

Demographics of animal bite victims & management practices in a tertiary care institute in Mumbai, Maharashtra, India

N.J. Gogtay, A. Nagpal, A. Mallad, K. Patel*, S.J. Stimpson*, A. Belur & U.M. Thatte

*Department of Clinical Pharmacology, Seth GS Medical College & KEM Hospital, Mumbai, India & *University of Massachusetts Medical School, Boston, MA, USA*

Received June 29, 2011

Background & objectives: Rabies is an important public health problem worldwide and more than 55,000 people die annually of the disease. The King Edward Memorial Hospital, Mumbai, is a tertiary referral centre where a rabies clinic runs 24 hours. In view of lack of information about the demographics of the disease in an urban environment the present study was carried out.

Methods: Data on 1000 consecutive animal bite victims presenting to the institute in 2010 were collected over a 15 wk period. An electronic database was specially created for capturing information and was modelled on the information available from the WHO expert consultation on rabies, 2005. Economic burden from the patients' perspective was calculated using both direct and indirect costs.

Results: The victims were largely males (771 subjects). The dog was the major biting animal (891, 89.1%). Bites were mainly of Category III (783, 78.3%). One twenty three subjects used indigenous treatments only for local wound care. Of the Category III bites, only 21 of 783 (2.7%) patients were prescribed human rabies immunoglobulin (HRIG) which was primarily for severe bites or bites close to or on the face. A total of 318 patients did not complete the full Essen regime of the vaccine. The median cost to the patient per bite was ₹ 220 (3.5 USD).

Interpretation & conclusions: Our findings showed that the use of HRIG was low with less than 2 per cent of the Category III patients being prescribed it. As vaccine and HRIG continue to remain expensive, the intradermal vaccine, shorter regimes like the Zagreb regime and monoclonal antibodies may offer safer and cost-effective options in the future. Further studies need to be done in different parts of the country.

Key words Animal bites - dog - HRIG - urban environment - vaccination

Rabies is an important public health problem worldwide and more than 50,000 people die annually of the disease¹. The annual estimated number of dog bites in India is 17.4 million, leading to estimated 18,000-20,000 cases of human rabies per year². As rabies

is not a notifiable disease in India and most deaths occur in rural areas where surveillance is poor, it is widely believed that this figure may be an underestimate. In the past, a large proportion of rabies patients did not receive any vaccination, and many did not complete

the full course. Sudarshan *et al*³ showed that the nerve tissue vaccine formed the mainstay of treatment; a high proportion of bite victims (39.5%) did not follow wound care, the use of rabies immunoglobulin was low (2.1%) and recourse to indigenous treatment was widely prevalent³.

The King Edward VII Memorial (KEM) Hospital in Mumbai, India is a tertiary referral centre with a rabies clinic that runs 24 hours. The present observational study was carried out in July to September 2010 in the rabies clinic of KEM Hospital, Mumbai, India, to collect demographic data on animal bite victims.

The study protocol was approved by the institutional review board and written, informed consent/assent was obtained from the bite victims over a 15 week period in 2010. An electronic database modelled on the information available from the WHO expert consultation on rabies was used⁴. Briefly, demographics, the Kuppaswamy index 2007⁵, past history of dog bite, nature of the bite, whether the animal was a pet or a stray, extent of injury, post bite treatment, and status of biting animals following the bite were collected from 1000 consecutive patients. Economic burden from the patients' perspective was calculated using both direct and indirect costs.

Results & Discussion

The victims were largely male (771, 77.1%), and the dog was the major biting animal (891, 89.1%). Bites were mainly of Category III 783 (78.3%). Only 308 victims washed their wounds with soap and water (Table).

All patients received the rabies vaccine free. Of the Category III bites, only 21/783 (2.7%) patients were prescribed human rabies immunoglobulin (HRIG). Of these 21, only two patients received HRIG from the hospital, while eight bought it from outside and the remaining did not actually take it for want of funds. Thirty two per cent did not complete the full Essen regime.

Patients visited the hospital from 2-6 times after the bite. The median cost to the patient per bite was ₹ 220 (3.5 US D) (range 10-8440; the upper figure indicating expenditure with HRIG). The number of working days or school days lost ranged from 0-12 days.

The present study conducted in 1000 consecutive patients in a tertiary referral centre in the city of Mumbai

showed that Cat III bites form the majority of bites, only a quarter of these patients were actually prescribed HRIG, and eventually less than 2 per cent took it. The WHO recommendations include immediate wound washing, expeditious administration of rabies vaccine and for severe categories of exposure, infiltration of purified rabies immunoglobulin (RIG) in and around the wound⁶. RIG is rarely administered in low-income countries because it is expensive (from US D25 to over 200 depending on whether it is of equine or human origin)⁷ and in short supply⁸. Therefore, it is usually only post-exposure vaccination (without RIG) that is administered and our study confirms this. The primary reasons for non administration for HRIG in our study was the limited budget allocation for the HRIG, non availability at times in the market place and very few doses actually available for use. A limited quantity of equine RIG was previously available on the hospital schedule and was replaced in May 2010 in favor of the relatively safer HRIG.

Our study also showed that despite the bites occurring in an urban set up, only indigenous practices were used by 12.3 per cent patients (Table). This was lower than that reported by Sudarshan *et al*³, and was similar to the study done by Icchpujani *et al*⁹ in 1357 patients where 10.8 per cent of victims resorted to harmful and/or indigenous practices.

Rabies is considered one of the world's most neglected diseases in developing countries with a disproportionate burden amongst the rural poor and children¹⁰. In countries enzoonotic for rabies, cell culture vaccines continue to remain in short supply and unaffordable¹¹. In Mumbai city, the preventive measures include 24 wards where dog bite cases are registered, a dog licensing department that carries out sterilization of stray dogs and liasoning with non government organizations (NGOs) for dog adoption and 18 municipal hospitals and 31 dispensaries where the vaccine is given free of cost¹². The pilot project initiated by the National Centre for Disease Control in 2008 in five Indian cities to train medical professionals in animal-bite management and raising public awareness is one such initiative¹³. As the rabies vaccine as well as RIG continue to remain expensive, regimes with fewer doses like the Zagreb regime, the intradermal vaccine and monoclonal antibodies are likely to offer safe and cost-effective treatment option in the years to come¹⁴.

Table. Demographic characteristics of the patients (n = 1000)

Demographics				
Sex	Male		771	(77.1)
	Female		229	(22.9)
Age in years	1-10		157	(15.7)
	11-20		233	(23.3)
	21-30		265	(26.5)
	31-40		174	(17.4)
	41-50		30	(3)
	51-60		90	(9)
	61 and above		51	(5.1)
Biting animal	Dog	891	Stray dogs	70.7
			Pet dogs	29.3
			Stray cats	67.6
	Cat	102	Stray cats	67.6
			Pet cats	32.4
Past history of animal bite	Monkey	4		
	Pigs	2		
	Rats	1		
		250	(25)	
WHO classification of bites	Category I		Nil	
	Category II		217	(21.7)
	Category III		783	(78.3)
Wound care	Washed with soap and water only		308	(30.8)
	Washed with soap and water and used antiseptic		199	(19.9)
	Indigenous practices only		123	(12.3)
	Washed with water only		74	(7.4)
	Washed with water, and used antiseptic and indigenous		41	(4.1)
	Did nothing		255	(25.5)
Immunoglobulin prescribed (expressed as a per cent of Cat III bites)		21/783	(2.7)	
Class according to Kuppuswamy index	Upper Class		24	(2.4)
	Upper Middle Class		193	(19.3)
	Lower Middle Class		369	(36.9)
	Upper Lower Class		398	(39.8)
	Lower Class		16	(1.6)

Values in parentheses are percentages

Acknowledgment

Authors thank Dr Sanjay Oak, Director, Seth GS Medical College & KEM Hospital, Mumbai, for permission to carry out the study, Dr Brett Leav, Mass Biologics, USA, for funding support for two authors (KP and SJS) to work at the institute and Dr Prasad Kulkarni, Serum Institute of India, Pune, for help in manuscript preparation.

References

1. Meslin FX, Briggs D. Eliminating canine rabies, the principal source of human infection: what will it take? *Antiviral Res* 2013; 98 : 291-6.
2. Gongal G, Wright AE. Human rabies in the WHO Southeast Asia region: Forward steps for elimination. *Adv Prev Med* 2011; 2011 : 383870.

3. Sudarshan MK, Mahendra BJ, Madhusudana SN, Ashwoath Narayana DH, Rahman A, Rao NS, *et al.* An epidemiological study of animal bites in India; results of a WHO sponsored national multi-centric rabies survey. *J Commun Dis* 2006; 38 : 32-9.
4. WHO Expert Consultation on Rabies. WHO Technical Report series 931. Available from: http://whqlibdoc.who.int/trs/WHO_TRS_931_eng.pdf, accessed on March 31, 2010.
5. Kumar N, Shekhar C, Kumar P, Kundu AS. Kuppaswamy socioeconomic status scale-updating for 2007. *Indian J Pediatr* 2007; 74 : 1131-2.
6. WHO recommendations for rabies post-exposure prophylaxis. 2010. Available from: www.who.int/entity/rabies/PEProphylaxisguideline.pdf, accessed on March 31, 2010.
7. Knobel DL, Cleaveland S, Coleman PG, Fevre EM, Meltzer MI, Miranda ME, *et al.* Re-evaluating the burden of rabies in Africa and Asia. *Bull World Health Organ* 2005; 83 : 360-8 .
8. Hampson K, Dobson A, Kaare M, Dushoff J, Magoto M, Sindoya E, *et al.* Rabies exposures, post-exposure prophylaxis and deaths in a region of endemic canine rabies. *PLoS Negl Trop Dis* 2008; 2 : e339.
9. Ichhpujani RL, Chhabra M, Mittal V, Singh J, Bhardwaj M, Bhattacharya D, *et al.* Epidemiology of animal bites and rabies cases in India. A multicentric study. *J Commun Dis* 2008; 40 : 27-36.
10. Bourhy H, Dautry-Varsat A, Hotez PJ, Salomon J. Rabies, still neglected after 125 years of vaccination. *PLoS Negl Trop Dis* 2010; 4 : e839.
11. Sudarshan MK, Gangaboraiah B, Ravish HS, Narayana DH. Assessing the relationship between antigenicity and immunogenicity of human rabies vaccines when administered by the intradermal route: results of a metaanalysis. *Hum Vaccine* 2010; 6 : 562-5.
12. Available from: www.mcgm.gov.in/irj/go/km/docs/documents/MCGM, accessed on September 19, 2013.
13. Chaterjee P. India's ongoing war against rabies. *Bull World Health Organ* 2009; 87 : 890-1.
14. Bakker AB, Python C, Kissling CJ, Pandya P, Marissen WE, Brink MF, *et al.* First administration to humans of a monoclonal antibody cocktail against rabies virus: safety, tolerability, and neutralizing activity. *Vaccine* 2008; 26 : 5922-7.

Reprint requests: Dr N.J. Gogtay, Additional Professor, Department of Clinical Pharmacology, Seth G.S. Medical College & KEM Hospital, New M.S. Building 1st Floor, Acharya Donde Marg, Parel, Mumbai 400 012, India
e-mail: njgogtay@hotmail.com