



A STUDY OF PROFILE OF RABID ANIMAL INJURY IN HUMAN IN A TERTIARY CARE INFECTIOUS DISEASE HOSPITAL OF EASTERN INDIA

Arijit Sinha¹, Ujjwal Bandyopadhyay*², Simanti Sinha³, Sarmila Guha (Banerjee)⁴,
Subhrendu sankar Kar⁵ and Subhrajyoti Mitra⁶

¹Assistant Professor, I.D and B.G hospital, Kolkata, India.

²Assistant Professor (Pathology), R.I.O, Medical College, Kolkata, India.

³Ex Post Graduate Trainee (PGT), Department of Pathology, Medical College, Kolkata, India.

⁴RMO, Department of Anesthesiology, Medical College, Kolkata-73, India.

⁵Assistant Professor, Department of Medicine, RG Kar Medical College and Hospital, Kolkata, India.

⁶Assistant Professor, Department of Medicine, Bankura Sammilani Medical College, Bankura Dist, India.

Corresponding Author:- **Ujjwal Bandyopadhyay**

E-mail: ujjwal.kalindi@gmail.com

Article Info

Received 18/01/2015

Revised 07/02/2015

Accepted 16/02/2015

Key words: Animal injury, Dog bite, Anti-rabies immunoglobulin.

ABSTRACT

Rabies, a zoonotic disease mostly caused by animal injuries, has 100% mortality, but is preventable. We studied the patient profile of rabid animal injury, that presented the tertiary care infectious disease hospital of eastern part of India (I.D.&B.G. Hospital, Kolkata, India) and the victims' awareness regarding the preventive aspects of the disease, during the period of January 2013 to December 2013. The victims were evaluated using detailed questionnaires and clinical examination. Amongst 2291 victims who attended for immunization, we found majority were males (63.11%), Hindus (81.62%) and of below poverty line (BPL) category (66.57%). Most had category III injuries (83.71%), mixed types of wounds (40.68%) and multiple site involvement (67.7%). Amongst patients with single site involvement, lower limb injuries predominated (40.33%). Head and neck injury predominated (60%) in below 10 years children. Dog was the most common (75.5%) biting animal. 0-10 years (30.2%) and 11-20 years (18.2%) age groups were commonly affected. Most injuries (56.52%) occurred during afternoon and evening. Victims had awareness about wound care and need of immunoglobulin in 13.83% and 15.58% cases respectively and most patients (75.46%) attended for immunization within 24 hours of injury. The present study of patient profile of rabid animal induced injury will help us to rationalise the distribution of appropriate preventive measures through existing healthcare.

INTRODUCTION

Rabies is a widespread, neglected and under reported zoonosis, with an almost 100% case fatality rate in human and animal untreated on time, and causes a significant social and economic burden in many countries worldwide [1]. The disease is caused by a neurotropic virus belonging to the genus *Lyssa* virus in the family *rhabdoviridae*. The rabies virion consists of a single-stranded negative sense RNA, contained within a bullet shaped bi-layered envelop. The virus is transmitted by its

introduction into wounds or cuts in skin or mucous membranes, most commonly by bites of rabid animals [2]. An estimated 55,000 people die annually from rabies [3]. In India, the annual incidence of animal bites is high, 1.7%. The main biting animal is dog, mostly strays, followed by cat [4]. Rabies is also found to occur following bites by rabid jackals, mongoose, horses and monkeys [5]. In fact, monkey bites are the second most common animal bite risk to travellers after dog bites [3]. However, human rabies can



be prevented by the use of effective post-exposure prophylactic measures [6].

The objective of this study is to observe the epidemiological characteristics and anti-rabies practices in patients attending the tertiary care infectious disease hospital (ID hospital) of eastern part of India, which will thereby help us take appropriate preventive measures and reduce the disease burden.

MATERIALS & METHODS

The study was conducted amongst patients who attended the ID hospital, for immunization, with category II & III injuries caused by rabid animals, during the one year period, extending from January 2013 to December 2013. Demographic profile including age, sex, residence, socio-economic status was recorded. APL (above poverty line) and BPL (below poverty line) were identified from the card issued by the government authority [7]. Category of bite, type of animal, site and type of injury, time gap between injury and wound care, need of immunoglobulin were judged by pre-scheduled questionnaires to victims. Evidence of wound infection was noticed on follow up vaccination date. Statistical software SPSS 11.0 and Systat 8.0 were used for the analysis of the data. Microsoft Word and Excel have been used to generate tables and graphs.

RESULTS AND ANALYSIS

Amongst 2291 victims who attended for immunization with category II & III injuries -1446 (63.11%) were males and 845 (36.88%) were females (male : female ratio 1.7 : 1); 1870 patients (81.62%) were Hindus and 420 (18.33%) were Muslims amongst which 758 (33.1%) were APL and 1532 (66.9%) were BPL. One patient was a Christian who was a traveller. The bite injuries involved different sites, of which head and neck accounted for 507 cases (22.13%), upper limb 630 cases (27.5%), trunk 230 cases (10.04%) and lower limb 924 cases (40.33%) (Table 1). Head and neck injuries predominated in 0-10 years children, accounting for 59.97% (n=415) of 692 cases in this age group. Incidences of single and multiple site injuries were 32.26% (n=739) and 67.74% (n=1552) respectively. Wounds were of different types, of which abrasion accounted for 20.3%

(n=465), puncture wounds 18.59% (n=426), lacerated wounds 20.43% (n=468) and mixed types of wounds 40.68% (n=932) (Figure-1). Amongst 2291 patients 373 (16.28%) had category II and 1918 (83.7%) had category III wounds. Distribution of patients according to different age groups showed 30.2% patients (n= 692) in the 0-10 years age group, 18.2% (n=417) in the 11-20 years age group, 14.36% (n=329) in the 21-30 years age group, 9.25% (n=212) in the 31-40 years age group, 12.53% (n=287) in the 41-50 years age group, 6.68% (n=153) in the 51-60 years age group and 8.77% (n=201) in the more than 60 years age group (Table 2).

During the one year study period, the incidence of cases in different months were as follows:- January 6.98% (n=160), February 6.98% (n=160), March 6.8% (n=156), April 9.17% (n=210), May 10.13% (n= 232), June 8.34% (n=191), July 6.11% (n=140), August 5.98% (n=137), September 6.59% (n=151), October 10.47% (n=240), November 13.79% (n=316), December 8.64% (n=198). (Figure-2)

In this study the most common biting animal was dog (75.51%, n=1730) following by cat (22.52%, n=516). Other animals responsible for bite injuries were found to be monkeys (1.48%, n=34), fox (0.22%, n=5), mongoose (0.22%, n=5). (Table-3)

Out of these biting animals, 88.82% (n=2035) were stray, 10.74% (n=246) were pets and 0.44% (n=10) were wild animals.

Most of the injuries, 56.52% (n=1295) occurring during the second half of the day (afternoon and evening) and 75.47% (n=1729) victims attended the immunization clinic within 24 hours.

All the persons involved in this study were immunised with anti-rabies vaccine. Out of 1918 category III cases, equine rabies immunoglobulin was given to 1911 cases. In other 7 cases (0.36%, n=1918), human rabies immunoglobulin was given due to allergic reactions to equine immunoglobulin. 13.84% (n=317) persons were about aware about wound care and 15.58% (n=357) were aware about the need of immunoglobulin. On follow up, evidence of wound infection was found in 9.65% (n=221) cases.

Table 1. Table shows site-wise distribution of cases

Site of injury	No. of cases	Percentage (n=2291)
Head and neck	507	22.13
Upper limb	630	27.5
Trunk	230	10.04
Lower limb	924	40.33

Table 2. Table shows age-wise distribution of cases

Age (years)	No. of cases	Percentage (n=2291)
0-10	692	30.2
11-20	417	18.2
21-30	329	14.36
31-40	212	9.25
41-50	287	12.53
51-60	153	6.68
Above 60	201	8.77



Table 3. Table shows the types of rabid animals responsible for the injuries

Animal type	Number of cases	Percentage(n=2291)
Dog	1730	75.51
Cat	516	22.52
Monkey	34	1.48
Fox	5	0.22
Mongoose	5	0.22
Others (rabbit)	1	0.05

Figure 1. Pie-diagram showing the different types of injuries observed in this study

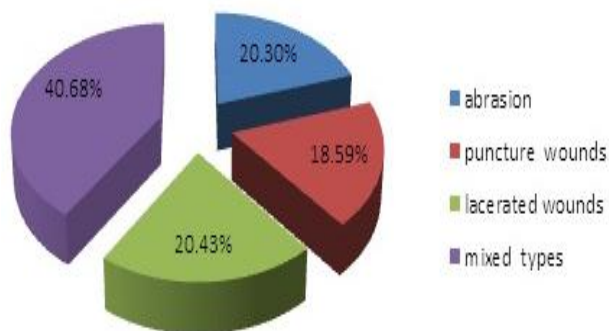
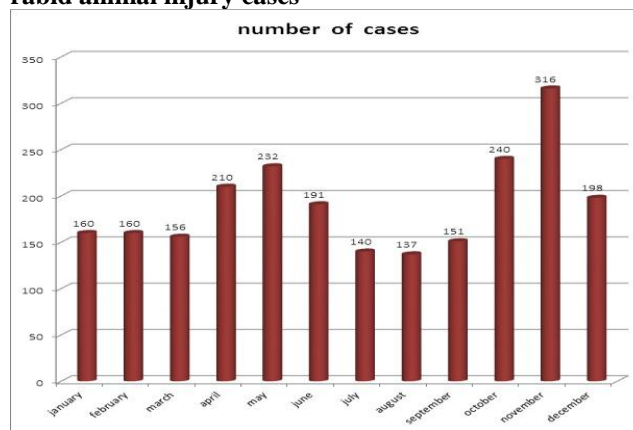


Figure 2. Bar diagram showing month-wise incidence of rabid animal injury cases



DISCUSSION

This study observes the various epidemiological characteristics and public awareness of rabies in eastern part of India and helps to ascertain the magnitude of the problem in this region, which might enable us to undertake various measures for the prevention and protection against rabies related morbidity and mortality.

In this study, the demographic profile showed a male predominance (63.11%) with a male : female ratio of 1.7 : 1. This is probably because rabies is an exposure related disease and as males move out of their houses more than females, mainly because of occupational purpose, males are affected more than females. This observation corroborates with the observations made by many other authors in their respective studies conducted in different regions of India and also in studies done outside India in Dhaka and in Turkey [4-16].

The study also shows that the victims of the disease mainly belong to lower socio-economic group as they are the ones mainly involved in outdoor activities and hence more exposed to rabid animal injury, and also because of their greater lack of disease awareness. This observation is in concordance with various other epidemiological studies on rabies [4,16]. Amongst the different age groups, children below 10 years have been found to be maximally affected, followed by children in the 11-20 years age group. Children are the principal victims because of their inherent fondness to animals, because of their tendency to provoke animals and also because they are less likely to defend themselves against

the attack by rabid animals. This observation corroborates well with other studies [18-20].

The site-wise distribution showed lower limb to be the most commonly affected site, accounting for 40.33% of all cases. The calf followed by foot was also the commonest site of bite in the study made by Jairaj Singh in Jamnagar, Gujarat [13]. Similar observations were made by many other authors in India as well as outside India. However, in this study, head and neck injuries predominated in the 0-10 years old children accounting for 60% of all injuries in this age group, probably because of their short statures which make them get easily bitten on the head and neck. Children were found to be vulnerable to head and neck and also upper extremity bites in many other studies made by Angelo Monroy in New York, TRBehera in Berhampore, Orissa [11,21]. In fact in a brief report of animal bite-related injuries attending the United States Emergency Department (US ED), face, head and neck were the leading body parts affected, mainly because the population attending the ED comprised children more than adults [19].

In this study, category III wounds accounted for 83.7% of all injuries while 16.28% injuries were Category II wounds. This was also the finding in several other studies. However, in a rural based study in Bangalore, the baseline study showed 63.8% Category II wounds and 36.2% Category III wounds and the cause for the greater number of category II wounds might have been due to the under-reporting of category III wounds in the baseline study [22-26].



This study showed an increasing number of cases in the months of October, November and May i.e. in the early-winter and summer. The study made by TR Behera in Berhampur, Orissa also shows a rise in the number of cases in the summer and winter months. However, in the study made by M Zeynali in Iran, Angelo Monroy in New York and in the brief report on dog- bite cases attending USED, a rise in the number of cases were noticed during the summer months [20,21]. Again in a study in Jamnagar, Gujarat, maximum number of cases was seen to occur during winter. The epidemiological study done in Dhaka by Md. Shahidul Haque showed no significant seasonality [15]. This study also shows an increasing number of cases during the second half of the day (afternoon and evening). In accordance with our findings, Venu Shah et al also reported in his study that the majority of bites occurred between 4 and 8 pm.

Our study revealed that dog is the main biting animal followed by cat, and out of these biting animals, most are stray. Other animals, potentially infectious are monkeys, fox, mongoose. Dogs, mostly stray, have been found to be the main biting animal in most other studies conducted in India, as well as outside India. Even in the US, dog bites continue to be a public health problem affecting 1.5% of the US population annually. In the US, vampire bats are the second most important vectors of the disease; monkeys, skunks, raccoons, foxes, coyotes being other important vectors. The yellow mongoose and jackal

are important vectors after dog in Eastern and Southern Africa. The red fox is an important vector in Europe.

Our study also revealed that most victims (75.47%) attended the immunization clinic within 24 hours of injury. However, they had little awareness about wound care and the need of rabies immunoglobulin. Similar scenario was observed in most other studies conducted in other parts of India as well as in Dhaka and Turkey.

In this study, incidence of wound infection was seen in 9.65% cases on follow up vaccination date. Similar incidence of wound infection (10.7%) was noted in the study made by Angelo Monroy in New York [21].

CONCLUSION

The observations made in this study have corroborated well with other studies. Because rabies is not a notifiable disease in India and there is no organised surveillance system, the actual number of deaths might be higher [17]. Epidemiological studies like the present study may help assess the true magnitude of the problem. Stringent measures including patient education, copious irrigation of bite wounds, early initiation of post-exposure prophylaxis in the form of modern tissue culture vaccine, and administration of HRIG, antimicrobial therapy for high risk wounds and control of population of stray dogs need to be undertaken to reduce the social and economic burden of disease.

REFERENCES

1. Recommendations of the OIE Global Conference on Rabies, S. Korea, 7-9 September 2011
2. Krebs JW, Wilson ML, Childs JE. (1995). Rabies-epidemiology, prevention, and future research. *Journal of Mammalogy*, 76, 681-94.
3. Sudarshan MK, Mahendra BJ, Madhusudana SN, Ashwoath Narayana DH, Rahman A, Rao NS, et al. (2006). An epidemiological study of animal bites in India, results of a WHO sponsored national multi-centric rabies survey. *J Commun Dis*, 38, 32-9.
4. Shetty RA, Chaturvedi S, Singh Z. (2005). Profile of animal bite cases in Pune. *J Commun Dis*, 37, 66-72
5. Salve H, Kumar S, Sa R, Rai SK, Kant S, Pandav CS. (2014). Feasibility of sustainable provision of intradermal post exposure prophylaxis against rabies at primary care level -evidence from rural Haryana. *BMC Health Serv Res* Jun, 14, 278.
6. Below Poverty Line (India) [http://en.wikipedia.org/wiki/Below_Poverty_Line\(India\)](http://en.wikipedia.org/wiki/Below_Poverty_Line(India))
7. Sudarshan MK, Mahendra BJ, Narayan DH. (2001). A community survey of dog bites, anti-rabies treatment, rabies and dog population management in Bangalore city. *J Commun Dis*, 33, 245-51
8. Shah V, Bala DV, Thakker J, Dalal A, Shah U, Chauhan S, et al. (2012). Epidemiological determinants of animal bite cases attending the anti-rabies clinic at V. S General Hospital, Ahmedabad, Health Line, 3, 66-8
9. Ichhpujani RL, Mala C, Veena M, Singh J, Bhardwaj M, Bhattacharya D et al. (2008). Epidemiology of animal bites and rabies cases in India. A multicentric study. *J Commun Dis*, 40, 27-36
10. Behera TR, Satapathy DM, Tripathy RM, Sahu A. (2008). Profile of animal bite cases attending the ARC of MKCG Medical College. *APCRI Journal*, IX, 20-5.
11. Goel S, Gupta H, Mazta S R. (2008). Epidemiological profile of Bite Cases Admitted at a 50 bedded Community Health Centre of Himachal Pradesh, India. *The Internet Journal of Health*, 7.
12. Hanspal JS, Bhandari D, Nagar S. (2007). A review of attendance trend of animal bite cases in the anti rabies clinic of GGS Hospital, Jamnagar (Gujarat). *APCRI Journal*, 8, 16-8.
13. Singh J, Jain DC, Bhatia R, Ichhpujani RL, Harit AK, Panda RC, et al. (2001). Epidemiological characteristics of rabies in Delhi and surrounding areas, 1998. *Indian Pediatrics*, 38, 1354-60
14. Haque MS, Yeasmin T, Islam MM. (2011). Epidemiological characteristics of human rabies at Infectious Disease Hospital, Dhaka. *Bangladesh J Child Health*, 35, 102-107.



15. Buzgan T, Irmak H, Yılmaz GR, Torunoğlu MA, Safran A. (2009). Epidemiology of human rabies in Turkey, 1992–2007. *Turk J Med Sci*, 39, 591–597
16. Menezes R. (2008). Rabies in India. *CMAJ*, 178, 564–6.
17. Bata SI, Dzikwi AA, Ayika DG. (2011). Retrospective study of dog bitecases reported to ECWA veterinary clinic, Bukuru, PlateauState, Nigeria. *Sci World J*, 6, 17–9.
18. Weiss HB, Friedman DI, Coben JH. (1998). Incidence of dog bite injuries treated in emergency departments. *JAMA*, 279, 51-53.
19. Zeynali M, Fayaz A, Nadim A. (1999). Animal bites and rabies, Situation in Iran. *Arch Iran Med*, 2, 120–4.
20. Monroy A, Behar P, Nagy M, Poje C, Pizzuto M, Brodsky L. (2009). Head andneck dog bites in children. *Otolaryngol Head Neck Surg*, 140, 354-7
21. Masthi NRR, Narayana DHA, Kulkarni P, Gangaboraiah, Belludi A. (2014). Epidemiology and prevention of animal bite and human rabies in a rural community-One health experiment. *Asian Pac J Trop Dis*, 4, S486-S490.
22. Gilchrist J, Sacks JJ, White D, Kresnow MJ. (2008). Dog bites, Still a problem ?. *Inj Prev*, 14, 296—301.
23. Belotto A, Leanes LF, Schneider MC, Tamayo H, Correa E. (2005). Overview of rabies in the Americas. *Virus Res*, 111, 5–12.
24. Krebs JW, Smith JS, Rupprecht CE, Childs JE. (2000). Mammalian reservoirs and epidemiology of rabies diagnosed in human beings in the United States, 1981–1998. *Ann NY AcadSci*, 916, 345–353.
25. Perry B. (1992). The epidemiology of dog rabies and its control in eastern and southern Africa In, Proceedings of the International Conference on Epidemiology, Control, and Prevention of Rabies in Eastern and Southern Africa, ed. King AA, 107–121. Editions Fondation Marcel Merieux, Lyon, France
26. Presutti RJ. Bite wounds. (1997). Early treatment and prophylaxis against infectious complications. *Postgrad Med*, 101, 243-254.

