29 (31.29%) felt that the number of stray dogs to be reduced of which 10 (10.98%) felt that the stray dogs should be killed. 8 (8.79%) thought that people in the community should be vaccinated before the exposure to the animal.

There was no significant statistical difference in knowledge regarding the causative agent of rabies between male and female students. Regarding the annual mortality in India due to rabies 23 (45.06%) of 51 boys

and 22 (55.00%) out of 40 girls had the correct knowledge regarding mortality due to rabies and again there was no significant statistical difference in knowledge between male and female students.

49 (96.07%) of 51 boys & all girls knew that rabies is transmitted by bites of an animal and 4 (7.84%) of 51 boys & 2 (05.00%) of 40 girls knew that that it could be transmitted by scratch and 2 (3.92%) of 51 boys & 2 (05.00%) of 40 girls knew that it is transmitted by animal lick also. The difference in knowledge between the sexes was not statistically significant.

All the respondents knew that rabies is transmitted by dogs. 16(31.37%) of 51 boys & 6(15.00%) of 40 girls knew that it is also transmitted by cats. 9(17.64%) of 51 boys & none of the girls knew that it is transmitted by monkeys. 7 (13.72%) of 51 boys & 2 (05.00%) of 40 girls felt that it can be transmitted by rodents also. The knowledge that a person can get rabies from monkey was significantly higher among males. 23(45.09%) of 51 boys and 20 (50.00%) out of 40 girls knew that rabies is an incurable disease. There was no significant statistical difference between knowledge of male and female students. 34 (66.66%) of 51 boys and 27 (67.50%) out of 40 girls knew that the symptom of rabies is hydrophobia and

Table 1
Sex wise distribution of knowledge regarding rabies and its prevention among first year medical students

	Male (n=51)	Female (n=40)	Total (n=91)
Correct knowledge of the causative agent	46 (90.19%)	39 (97.50%)	85 (93.41%)
Knowledge of Annual Mortality in India	23 (45.06%)	22 (55.00%)	45 (49.45%)
Knowledge of Transmission	Bite	49 (96.07%)	40 (100.00%)
	Scratch	4 (7.84%)	2 (5.00%)
	Lick	2 (3.92%)	2 (5.00%)
Knowledge of Reservoir	Dog	51 (100.00%)	40 (100.00%)
	Cat	16 (31.37%)	6 (15.00%)
	Monkey	9 (17.64%)	Nil
	Rodent	7 (13.72%)	2 (5.00%)
Knowledge of Case fatality	23 (45.09%)	20 (50.00%)	43 (47.25%)
Knowledge of Symptoms of rabies in man	34 (66.66%)	27 (67.50%)	61 (67.03%)
Knowledge of Post-exposure measures	Wash with soap & water	28 (54.90%)	23 (57.50%)
	Apply antiseptics	30 (58.82%)	22 (55.00%)
	Consult doctor immediately	38 (74.50%)	22 (55.00%)
Knowledge of Number of vaccine doses	14 (27.45%)	9 (22.50%)	23 (25.27%)
Knowledge of Preventing rabies in community	Awareness	19 (37.25%)	14 (35.00%)
	Reducing stray dogs	8 (15.68%)	11 (27.50%)
	Vaccinating dogs	28 (54.90%)	15 (37.50%)

aerophobia. There was no statistical difference between knowledge of male and female students.

Regarding the immediate measures that should be done to the bite wound, 28 (54.90%) of 51 boys and 23 (57.50%) out of 40 girls felt that it should be washed with soap and water. 30 (58.82%) of 51 boys and 22 (55.00%) out of 40 girls felt that an antiseptic has to be applied and 38(74.50%) of 51 boys and 22 (55.00%) out of 40 girls felt that the bite victim should consult doctor immediately. The difference in knowledge between the sexes was not statistically significant. 14 (27.45%) of 51 boys and 9 (22.50%) out of 40 girls knew that 5 vaccine injections should be taken when bitten by dogs. There was no statistically significant difference between knowledge of male and female students.

With regard to their perceptions on the various measures that should be taken to prevent rabies from occurring in the community 19 (37.25%) of 51 boys and 14 (35.00%) out of 40 girls felt that various awareness activities to be undertaken regarding the prevention of occurrence of rabies, 8 (15.68%) of 51 boys and 11 (27.50%) out of 40 girls felt that the number of stray dogs

to be reduced and 28 (54.90%) of 51 boys and 15 (37.50%) out of 40 girls felt that the dog should be vaccinated.

Conclusion

Majority of the first MBBS students knew that rabies is caused by virus which is transmitted through dog bite. About half of the students knew about the symptoms and post exposure measures correctly. They had poor knowledge about the other modes of transmission, animals that can transmit rabies, rabies immunoglobulin and the number of vaccine doses. The knowledge regarding rabies and its prevention among male and female students was not dissimilar.

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Announcement

The APCRI Newsletter is published every six monthly, in October and in April. APCRI members and the members of the Scientific Community are requested to contribute News Clippings, Photographs and Reports on Scientific activity on Rabies and Related matter for publication in the Newsletter.

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Original Article

IDRV & ERIG: The Cost effective arsenal in Rabies prophylaxis

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Introduction

Rabies is an important public health problem in India. Maximum numbers of deaths due to human Rabies are reported from our country. It is estimated that in India 1.7 crore animal bite exposures lead to 20,000 deaths. 95% of the 50,000 global rabies deaths are because of dog bites^{1,2}. Rabies is a 100% fatal disease which can be prevented by timely and appropriate Anti Rabies prophylaxis. Primary care of wound, proper categorisation of bite & use of Rabies Biologicals such as RIG and Vaccine can prevent such a dreaded disease. The Anti Rabies Clinic of MKCG Medical College Hospital is a tertiary care centre catering to 10 southern districts of Odisha. The rate of reporting of new Category-III cases is nearly 450-600 per month. This Institute is the first in the state to introduce IDRV since 27th April, 2007. At present ERIG for category-III exposures is also being administered free of cost by Govt. of Odisha over last three years.

Objective

1. To calculate the amount of IDRV & ERIG used per day.
2. To calculate the cost of IDRV & ERIG used per day.
3. To compare the cost of IDRV & ERIG against TCV by Essen regimen.

Methodology

Hospital based cross-sectional study conducted in Anti Rabies Clinic of M.K.C.G Medical College Hospital from 1st April to 30th Sept. 2008. Data was collected from the registers & daily reports and the average amount of ARV & ERIG required per day was calculated. The cost of the rabies biological used in the ARC was estimated from the cost incurred by the purchase section of Central Drug Store of Govt. of Odisha.

Observation and Discussion

The Anti Rabies Clinic, M.K.C.G Medical College, Berhampur was the pioneer institute of the state to implement IDRV from 27th April 2007. The average new cases registered in ARC, MKCG Medical College, Berhampur was **15-20**. The average number of doses of

vaccine required per day was **55-65 doses**. The cost per day @ Rs 180/- per dose of CCV(PVRV Inj Abhayrab) was found to be Rs 10,620/- if administered by Essen regimen. The cost of ARV by IDRV was Rs 2,124 /-. The average amount of ERIG used per day in the ARC during the study period was 115 ml/day basing on the recommended dosage by WHO³.

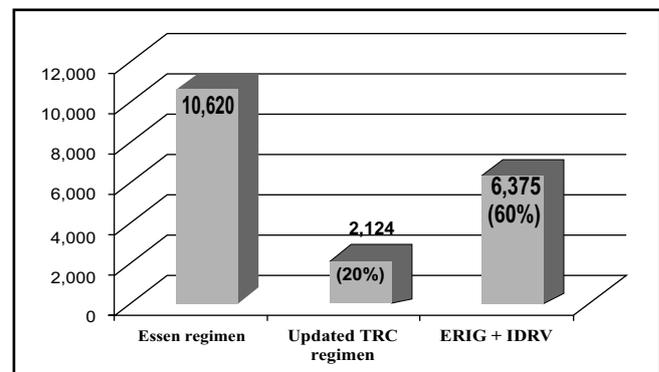


Fig 1: Comparative cost

As per the Central Drug Store of Govt. of Odisha the price of inj. Abhayrab (PVRV = 0.5ml) & inj. Equirab (ERIG = 1500IU in 5ml vial) was Rs. 180 per vial & Rs. 185 per vial respectively. If inj. Abhayrab would have been administered by Essen regimen, the cost of vaccine only was calculated to be Rs. 10,620/-. As IDRV is given since 27th April 2007 the cost of the vaccine has been reduced to Rs. 2,124/- which is nearly 1/5th of the cost to have been incurred if Essen regimen was used. The cost of ERIG used for Category-III cases & amounting to 115ml per day was Rs. 4,255/-. The combined active & passive immunization carried out with IDRV and ERIG will incur accost of Rs. 6,375/- which is still 40% less than the cost to have been incurred for the vaccine only if given by the Essen regimen.

Since Nov. 2009 the Govt. of Odisha has supplied ERIG to the Anti Rabies Clinics of the three Govt. Medical Colleges & Capital hospital at Bhubaneswar. The free supply of vaccine & Rabies Immunoglobulin to all cases attending the ARCs has a definite impact on case attendance. The average case registered in the year 2007 was 406 which has increased to 498 in the year 2009

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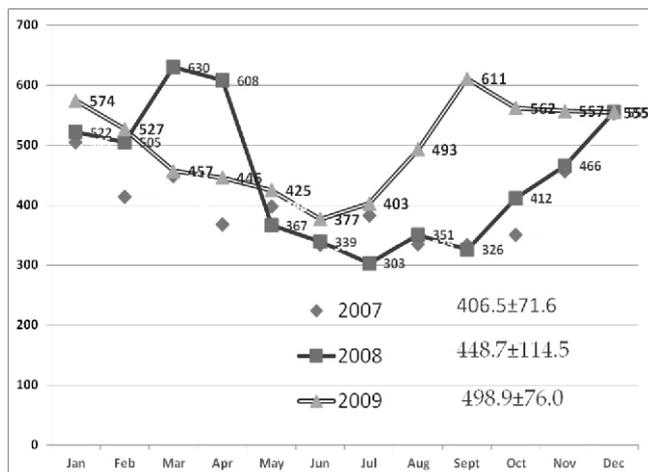


Fig II: case attendance

which was found to be extremely statistically significant ($P < 0.0001$).

Conclusion

Rabies is a fatal zoonotic disease and India accounts for nearly 1/3rd of global rabies cases. The cost of rabies biologicals is one of the major factors of incomplete treatment leading to higher probability of succumbing to the disease. Providing antirabies vaccines to the exposed cases by Essen regimen puts a great burden on the Govt.

exchequer. IDRV is the cost effective mode of active immunization against rabies. However simultaneous passive immunization should be carried out for all Category-III exposures, otherwise partial treatment may prove fatal.

Passive immunization with HRIG though proved to be safe but is prohibitive in cost. The currently available ERIG (inj.Equirab) is a highly purified RIG & is also safe⁴. The combination of IDRV & ERIG saves nearly 40% of the cost which the Govt. would have incurred if TCV alone was administered by Essen regimen. So IDRV & ERIG are the most cost effective rabies biological which can be used for post exposure cases not only in India but also in other economically deprived countries as a tool towards decreasing the global burden of rabies

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Announcement

The APCRI Journal is published twice a year. Once in January and again in July. The APCRI Journal invites Contributions from the Scientific Community, on All aspects of Rabies and Related Matter, in the form of Original Articles and Review Articles, Brief Reports, Case Reports, Personal Viewpoint, Letters to the Editor, Notes and News, Your Questions and Book Review.

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Original Article

A Comparative Study of Health seeking behaviour of animal bite cases in rural and urban areas of Meerut District

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Dr. Roopa Hanspal⁴, Dr. Pawan Parashar⁵

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Abstract

Objective: To study the Health seeking behaviour of animal bite cases

Study Design: Cross-sectional study by interview method.

Subjects: 400 inhabitants of village Khajuri of Meerut district and 160 population of Multan nagar area in Meerut city.

Statistical analysis: simple proportions and percentages.

Results: Out of 400 people interviewed in rural area, 142 (35.5%) animal bite cases were found and in urban area out of 160 inhabitants interviewed 12 (7.5%) animal bite cases were found in last six months. Majority of people in rural area preferred home remedies of treatment by red chillies and turmeric paste applications, whereas in urban area people would prefer going to government hospitals for treatment.

About 60% people in rural area were bitten by stray dog whereas in urban area majority were bitten by pet animals. In rural area majority cases took more than 2 days from exposure to reporting at ARC as they were following indigenous methods and home remedies whereas in urban area majority cases approached ARC late due to ignorance and negligence. Majority of bite cases at both the areas did not receive complete doses anti rabies vaccines.

Key words: Animal bite, treatment approach, late reporting, Anti Rabies vaccine.

Introduction:

Animal bites pose a major public health threat both in developed and developing nations. These bites not only increase the morbidity and mortality but also loss of man-days and money on treatment. In India alone, Rabies causes an estimated 20,000 deaths with 17.4 million exposures to animal bite every year¹. The health seeking behaviour of people regarding animal bite could be one of the reasons for such quantity of exposures. DALYs due to rabies is more than due to SARS and dengue fever². In India a person is bitten by an animal every 2 seconds, and someone dies from rabies every 30 minutes³. By mere washing of wounds and application of antiseptics, the risk of rabies will reduce by about 50%⁴. There are myths and false believes associated with wound management. These include application of oils, herbs and red chillies on the wound inflicted by rabid animal. More faith in indigenous medicines that are of unproven efficacy and not washing of wound properly because of fear that it would get infected⁵. We need to understand local epidemiology of bites for the development of an efficient precaution programme at local level.

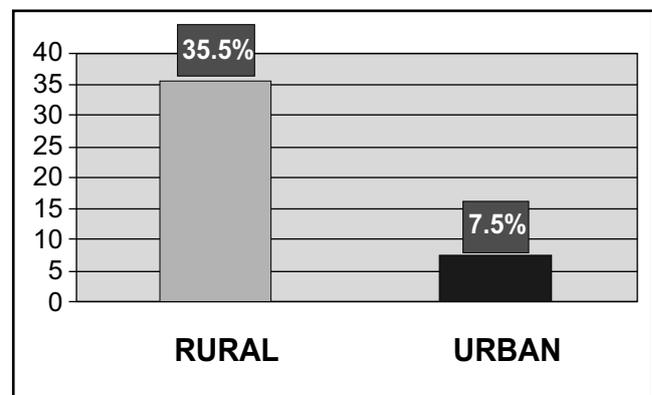


Fig-1 : Distribution of animal bite cases according to residential area

This study is undertaken to highlight the health seeking behaviour of animal bite cases.

Materials and Methods:

Study area: The study was conducted in rural area of village Khajuri in Meerut district and urban area of Multan nagar in Meerut city.

Study Period: The study was carried out from January 2008 to June 2008

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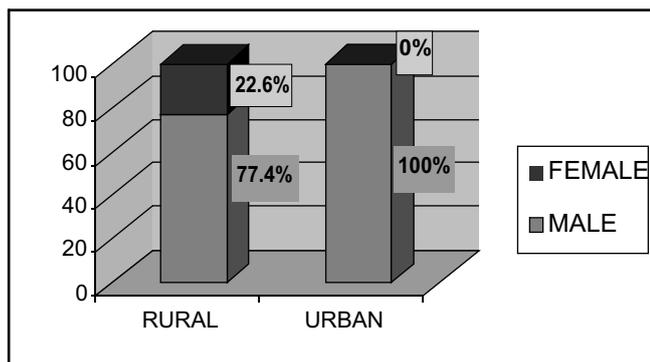


Fig. II Distribution of animal bite cases According to sex and residential area

Study design: This is a community based cross-sectional study.

Participants: Total 142 inhabitants of rural area and 160 inhabitants of urban area were contacted. Selection of the areas and families were done by simple random method. Each area was divided into four quadrants and one centre for the study purposes.

The head of the household or in his/ her absence any other adult member of the family was interviewed.

Study instrument: A structured questionnaire was prepared. The questions were related to health seeking approach of animal bite cases.

Statistical Analysis: The data was analysed by simple proportion and percentages.

Results and discussion:

Total 400 inhabitants of rural area and 160 inhabitants of urban area were included in the present study. Out of the total, 536 (95.7%) were males and 24 (4.3%) were females. Almost same pattern of sex distribution were found in rural and urban area.

Almost half (52.0%) of the studied population in rural area were illiterate whereas only 16.3% of population were illiterate in urban area.

Out of 400 people interviewed in rural area, 142 (35.5%) animal bite cases were found. In urban area out of 160 inhabitants interviewed 12 (7.5%) animal bite cases were found in last six months. Virtually when compared to all other studies i.e Shetty *et al*⁶, Agarwal *et al*⁷ and Sudarshan *et al*⁸ demonstrated more animal bite cases in

Table-I

Distribution of animal bite cases according to sex and residential area

Sex	Rural area No (%)	Urban area No (%)	Total No (%)
Male	110(77.4)	10 (83.3)	120 (77.9)
Female	32 (22.6)	2 (16.7)	34 (22.1)
Total	142(100.0)	12 (100.0)	154 (100.0)

Table-II

Distribution of animal bite cases according to educational status

LITERACY STATUS	RURAL (N= 142) Percentage	URBAN (N= 12) Percentage
Illiterate	52.0	16.3
Primary	26.3	40.6
Higher Secondary	16.7	33.1
Graduate & above	5.0	10.0

Table-III

Distribution of animal bite cases according to Age-group

Age Group	RURAL (N= 142) Percentage	URBAN (N= 12) Percentage
5 - 10 years	7.0	8.3
10 - 20 years	29.6	41.7
20 - 40 years	38.7	33.4
40 - 60 years	17.6	16.6
60 - 80 years	6.3	0
> 80 years	2.1	0

Table-IV

Distribution of cases according to the site of Bite

SITE OF BITE	RURAL (N= 142) Percentage	URBAN (N= 12) Percentage
Lower limb	67.6	91.7
Upper limb	26.8	8.3
Head & face	2.1	0.0
Trunk	3.5	0.0

Table-V

Distribution of cases according to the type of animal

TYPE OF ANIMAL	RURAL (N= 142) Percentage	URBAN (N= 12) Percentage
Stray Dog	50.0	33.3
Pet Dog	48.6	66.7
Monkey	1.4	0.0

rural areas. The high incidence of bites in rural area as compared to urban may be due to the fact that people in rural area, mainly farmers and labourers, proceed for work in early hours of the day and continue late evening, thus more exposed to bites primarily due to poor visibility. Prevalence of dog bite cases are more in rural area than in urban.

Table-VI
Distribution of animal bite cases according to their treatment seeking approach

TREATMENT APPROACH	RURAL (N= 142) Percentage	URBAN (N= 142) Percentage
Wash & Seek Medical Help	6.2	72.5
Home Treatment	47.6	10.9
Indigenous	24.3	11.4
Untreated	21.9	5.2

Table-VII
Distribution of cases according to Reasons for late reporting to Health centre for seeking treatment

Reason for Late Reporting	RURAL (N= 142) Percentage	URBAN (N= 142) Percentage
Initially taken Indigenous / Home remedy	57.2	19.6
Ignorance / Negligence	26.3	45.8
Waiting to see if animal alive	12.3	34.6
Far distance of Health Centre	4.2	0.0

Maximum number of cases had bite on lower limbs in both rural (67.6%) and urban (91.7%) areas.

Numbers of stray dog bites are more in rural area (50.0%), but in urban area numbers of bites are more of pet dogs (66.7%).

In case of animal bite, majority of people in rural area prefer indigenous methods and home remedies (71.9%) including application of chilly/turmeric powder, jhaad-phook etc, whereas, in urban area majority people (72.5%) preferred seeking medical help.

About one-fifth of study population in rural area believed in self healing of bite wound.

In both areas about 50% of bite cases show late reporting to health centre. In rural area, it was due to initial involvement in indigenous/home remedies whereas in urban area it was due to ignorance and negligence.

Majority of people in both rural and urban areas had little knowledge about rabies, its transmission, management and prophylaxis.

In rural area only (23.3%) bite cases went to Health centre for treatment and among those only about one-fourth of them completed the full course of ARV. In urban area also majority of animal bite cases (80.7%) did not completed the full course of ARV.

About 60% people in rural area were bitten by stray dog whereas in urban area majority were bitten by pet animals. In rural area majority cases took more than 2 days from exposure to reporting at ARC whereas in urban area majority cases approached ARC after 1 day.

Conclusion

Our study indicated that the proper health seeking approach of the affected population is still lacking, which is not only among people in rural areas, but also among urban population. The point to be highlighted is that majority of people believe in indigenous methods or home remedies for treating animal bite wounds and still others will do nothing and will keep it untreated. So a thorough workout is needed to organize awareness programme regarding management of animal bites in rural and urban areas.

In absence of a National Rabies Control Programme, local health authorities and Medical Institutions should take the lead to increase awareness amongst the community regarding primary prevention of animal bites as well as health problems associated with it.

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Original Article

An analysis of records of patients reporting at Anti-Rabies Clinic, Gwalior. (MP)

Ranjana Tiwari¹, SK Patne², Dhiraj Kumar Srivastava³, PC Mahajan⁴

Abstract

Introduction:

Rabies is a viral, enzoonotic, life threatening disease, invariably fatal once the symptom has occurred. Through rabies vaccine is freely available in the open market in urban and district level, but the patient dependency is on public hospital for free supply of vaccine.

Objectives:

- To study the epidemiological character of animal bite.
- To study the compliance of patients to prescribed post exposure vaccination schedule.

Material and Method:

The study is an observational study conducted over a period of one year. Case report of the patients were analyzed and study variable included were the animal bite, age, sex, time trend of disease, time of reporting to ARV clinic, category of exposure, status of dog, site of bite and treatment compliance to post exposure schedule.

Result:

A total of 3001 patients reported during the study period of one year. Majority of the cases were of dog bite. Lower limb (58) was the most common site involved followed by the upper limb. Only 48% of cases reported on time. Majority of the patients reported after the traditional management of wound or sometime after the death of dog.

Conclusion:

Sufficient availability of Anti Rabies Vaccine in Public Sector and at an affordable cost in open market is the major strategy for its control. Recent introduction of Intra Dermal schedule can also over come this problem.

Key Word: Dog Bite, Rabies, Anti rabies clinic

Introduction

Rabies is a viral, enzoonotic, life threatening disease, invariably fatal once the symptom has occurred. It is an endemic disease in India. India alone is responsible for 20000 deaths annually estimated to be two per 1000¹. Death due to rabies are grossly under reported. Majority of the rabies patients are LAMA (Lost against medical advice) or made LAMA from the hospital admission knowing that death is inevitable. Rabies is a vaccine preventable disease. Prevention in humans after animal bite depends on a combination of interventions including post exposure prophylaxis and according to WHO post exposure prophylaxis is estimated to prevent 90% deaths in Asia and Africa¹.

Through rabies vaccine is freely available in the open market in urban and district level, but the patient dependency is on public hospital for free supply of vaccine. Numbers of patients are steadily increasing day by day in public hospital because of increase in community awareness, unaffordable cost of vaccine and fear of death.

So the present study was under taken with objectives of.

- To study the epidemiological character of animal bite.
- To study the compliance of patients to prescribed post exposure vaccination schedule.

Material and methods

The present study is an observational study conducted at ARC (Anti Rabies Centre) under Department of Community Medicine, G. R Medical College, Gwalior (MP) over a period of one year from 1 Jan to 31Dec 2008. During this period all the patients registered in OPD were taken as the study population. Case report of the patients were analyzed and study variable included were the animal bite, age, sex, time trend of disease, time of reporting to ARV clinic, category of exposure, status of dog, site of bite and treatment compliance to post exposure schedule.

Data were statistically analyzed using suitable statistical test in the department.

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Table I:
Showing the distribution of cases according to the type of animal bite

Animal Bite	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Dog	304	309	305	292	259	228	231	200	199	181	168	244	2854
Cat	1			1		2					1	1	7
Cow								1					1
Buffalow	3												3
Pig								2					2
Donkey			1					1					2
Horse			2			1			1			1	5
Fox										2			2
Monkey	2	3	8	2	3	5	1	5			4	1	34
Mongoose			1			1	2	1					5
Gonndwa					1			3	1				5
Beer											1		1
Leopard											6		6
Rat		1		1			1		3				6
Bird (Crow)								1					1
Squirrels					1								1
Lizarards					1					1			2
Human	1												1
Other wild animal bite	1				3	2	1	3	1	3	3		17
Milk Consum-ption		4	5	2		4	2	6	1	6			30
Exposure to Rabid pt.	2		3				1					9	15
Total	314	317	325	298	268	243	239	223	140	193	183	258	3001
%	10.4	10.5	10.8	9.9	8.9	8	7.9	7.4	4.7	6.4	6	8.5	

Result

A total of 3001 patients reported during the study period of one year. Of this majority of the cases were of dog bite. Animal bite cases reported highest in the months of Jan- March and then showing declining trend, less number of cases are reported in the month of September, followed by an increase in the subsequent months. (Table I).

Dog bite cases contribute 95.3% to over all bite cases. Monkey Bite contributes 1.13% in wild animal bites. Though dogs are the major contributors but monkey are also the common animal associated with animal bite cases. (Table II).

Out of the total bite cases 83.28% were male and 16.71% were female. Maximum cases were contributed by working adult group (47.7%) followed by the school going child (22.6). (Table III).

Lower limb (58) was the most common site involved followed by the upper limb (17.86). Upper limb, head, scalp & face are the common site of bite among children. (Figure I)

Treatment for the prevention of rabies in human exposed to suspected rabid dog should begin within 24 hours. Patients presenting after 24 hours or later are prone to developing the risk of rabies. Only 48% of cases reported on time. Majority of the patients reported after the traditional management of wound or sometime after the death of dog. (Table IV)

Dog was alive only in 64.6% cases and killed in 6.2% cases. In 20.4% of cases the dog is untraceable.

Majority of the cases (79.4%) were having category II exposure followed by Category III and Category I. (Table V).

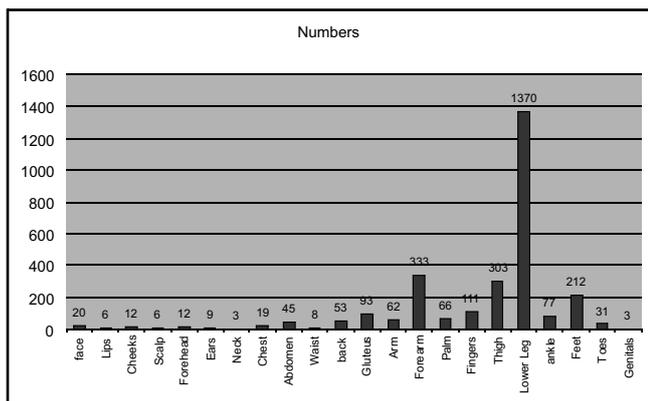


Fig. I : Showing the site of animal bite.

Table II
Showing the distribution according to the category of animal bite

S.No	Animal bite	No. of cases	Percentage
1	Domestic	2861	95.3
2	Peridomestic (Cow, Buffalo, pig, donkey, horse)	13	0.4
3	Wild Animal (Monkey, Fox, Bear, Leopard & other wild animal bite)	71	2.4
4	Milk consumption of a rabid animal	30	1
5	History of contact with rabid patients	15	0.5
6.	Other bites not reported to cause rabies (squirrel, lizard and human bite)	11	0.3

Table III
Showing the distribution of cases according to the age and sex.

Age	Male	Female	Total	Percentage (%)
0.1	1	0	1	0.03
1-4	123	29	152	5.3
5-10	456	89	545	19
11-17	564	83	647	22.6
18-60	1120	242	1362	47.7
>60	113	34	147	5.2
Total	2377	477	2854	

Table IV
Showing the distribution of cases according to the reporting time

Sl.No.	Reporting Time	No. of cases	Percentage (%)
1	Withing 24 Hrs.	1379	48.31
2	2-6 days	859	30.09
3	7 - 10 days	349	12.22
7	10 days after	267	9.35

Table V
Showing the distribution according to the category of bite

Type of Bite	No. of cases	Percentage (%)
Category I	140	4.90
Category II	2266	79.40
Category III	448	15.69

The cases in Category II were prescribed Anti Rabies Vaccine only. In Category III the patients were prescribed Anti Rabies Vaccine and rabies immunoglobulin [RIG].

71.8% of the patients under category II and 97.4% of Category III patients the completed course of Anti Rabies Vaccine.

Discussion

Animal bites are still a major public health problem in developing countries like India. Both children and adult are prone to it. In the present study, it was noted the present study that 47.7% of all the patients reported to Anti rabies Clinic were in the age group of 18-60 years. This is the most productive age group. As a result of this they have to move frequently from one place to another for their work making them more prone to the bite by animals. This is similar to the finding of our pervious study published in this journal² and that of other researchers³⁻⁸.

Majority of the animal bites are due to Domestic animals like dog or cat. However bite from wild animal like monkey can also be a major contributor. Children and adult tend to play with Domestic animal, whether pet or street, irrespective of knowing their mood and behavior. Sometime people collide or put their feet on them and thus get bitten accidentally as a mechanism of defense. Other researcher have also quoted similar finding in their study^{2,4,5}. Similarly, the most common site of bite among patients is lower limb followed by arm.

It was noted in the present study that nearly half (48.3%) of the patients reported to out Anti Rabies Clinic within 24 hours of animal bite. This is of a significant importance as the treatment of animal bite should be started within 24 hours of animal bite. However, the remaining 52% of the patients reported after 24 hour of bite making them more prone to rabies. Misconceptions about rabies, traditional medication and cost of treatment in the markets are the major hurdles in starting early management of animal bite. Agrawal N and Reddaiah VP³ also noted similar reasons for delay in the management of animal bite among their study group in Ballabgarh.

It was noted in the present study that majority of the animal bites belong to category II (79.4%) followed by

category III (15.69%) and was caused by dog bite who were alive (64.6%). Other researchers have also noted similar proportion in their study^{2,4,6-8}.

It was observed in the present study that majority of the patients were in Category II. They were prescribed Anti Rabies Vaccine. For Category III bites, all the patients were given Anti rabies Vaccine and RIG. Recent introduction of Indra Dermal Injection of Anti rabies Vaccine can solve this problem of limited supply of TCVs, to a large extent. However it needs to be universalized and sufficient training has to be given to make it a successful strategy.

It was also observed in the present study that 71.8% of Category II patients and 97.4% of Category III patients received the complete course of Anti Rabies Vaccine. However of this 26.9% of Category II and 24.4% of Category III patients showed some delay in receiving schedule doses by 2-6 days. Remaining 28% of Category II and 2.5% of Category III did not receive the complete course of Anti rabies vaccine. This could be due to unawareness about the importance of receiving the complete course of Anti Rabies Vaccine in an animal bite case. These patients are prone to the development of rabies as incomplete immunization does not lead to the development of sufficient immunity against rabies. Studies carried out by Agrawal N and Reddaiah VP³ had also shown similar result in their study.

Conclusion

Animal bites are the major issue of public health importance. Animal Control has not been a successful

strategy in India especially for stray dogs. Thus rabies control primarily rests on post exposure prophylaxis. Sufficient availability of Anti Rabies Vaccine in Public Sector and at an affordable cost in open market is thus the major strategy for its control. Recent introduction of Intra Dermal schedule can also overcome this problem.

Proper patient counseling about the complete course can help in increasing the compliance of patients. IEC activities addressing the misconceptions about the Rabies should be undertaken simultaneously.

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Announcement

The APCRI Newsletter is published every six monthly, in October and in April. APCRI members and the members of the Scientific Community are requested to contribute News Clippings, Photographs and Reports on Scientific activity on Rabies and Related matter for publication in the Newsletter.

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Original Article

Perception of Paramedical Students on Rabies and its prevention

S R Haldar¹, D M Satapathy², D Jena³, R M Tripathy⁴

Abstract

The study was conducted to assess the knowledge and perception of paramedical workers regarding animal bite & its management coming for training in the field practice area Ankuli of MKCG Medical College Hospital Berhampur. It was a cross sectional study. A total 108 Paramedical students were interviewed about their knowledge on Rabies, Primary wound care and rabies biological. All students knew that Rabies is a fatal disease. 51% students agreed about wound washing with soap & water. 27.7% told that karela leaf / turmeric paste should be applied immediately after animal bite wound. Though NTV has been replaced by TCV since 2004 still 38% have a perception that NTV is given over periumbilical area. Only 6.5% of students have an idea that anti rabies vaccine can be given over gluteal area. 70% told that alcohol should be avoided but non had any perception of avoiding drugs as Chloroquin & steroids.

Key words: Paramedical workers, Knowledge, Rabies biological

Introduction

Rabies is an important public health problem in India. Maximum number of deaths due to human Rabies are reported from our country. It is estimated that In India 1.7 crore animal bite exposures lead to 20,000 deaths. 95% of the 50,000 global rabies deaths are because of dog bites^{1,2}. Rabies is a 100% fatal disease which can be prevented by timely and appropriate Anti Rabies prophylaxis. Primary care of wound, proper categorisation of bite & use of Rabies Biologicals as RIG and Vaccine can prevent such a dreaded disease. Health personnel in our country have an important role in preventing such human casualties. Though Medical Officers have a major role but the gross inequality in the Doctor-Population ratio makes them unavailable to the community. However nearly 95% of the health personnel at a primary health centre are trained paramedics as Nurses, Pharmacist, Health supervisors & workers.

The paramedical personnel constitute one of the pillars for provision of primary health services to the Community. Their presence at a peripheral health institution 24×7 makes them to act as the first contact for health problem faced by the community. The perception and attitude of paramedical health personnel on Rabies & its prevention is very essential as early & appropriate wound care is an important component of Anti Rabies treatment. The present study entitled "Perception of Paramedical students on Rabies and its prevention" was therefore carried out with the following objectives.

Objective

1. To assess the perception of paramedical students on Rabies.

2. To find out their knowledge on primary wound care.
3. To find out the knowledge on rabies biological as RIG & Vaccine.

Methodology

The Para Medical students (LHV, GNM, MSc Nursing students) attending the Urban health centre/ Epidemiology unit of Department of Community Medicine, MKCG Medical College Hospital during their coarse study/ internship were interviewed regarding their perception on Rabies and its prevention over a pre-tested & scientific designed Questionnaire. The data thus collected was compiled and analysed in the Department of Community Medicine.

Observation and Discussion

A total 108 paramedical students were interviewed about the knowledge & perception of dog bite management & rabies. All students knew that Rabies is a fatal disease but 31.5% have a misconception that pet dog can not transmit Rabies. 20.4% have an idea that rodents like rat can be a vector for Rabies.

Regarding Primary wound care, 51% of students knew about thorough washing of bite wound with soap & water and 30.5% told application of betadine /any topical virucidal on wound but in a study by Vinay M *et al* it was 53% and 35.2% respectively³. In our study 27.7% of paramedical students have an idea of karela leaf or turmeric paste application on bite site but in a study of knowledge of college students on rabies by Vinay M & *et al* was 37.8%. Only 29% of respondents had the knowledge that both RIG and ARV has to be given after animal bite but rest majority (71%) had no perception on RIG.

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Though NTV has been discontinued since 2004 & CCV is used throughout the country, 38% students have still an idea that NTV is given in peri-umbilical area.

In a study by Harish BR & et al 71% of doctors have a perception that TCV should be given over arm or antero lateral part of thigh⁴. But in our study it was 55.5% only.

According to “National Guideline for management of Animal bites” suturing of wound should be avoided as far as possible. If unavoidable, minimum loose sutures should be applied after adequate local treatment along with proper infiltration of anti rabies serum⁵. In this study 12% of students have an idea that bandage and suturing is avoided in dog bite cases.

70% of the students have an idea alcohol should be avoided during treatment. But none had the knowledge

that immunosuppressives as steroids & Chloroquine are also avoided that period. 11% of students still have an idea that certain foods and heavy works is restricted during the treatment.

Conclusion

The present study revealed that knowledge of paramedical students regarding animal bite management is inadequate. Their study curriculum was also verified and found that a chapter on Rabies and its prevention is not present specially for the grass root level health workers. The paramedical students are the future grass root level health provider of the community. As dog bite is a common problem faced by the community and India reports the highest number of rabies death, it is time that animal bite management should be taken as a study topic for the paramedical students. Formulation of a national programme for prevention and control of Rabies in India will have a definite impact in inclusion of such a dreaded disease as Rabies for the Paramedical students. This will not only enhance their knowledge on rabies prevention but also help in proper management of animal bite victims in rural and far-flung areas of our country.

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Table
Knowledge on Wound care & Rabies

Knowledge on Rabies		No.& % age n=108
	Rabies is a fatal disease	100%
	Pet dog does not cause Rabies	34(31.5%)
	Rat bite can transmit Rabies	22(20.4%)
Wound care	Wash wound with soap & water	55(51%)
	Using topical virucidal/betadine	33(30.5%)
	Applying karela leaf/ turmeric paste	30 (27.7%)
	To avoid bandage & suturing	12%
Knowledge on rabies biologicals	No idea on RIG	76(71%)
	Both ARV &RIG are given	31(29%)
	ARV on deltooid/ant-lat part of thigh	60(55.5%)
	Persistence of NTV use(abdomen)	41(38%)
	TCV over gluteal area	7(6.5%)
Advice to animal bite victim	To avoid Chloroquine & steroids	0
	To avoid alcohol	76(70%)
	Restriction of some food & work	12(11%)

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Original Article

A study of Profile of re-exposure cases and their compliance to the Intra Dermal Rabies Booster Vaccination at the Anti Rabies Clinic of Mandya Institute of Medical Sciences, Mandya.

Mahendra B J¹, Harish B R², Manjunath M³, Nagaraja Goud⁴, Anil Kumar K⁵

Abstract

Objectives:

1. To describe the socio demographic profile of re exposure cases reporting to the ARC of MIMS
2. To assess the compliance to IDRV schedule amongst the re-exposure cases

Study Setting:

Anti-Rabies Clinic of Mandya Institute of Medical Sciences, Mandya

Study Period:

1st Jan 2011 to 31st Dec 2011

Study Subjects:

All re exposure cases who reported to the ARC of MIMS during the study period were included in the study.

Results:

A total of 102 re exposure cases reported to the ARC of MIMS during 2011. 74(72.5%) of them were males. 38(37.3%) were aged less than 15 years. 70 (68.2%) were from the rural areas. 78(76.4%) of them had category III exposure. 96(94.1%) of the exposures were due to dog. 86(84.3%) of them belonged to lower socioeconomic status. 91(89.2%) had performed wound toilet before reporting to the ARC. 80 (78.4%) of the 102 re exposure cases completed the required vaccination schedule.

Key Words: Rabies, Post exposure Prophylaxis, Re exposure

Introduction

Rabies continues to claim an estimated 20,000 lives annually in India¹. The reason for this high number of deaths due to a disease that is preventable is attributable to lack of awareness among people about management of animal bites which prevents them from obtaining medical care including Post Exposure Prophylaxis (PEP) and also non compliance to the PEP schedule^{2,3,4}. This situation exists in spite of appropriate PEP being available, the use of which would further bring down the occurrence of Rabies deaths in India significantly.

Studies have shown that the drop out rates in people receiving PEP are high and despite efforts made by health professionals the drop out rates continue to remain high⁴. The WHO recommends two booster vaccinations for persons who have been previously received complete PEP or Pre Exposure Prophylaxis (Pr EP). There is very limited information on the PEP among the re-exposure cases⁵ and there is a need to study the compliance to the 2 booster

doses and hence the present study was taken up at the Anti Rabies Clinic of the Mandya Institute of Medical Sciences

Objectives

The present study was conducted with the following objectives

1. To describe the socio demographic profile of re exposure cases attending the ARC of MIMS
2. To assess the compliance to IDRV schedule amongst the re exposure cases attending the ARC of MIMS

Methodology

This study was conducted in the ARC of MIMS. All cases of re-exposure to animal bite who reported to the ARC of MIMS (Those who had records for having received PEP / Pr EP) during the period of 1st Jan 2011 to 31st Dec 2011 were included in the present study. All those who did not have any information of the previous exposure were excluded from the study.

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Results and discussion

During the study period 4256 new animal bite cases reported to the ARC of MIMS, among these 102 (2.4%) were cases of re-exposure. 38 (37.3%) of the re-exposure cases were children aged less than 15 years of age. Majority of the re-exposures 74 (72.5%) had occurred among males (Table 1).

Table 1

Distribution of re exposure cases by age and Sex

Age	Females	Males	Total (%)
15 years	06	32	38 (37.3)
15 years	22	42	64 (62.7)
Total	28	74	102 (100)

Most of the re-exposure cases 70 (68.2%) were from rural areas. 86(84.3%) of the cases were from lower socioeconomic status as classified using the modified B G Prasad classification. 78(76.6%) of the re exposure cases had category III exposure (Table 2).

Table 2

Distribution of re exposure cases by category of exposure

Category of exposure	Females	Males	Total (%)
Cat I	Nil	Nil	Nil
Cat II	09	24	34 (33.4)
Cat III	18	50	78 (76.6)
Total	28	74	102 (100)

Exposure amongst 96(94.2%) of the bite victims were to Dogs and 5(4.9%) to Cats and 1(0.9%) was exposed to a suspect rabid Cow. 41(42.7%) of the dogs that the study subjects were exposed to in the present study were either community owned or stray and 55 (57.3%) were pet dogs.

The mean time interval between the first and subsequent exposure was 11.3 ± 9.4 months and the range was from 1 to 36 months

It was noted in the present study that the majority 73 (72.3%) of the subjects were victims of a provoked bite (the total number was 101 as 1 case was exposed to a suspect rabid cow)

The mean time of reporting to the ARC of MIMS after re exposure was 24.24 ± 24.06 hrs and the range was from 1 hour to 144 hours. It was observed to be not statistically significant compared to the time of reporting of the same victims during the previous exposure, which was 29.9 ± 38.5 hrs. This delay of nearly a day after the exposure in reporting to the ARC in re exposure cases is a matter concern as all the subjects were aware of the need to report

early as was advised during their previous exposure (The high standard deviation is attributable to extreme delays on the part of some victims).

91(89.2%) had performed wound toilet before reporting to the ARC. This is higher than the findings in our own center as was seen among the first time exposed subjects⁴.

It was noted that none of the subjects in the present study had applied irritants to the bite wound.

80 (78.4%) of the 102 re exposures cases completed the required booster vaccination schedule of 2 doses on days 0 and 3. This is also again a matter of concern though compliance to the vaccination schedule amongst re-exposure cases is considerably higher at our centre compared to compliance amongst people who have been exposed to animal bite for the first time^{4,6}.

Conclusion

It is evident from the results of the present study that the problem of re-exposure is present in the study area. The Time gap between the exposure and report at ARC is marginally better among re-exposure cases as compared to first time exposed. The performance of wound toilet was better among the re-exposure cases. These differences were however not statistically significant. It was satisfying to note that none of the re-exposure cases had applied irritants to the bite wound. It was a matter of concern that 22 (21.6%) of the re-exposed cases defaulted to the booster schedule.

Recommendation

Similar studies need to be done on a larger scale and at different centers to assess the burden of re-exposure.

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Review Article

Equine Rabies Immunoglobulin: an indispensable immunotherapy

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Summary

Human RIG represents the gold standard in the Post Exposure treatment of rabies, but HRIG is very expensive, available only in limited quantities and that too in industrialized countries. Its high cost makes it virtually unaffordable in developing countries. In India, the cost of single treatment with HRIG is equivalent to 6 months wages of an Indian laborer. But, the modern bio-engineered heterologous serum (ERIG) has come out as a safe and affordable alternative to HRIG. The proper management of the disease, supplemented with ERIG can save many more lives which may be lost just because of improper and unaffordable post exposure management of this dreadful disease.

Key Words: Antirabies serum, Equine Rabies Immune Globulin, Human Rabies Immune Globulin

Introduction

Although rabies is to be considered as a disease that should be controlled on a priority basis, unfortunately it remains as a neglected disease in majority of the countries particularly in Asia¹. This disease is caused by a virus of the family *Rhabdoviridae* belonging to the genus *Lyssavirus* and affects warm-blooded animals, resulting in acute encephalitis with fatal outcome. The susceptibility to rabies infection depends upon the virus strain, genetic make up of the host, concentration of neurotransmitter receptors at the site of bite, inoculum size and very importantly proximity of the bite to the central nervous system of the host. Rabies has been a continuing problem in several countries across the globe and posed a challenge in front of researchers².

The seriousness of the disease can be estimated by the fact that WHO has cosponsored the "first World Rabies Day (WRD), along with the Alliance for Rabies Control (ARC) and Centre for Disease Control and Prevention, Atlanta (CDC), on 8 September 2007, with the aim of dispersing awareness about the impact of rabies, its easy prevention and to control and eliminate the disease in animals as well as humans. **Over 393,000 people in 74 countries participated and over 54 million people across the world were educated through the various activities performed on the first World Rabies Day. The next World Rabies Day was organized on 28 September 2009 across the world³. In the current year also, 28th September will be celebrated as World Rabies Day.**

Epidemiology: Public health impact of rabies

Rabies has a worldwide distribution with the exception of Oceania and Antarctica continents, which are luckily free from it^{4,5}. Although nearly 50 countries are free from

rabies nearly 100 countries across the world are the victims of this deadly virus.

Rabies has been reported to take **55,000** lives annually across the world of which 31,000 deaths occurs only in Asia. Rural population contributes about 90% of this total mortality⁶. The main affected population among humans is children and young adults. The deaths from rabies are likely to be grossly under-reported in a number of enzootic countries, particularly in the youngest age groups. Approximately 10 million people receive post-exposure prophylaxis annually and is estimated to prevent nearly 330 000 deaths in Asia and Africa. Statistics indices projects that rabies is globally responsible for the total loss of 1.74 million disability-adjusted years (DALY) each year of which 996,000 cases are contributed by the Asian countries⁷. In Asia, out of around 2.5 billion people exposed to the rabies infection every year; antirabic treatment is availed by only 8 million people. The annual global expenditure for rabies prevention is, by conservative estimates, >US\$ 1 billion. Although Public awareness for wildlife and domestic animals, availability of vaccines (for pre-exposure treatment) and antiserum (for post exposure treatment) have remarkably resulted in decline in the incidences of the disease. But, the frequency of post exposure prophylaxis is expected to rise dramatically as all countries are willing to replace Neural Tissue Vaccines with modern, safe and highly potent Cell Culture Vaccines.

Rabies in India

Rabies is a major health problem in India too and is responsible for extensive morbidity and mortality. Human cases of rabies are reported from all over the country, with the exception of Andaman & Nicobar and Lakshadweep Islands. It is estimated that in India, every 30 minutes a life

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is taken away by rabies. The Association for the Prevention and Control of Rabies in India (APCRI) reported in 2004 that 20,565 humans died in a year from Rabies in India. The annual incidence of animal bites was estimated to be 17.5 million per year and the majority of the victims are the children younger than 15 years.

Use of Hyper immune serum in the post Exposure Prophylaxis

Though the treatment of this deadly disease of great public health problem, started around 124 years ago with Louis Pasteur but still rabies is a public health problem in almost all the countries, which are victims of rabies. The disease may be treated in the pre as well as post exposure period to the virus. The vaccines are the means of protection in the pre-exposure period and are recommended for veterinarians, laboratory technicians; people involved in research and the personnel that work with animals, because of having risk to the exposure to virus^{5,8,9}.

On the other side, post-exposure prophylaxis is indicated for people accidentally exposed to the virus. It consists of vaccination against rabies or a combination of the vaccine with hyper immune serum. The use of hyper immune serum is intended to permit the neutralisation of the virus before it penetrates the peripheral nerves and to provide enough time for the immune response to develop¹⁰.

Historical perspective to the use of Hyper-immune serum

In 1945, Habel demonstrated that the vaccine must be administered along with the serum for obtaining better results in preventing post-exposure causality in rabbits¹¹. In 1950, the World Health Organization recommended the use of anti-rabies serum¹². At present hyper immune serum was considered coadjuvants in rabies prophylaxis and became part of most of the anti-rabies treatment services in the world^{13,14}.

However, if prophylactic serum is given after one week of the initiation of vaccination, then probably the serum therapy loses its importance, as unnecessarily it would suppress the natural antibody formation response in the host body¹².

Types of Immunoglobulins

Different from the vaccine that supplies the antigen for the body to produce the antibodies necessary, the serum is the ready antibody. There are three classes of rabies biologicals commercially available for passive immunization: human rabies immunoglobulin (HRIG), equine rabies immunoglobulin (ERIG), and highly purified F(ab')₂ products produced from ERIG.

Human Rabies Immunoglobulin (HRIG): Human rabies immunoglobulin (HRIG) produced under good

manufacturing practices is virtually devoid of serious adverse reactions. The earliest attempt to prepare a rabies immune globulin of human origin has been reported by Habel¹⁵. Later on the HRIG was raised in different variants by different researchers like Anderson and Sgouris¹⁶, Winkler et al¹⁷, Sikes¹⁸ and Cabasso et al¹⁹.

Human rabies immunoglobulin is a liquid or freeze-dried preparation for passive immunization, containing immunoglobulin, mainly IgG. It is obtained from the plasma of donors immunized by repeated rabies vaccination. These preparations contain specific rabies antibodies for neutralizing the rabies virus. **The use of homologous immunoglobulins for human post-exposure treatment virtually eliminates the risk of anaphylaxis and serum sickness associated with heterologous serum products.** The dose of the human rabies immunoglobulin (HRIG) is 20 IU per kg body weight (maximum 1500 IU). HRIG does not require any prior sensitivity testing. HRIG preparation is available in concentration of 150 IU per ml. Half of the calculated dose is administered by intra muscular injection and half by infiltration around the wound²¹.

Constraints to the use of HRIG

Homologous HRIG no doubt has an obvious advantage over the heterologous ERIG as the administration of the former minimizes the risk of anaphylaxis or serum sickness. Although, human RIG represents the gold standard concerning passive immunization for the treatment of rabies, but it is very expensive, is available only in limited quantities and available mainly in industrialized countries. In India, the cost of single treatment with HRIG is approximately Rs. 15,000/-, which is equivalent to 6 months wages of an Indian laborer and makes it almost unaffordable²¹.

Heterologous antirabies Immunoglobulin

Utilisation of anti-rabies serum of equine origin (ERIG) for prophylaxis in humans was acceptable in the medical practice only a few decades ago, because at the time of its inception ERIG induces important reactions in the recipients^{22 & 23} has suffered from bad publicity due to fear of inducing anaphylaxis and serum sickness reactions²³⁻²⁴.

Although the frequency of serum related reactions is relatively low and is generally not fatal, it is always recommended that serum administration should take place only in the hospitals equipped with proper facilities for control of eventual anaphylactic reactions²⁵.

Anaphylaxis reactions occur typically in the individuals who are second time receiving the serum therapy, the first serum administration is responsible for inducing sensitization²⁶. The serum reaction is manifested by fever, urticaria, arthralgia, lymphadenopathy, proteinuria and

peripheral neuropathy. The other common symptoms in sensitive individuals are pain at the site of serum infiltration, rashes at site of infiltration and urticarial rash. Even after negative skin test, 1 - 6% of the patients may develop adverse reactions to heterologous serum administration²⁷.

Historical Perspective of Production of Equine Rabies Immunoglobulin (ERIG)

Development of hyper immune serum destined to passive immunization against Rabies; occurred simultaneously with the anti rabies vaccine²⁸. Babes and Cerchez²⁹ first observed the efficacy of rabies immunoglobulin. In 1950, WHO recommended the use of anti rabies serum due to the high number of studies performed since 1889³⁰. The purified equine-based rabies antiserum (ERIG) possesses specific activity of neutralizing the rabies virus^{31,32}.

In India, both public and private sectors are engaged in manufacturing the anti rabies serum. Out of the total 16 million vials /year global market demand, 5-6 million vials/year are required in India. Antirabies serum in India was first prepared in 1903 by Central Research Institute Kasauli (**earlier known as Pasteur Institute of India Kasauli**) a Government of India concern³³. Haffkine Biopharmaceuticals Corporation Ltd. Mumbai; Vins Bioproducts, Hyderabad; Cadila, Pharmaceutical, Ahmedabad; Bharat Serum & Vaccines Ltd, Thane and Serum Institute of India, Pune are among the other leading Government and private manufacturers in the trade. ERIG has been prepared in the past using a combination of inactivated and fixed (live) strains of rabies virus³⁴. Fuenzalida and Palacios³⁵ developed a better method for hyper immunization of horses. The animals were given a series of subcutaneous injection of anti rabies vaccine in increasing concentration followed by simultaneous subcutaneous, intra-peritoneal and intradermal injections of pure virus in Freund's incomplete adjuvant. The horses were bled 20 days after completion of 48 days immunization schedule³⁴. It consists of a solution of purified immunoglobulin raised in horses and mules and is obtained from the serum of these hyperimmunized animals.

A brief introduction to the production of ERIG

ERIG is prepared using various immunogenic preparations, consisting usually of a combination of inactivated and fixed strain of rabies virus³⁴. The animals are given a series of injections of the vaccine. All the injections are given subcutaneously into the lateral aspect of the neck. The standard immunization schedule lasts for about 15 weeks and the first manufacture bleeding is done two weeks later. The blood is collected, centrifuged and the serum without erythrocytes is collected for preparation of the product that contains the antibody.

Immunization of equine with cultured rabies antigen was also tried by different agencies for anti rabies serum production; using two-types of antigens *i.e.*, live and inactivated, both prepared from VP strain of rabies virus cultured on BHK-S13 cells and maintained by weekly passage. First stage involved immunization with inactivated antigen followed by a second stage using live antigen in a volume of inoculums as large as 100 ml, until a satisfactory titre was achieved³⁴.

A therapeutic antirabies immunoglobulin preparation of equine origin for human use was produced at the Queen Saovabha Memorial Institute, Bangkok, Thailand by immunizing horses with a purified Vero cell rabies vaccine³⁶.

ERIG: Recent Developments

Anti-rabies serum, routinely used nowadays, consists of a solution of purified immunoglobulins obtained from the serum of hyper immunised horses inoculated with rabies virus. Purification techniques can be used to reduce the risk of sensitisation to ERIG. Their objective is to maximize the specific activity and to minimize the allergenic substances in the product. The purification of immunoglobulins from human plasma is carried out according to the technique of Cohn et al, based on the selective precipitation of proteins by chilled ethanol. This technique has been adapted for purifying heterologous immunoglobulins.

Safer production of equine serum is recommended to eliminate or minimize the risk of anaphylactic type hypersensitivity and serum sickness reactions. With the advancement in technology, now a days the anti rabies serum preparations are purified by specific enzyme treatment, Ammonium sulfate fractionation and thermo coagulation³⁷. It minimizes the foreign protein burden, which results in reducing the incidence of hypersensitivity therefore making the treatment more safe and efficient^{38,39}. The incidence of hypersensitivity reactions during the early 1990s, were reported to be as high as 40 % in the individuals receiving anti rabies serum therapy whereas nowadays with the availability of more refined ERIG, the anaphylactic reactions occurs are very few and this frequency reported in the recent past is 1:40,000 patients⁴⁰. A recent study also supports this fact, when prophylactic treatment with ERIG was given to 33 individuals; none of them developed any type of hypersensitivity or serum sickness reactions mediated by immunocomplexes⁵.

Barriers to the post exposure treatment of the disease

It was also proved that the mortality resultant from severe bites is reduced tenfold if the serum is administered associated with vaccine^{41,42}. But, the common factors

contributing to the disease seems to be the lack of awareness among the public and health authorities; non-availability, short supply and high cost of modern vaccines and immunoglobulin, and lack of keen interest of the Government authorities in controlling the canine rabies on war footing basis.

WHO Recommendations for Passive Immunity

Use of antirabies immune serum or globulin of equine origin in the post exposure immunization of man has become accepted in medical practice only during the past three decades⁴³. WHO strongly recommends the administration of rabies immunoglobulin along with vaccine in class III exposures (single or multiple transdermal bites), scratches and contamination of mucous membrane with saliva. Presently both human rabies immunoglobulin (HRIG) and purified equine rabies immunoglobulin (ERIG) are available. But HRIG is very expensive, as it is imported and also not freely available in many countries. Whereas, ERIG is indigenously produced, less expensive and easily available. This treatment is especially important when the incubation period is anticipated to be short⁴³. Although, HRIG is an ideal product with no adverse reactions, but its cost and less availability are the limiting factors.

Dosage and administration of ERIG

WHO recommended human dose of equine-based RIG as 40-IU/Kg-body wt. As much as possible, the serum should be infiltrated into and around the wound area. All the wounds should be infiltrated with RIG. If the total volume of RIG is not sufficient to infiltrate all the wounds, it can be diluted with normal saline (up to 3 times) before administration. RIG has to be given as a single dose and should not be repeated. After local infiltration, the remainder of the serum should be given intramuscularly in the gluteal region. Before administering the ERIG the instructions by manufacturer on the leaflet accompanying the antiserum must be followed. The ARS produced for use in India contains 300 IU per ml. If there was complete post exposure or pre exposure treatment in past one year with tissue culture vaccines there is no need for administration of RIG⁴⁴.

Other rabies biological products

F(ab')₂ products: F(ab')₂ fragments are obtained by cleavage of the immunoglobulin by a proteolytic enzyme, pepsin, followed by separation of the F(ab')₂ fragments from the Fc fragment. Many of the ERIGs now available are produced in this way. F(ab')₂ fragments are cleared more rapidly in vivo than intact immunoglobulins. Undesirable side-effects are rare and are similar to those listed above for ERIGs.

Rabies immune globulin (RIG) is essential for post-exposure prophylaxis but is expensive and is not widely

available. A monoclonal antibody cocktail is useful for post-exposure treatment of mammals for rabies and rabies-related viruses. The cocktail is immunoreactive with both glycoprotein and nucleoprotein epitopes of rabies virus and is cross-reactive with rabies-related virus *Duvenhage* and *Mokola*. The specific virus neutralizing activity is higher than human or equine anti-rabies hyper-immune sera presently recommended by the World Health Organization as the post-exposure therapy of choice. Rabies virus-neutralizing human monoclonal antibodies (Mabs) were evaluated in vitro and in a Syrian hamster model as a potential future alternative.

Considering the fact that globally, approximately 10 million people each year are treated after exposure to rabies. Some 40,000 to 70,000 people die of the disease each year, mainly in Africa, China and India. Post exposure prophylaxis for severe bites requires both active immunizations, using vaccines and passive immunization in the form of rabies immunoglobulins (RIG), Zydus and WHO are developing next-generation biologicals to fight rabies. Rabies monoclonal antibodies (MAbs) are expected to be an innovative therapy and can emerge as a potent alternative. While the rabies vaccine induces active immunity, the Rabies monoclonal antibodies can be safely administered with the vaccine to provide immediate passive neutralizing activity.

Equine Rabies Immunoglobulin: A safe substitute for HRIG

Human RIG is available in confidential quantities on specific markets and is too expensive approximately five times more expensive than purified horse serum. Hence, where HRIG is not available or affordable, purified equine immunoglobulin (ERIG) or F(ab')₂ products of ERIG should be used. The adverse-reaction rate of patients receiving highly purified ERIGs has been reduced to <12%. Most of the new ERIG preparations are highly purified commercial preparations. These are potent, safe and considerably less expensive than HRIG. Moreover, the occurrence of adverse events has been significantly reduced. This product is available in around 1500 IU/ vial, each vial costing about Rs. 350-450 in India.

To conclude, in view of the high costs of rabies immunoglobulin of human origin (HRIG), heterologous (mainly equine) immunoglobulins are required for the prevention of rabies in persons who have been severely exposed (category III) to the virus. Since RIG should be administered in all category III exposures and category II exposures involving immunodeficient individuals, it should be made available at all the treatment centres in the country at an affordable price to prevent innocent deaths. If used under trained medical supervision, the use of highly purified horse immunoglobulin will save many precious lives, which are lost just because of non-availability and the

cost involved in the Post exposure treatment using homologous rabies immunoglobulin.

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ASSOCIATION FOR PREVENTION & CONTROL OF RABIES IN INDIA (APCRI)

Guidelines for applying for “Young Scientist Award 2012”

1. The applicant can either be a Medical or Veterinary person with a postgraduate degree or diploma.
2. Age of applicant should not be more than 40 years as on 1st July 2012.
3. Application with full details of the research work in the field of Rabies should be submitted to Secretary General*, APCRI (in sealed cover) on or before 31st May 2012 through head of the institution where he / she has completed the research work.
4. Research work(s) carried out as a project or a scheme or departmental research or P.G researches are eligible for consideration.
5. The research should have been carried out during the proceeding 5 years.
6. The research should have been carried out in India.
7. Evidence of age (Date of birth) should be enclosed along with the application.
8. Only life members of APCRI are eligible to apply for the award.
9. The Award committee of APCRI reserves the right to defer the award if suitable candidates are not available in the particular year and the decision of the committee will be final.
10. The award carries a cash prize (paid by Demand Draft) of Rs 5,000/- a citation & a certificate which will be given during the conference.
11. One award will be given per year.
12. The young scientist who applies & gets the award shall make the presentation of his/her research work during the annual conference of APCRI during the same year. He/she will be given Travel (2 tier AC train) fare & an amount of Rs 3000/- towards accommodation & incidentals.

* **Prof. (Dr.) Thomas Mathew**

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Association for Prevention & Control of Rabies in India (APCRI) Application for “Young Scientist Award 2012”

1. **Name:** _____
2. Date of Birth & Age: _____ Yrs _____
3. Sex: _____
4. **Institutional address:** _____

5. Qualification(s): _____
6. Present designation: _____
7. Phone Nos: Office): _____ (Res): _____ Mobile: _____
8. Fax: _____
9. E-mail (s): _____
10. **Topic of research (s) work undertaken** (enclose only details of work done in the field of rabies): _____
11. Place & year during which research was undertaken: _____
12. Training undergone (relevant to rabies): _____
13. Total years of Experience: _____ Teaching: _____ Research: _____
14. Awards/ Medals / Fellowship received (enclose copies) _____
15. Total number of research papers published (relevant to rabies): _____
National Journals _____ , International Journals _____
16. Any other information in support of research work: _____

(Signature of the applicant)

(Signature & Seal of Head of the Department) (Signature & Seal of the Head of the Institution)

- Note:** 1) Submit an attested copy of proof of your age (10th std. marks card/etc.)
2) Submit a copy of the research work done for claiming the award

ASSOCIATION FOR PREVENTION & CONTROL OF RABIES IN INDIA (APCRI)

Association for Prevention & Control of Rabies in India (APCRI) was founded on 17th April, 1998 & is registered as a scientific society under the Karnataka Societies Act S-No 439, 2000-01. It is an association of professionals, scientists & others who are committed to the elimination of rabies from India.

Goal: Rabies Free India by 2020.

Activities till date

1. **Annual Conferences on 6th July (World Zoonosis Day) or near about (On Saturday and Sunday only):**
Kolkata (1999), Bangalore (2000), Amritsar (2001), Jaipur (2002), Bhubaneswar (2003), Kolkata (2004), Shimla (2005), Jammu (2006), Hyderabad (2007), Lucknow (2008), Thiruvananthapuram (2009), New Delhi (2010) and Chennai (2011).
2. **Workshops, Seminars & Training Programmes:**
 - National workshop for APCRI trainers in modern WHO approved rabies prophylaxis at NIMHANS, Bangalore (2001).
 - National seminar on “Intradermal Rabies Vaccination”, KIMS, Bangalore (2003).
 - National workshop on “Developing guidelines for Rabies Prophylaxis” at Hyderabad (2006).
 - National workshop on “Rabies Prophylaxis “at Alleppey, Kerala (2006).
 - National workshop on “Rabies Immunoglobulin (RIG) Administration” at KIMS, Bangalore (2008).
 - National Seminar on Rabies Vaccines: Important Issues, at Visakhapatnam (Vizag), Andhra Pradesh (1st March, 2009).
 - **National Workshop on Development of IEC Material on Prevention of Rabies for School Children and Public at Mysore, Karnataka (20th & 21st March, 2010).**
3. **Publications:** APCRI Journal (Biannual) & APCRI News Letter (Biannual).
4. **WHO sponsored “National multicentric Indian rabies survey” (2004).**
5. **Award:** APCRI was honoured with “**Chiron vaccines award 2000**” for its contribution to prevention & control of Rabies in India.
6. APCRI in association with Indian Academy of Paediatrics (IAP) and Rabies in Asia (RIA) Foundation, formulated the **IAP Guidelines for Rabies Prophylaxis in Children** (2008)
7. **Slides on “Rabies Prophylaxis Current concepts & Recommendations”** prepared by an expert consultation (2001), Revised in 2006 & now available on www.apcri.org
8. Observed “**World Rabies Day**” in 8th September, 2007, 28th September 2008 and 28th September, 2009, 28th September, 2010 and 28th September, 2011 all over the country.
9. WHO-APCRI survey on '**Post Exposure Prophylaxis modalities in India** (2007).
10. APCRI is regularly organizing Zonal/ Regional conferences & CME programmes.
11. APCRI played a major role in implementation of **Intradermal Rabies Vaccination (IDRV)** in the country.
12. **Manual on Rabies Immunoglobulin (RIG) Administration published in February, 2009.**
13. APCRI Educational Portal in 2010. The site can be visited at edu.apcri.org.