

Profile of Simian Attacks on Humans in a Tertiary Hospital of Almora

H.C. Garkoti¹, Manoj Verma², Geeta Bhandari³, K.S. Shahi⁴

¹Department of ENT, SSJGIMSR-GTB, Hospital, Almora, Uttarakhand India. ^{2,4} Department of Surgery, SSJGIMSR-GTB, Hospital, Almora, Uttarakhand, India. ³Department of Anaesthesiology, SSJGIMSR-GTB, Hospital, Almora, Uttarakhand, India.

ABSTRACT

BACKGROUND

Monkeys are responsible for 2-21% of all animal bite injuries. Monkey bites are second only to the dog bites as represented in India. Control of animal rabies is central to the prevention of human disease. Thus, prophylaxis (for domestic animals and selected humans) and PET remain essential to the prevention of clinical rabies.

METHODS

Patients presenting to the outpatient and emergency department with the complaint of monkey bite were enrolled in the study. All particulars of patients, history and examination findings were recorded in the clinical proforma after taking proper informed consent. Wounds were categorized based on WHO guide to postexposure prophylaxis. Local treatment consisted of two parts: first aid and wound management. ARV was administered in category II and III exposures in accordance to the intradermal schedule. Data was analysed for clinical information such as age, sex, socioeconomic status, timing & site of bite, categories of contact and treatment given.

RESULTS

In our study of 68 patients, 24 (35.3%) were males and 44 (64.7%) were females. Majority of the patients belonged to the age group of 11-40 years in both male (n=20; 83.33%) and female (n=34; 77.27%) patients. Mean age group of patients in the study was 28.29 years. This generally reflects the greater exposure of young adults to the monkeys. Based on modified Kuppaswamy scale, most patients belonged to the class III (n=36; 52.9%) followed by class IV (n=16; 23.5%). All the patients sustaining bites from monkeys were vaccinated. Majority of the bites involved the lower extremities (n=31; 45.6%) followed by upper extremities (n=27; 39.7%). Based on WHO guidelines for wound categories, most patients belonged to category II (n=49; 72.1%) followed by category III (n=19; 27.9%).

CONCLUSIONS

In our study, we found that majority of patients sustaining monkey bites were young adults and belonged to lower middle & upper lower class. There was no difference with respect to gender. Most common sites of monkey bite were upper & lower extremities and belonged to WHO category II. No cases of rabies were observed in our study.

KEY WORDS

Almora, Monkey, Simian, Animal, Bite, Rabies, Immunization, Prophylaxis, Treatment

Corresponding Author:

Dr. K.S. Shahi,

Professor. & Head

Department of Surgery,

SSJGIMSR-GTB, Hospital,

Almora, Uttarakhand, India.

E-mail: kedar_shahi@rediffmail.com

DOI: 10.14260/jemds/2022/93

How to Cite This Article:

Garkoti HC, Verma M, Bhandari G, et al. Profile of simian attacks on humans in a tertiary hospital of Almora. J Evolution Med Dent Sci 2022;11(04):465-469, DOI: 10.14260/jemds/2022/93

Submission 01-02-2022,

Peer Review 02-03-2022,

Acceptance 09-03-2022,

Published 11-03-2022.

Copyright © 2022 H.C. Garkoti et al. This is an open access article distributed under Creative Commons Attribution License [Attribution 4.0 International (CC BY 4.0)]

BACKGROUND

Monkeys are responsible for 2-21% of all animal bite injuries. Monkey bites are second only to the dog bites as represented in India. Monkeys are mammals of order primates and include a variety of species that are excellent climbers and arboreal animals. Different species of monkeys are distributed throughout the world. In Uttarakhand population of monkeys is around 1.5 lakhs with an annual increase rate of 36% according to the reports of forest department. The *Rhesus macaque* (*Macaca mulatta*) is the most common species that is widely distributed throughout North India. This species is aggressive in nature and is responsible for a variety of problems to humans. Monkey bites are an important risk among travelers, being the second most common animal bite risk to travelers after dog bites. Scratches and bites inflicted by similar attacks deserve urgent attention because of their potential for transmitting rabies along with other viral & bacterial infections. Almora is a small town in the hills of Kumaon with urban, semiurban and rural population. The natural environment with a lot of plantations in the town and forest surrounding the town along with the patchy rural area with agricultural land and fruit gardens in and around the town is a favorable place for many troupes of monkeys. People of Almora were found to be well aware of the hazards like rabies and tetanus due to animal bites. Most of them had cleaned their wounds with soap and applied some kind of antiseptic lotion or cream before reaching the hospital. People were aware about rabies & tetanus vaccine and few asked about the need of suturing it.

Rabies is a viral disease leading to an almost uniformly fatal encephalitis in humans.^[1] It remains a significant viral cause of mortality in tropical countries.^[2] it occurs throughout the world except in Antarctica and a few island nations.^[3] In developing areas where canine rabies is common, most cases of human rabies result from dog bites. There is no established treatment for rabies once symptoms have begun. Rabies vaccination for prevention and PET was introduced in the nineteenth century, first by Galtier and later by Pasteur.^[4] Control of animal rabies is central to the prevention of human disease. Thus, prophylaxis (for domestic animals and selected humans) and PET remain essential to the prevention of clinical rabies.

Treatment depends on the health status of the patient, the location of the bite and whether or not there is a suspicion of rabies in the monkey. The main principles of care include early medical management including wound cleansing; prophylactic antibiotics to decrease infection risk; rabies post-exposure treatment depending on the animal vaccination status; administration of tetanus vaccine if the person has not been adequately vaccinated. After exposure, rabies prevention begins with good wound care, which reduces the risk of rabies by up to 90%.^[5] Wash the wound thoroughly with a 20% soap solution.^[6] This should be followed by application of 70% ethanol or an iodine-containing solution. Wounds should not be sutured prior to a decision about PET; if a wound must be sutured, rabies immunoglobulin should be instilled into the wound and infiltrated around it. Following wound care, the clinician must decide whether to institute passive or active immunization.^[7] PET appears safe in pregnant women and should not be withheld for this reason.^[8] Antirabies immunoglobulin is

available in both human (HRIG) and equine forms (pooled antirabies serum, and purified antirabies serum of equine origin (equine rabies immunoglobulin, ERIG)). HRIG is given in a dose of 20 IU/kg, with half injected in the vicinity of the wound, and the remainder injected intramuscularly in the gluteal region. The present study was planned to study the man & monkey conflict in the city of Almora that caused injuries to humans because of attacks by the monkeys.

Objectives of the Study

1. To describe the clinical profile and management of monkey bite patients presenting to the tertiary care hospital in the Kumaun region of Uttarakhand.
2. To study and establish different age groups and gender of patients sustaining monkey bites.
3. To study the various risk factors and presentations of monkey bites.
4. To study the management of monkey bites.

METHODS

This hospital based observational cross-sectional study included the patients presenting to the outpatient and emergency department with the complaint of monkey bite. The data of 68 patients collected from January 2018 to December 2018 was analyzed and studied. The sampling method used was convenient sampling.

All particulars of patients, relevant clinical history and examination findings were recorded in the clinical proforma after taking proper informed consent.

Category	Categories of Contact with Suspected Rabid Animal	Post-exposure Prophylaxis Measures
I	Touching or feeding of animals Licks on intact skin	None
II	Nibbling of uncovered skin Minor scratches or abrasions without bleeding licks on broken skin	Immediate vaccination and local treatment of the wound
III	Single or multiple transdermal bites or scratches Contamination of mucous membrane with saliva (i.e., licks) Exposure to bats, whatever the nature of contact	Immediate vaccination and administration of rabies immunoglobulin Local treatment of the wound

Wounds Were Categorized Based on WHO Guide to Postexposure Prophylaxis

Local Treatment Consisted of Two Parts

First Aid

This included washing and flushing the wound well with soap solution, detergent solution or water alone and applying povidone iodine after washing the wound.

Wound Management

Suturing was postponed. When suturing was necessary, it was done after applying immunoglobulin locally. HRIG (dose=20 IU/kg) was instilled half in the depth of the wound and remaining half infiltrated around the wound. Antitetanus treatment and antibiotics were started to control wound infections.

ARV was administered in category II and III exposures in accordance to the intradermal schedule. 0.1 ml each (total 0.2

ml in two sites) tissue culture ARV was administered on both deltoid areas ID route involving two different lymphatic area drainage sites. 1 ml insulin syringe with 28 G fixed needle was used and 70% ethanol or isopropyl alcohol was used as skin disinfectant.

Data was analyzed for clinical information such as age, sex, socioeconomic status, site of bite, categories of contact and treatment given.

Statistical Analysis

Statistical testing was conducted with the statistical package for the social science system version SPSS 17.0. Continuous variables are presented as mean $\pm$ SD, and categorical variables were presented as absolute numbers and percentage. Tables were created using MS Excel 2021.



Figure 1.
A 32-year-old Lady
Bitten on Back by
Monkey

RESULTS

Age Group (in years)	Number of Patients	Percentage
0-10	1	1.47
11-20	23	33.82
21-30	14	20.58
31-40	17	25.00
41-50	8	11.76
51-60	4	5.88
61-70	1	1.47
>70	0	0
Mean age	28.29 years	
Standard deviation	13.62	
N=68		
Table 1. Age Distribution of the Patients		

Table 1. Age Distribution of the Patients

Majority of the patients belonged to the age group of 11-40 years in both male (n=29; 80.5%) and female (n=26; 70.3%) patients. Mean age group of patients in the study was 28.29 years with standard deviation of 13.62. This could represent the increased risk of exposure of children and young adults to the monkeys.

Sex	Number of Patients	Percentage
Male	24	35.3
Female	44	64.7
N=68		

Table 2. Sex Distribution

In our study of 68 patients, 24 (35.3%) were males and 44 (64.7%) were females. There was no statistically significant difference between the pattern of monkey bites and sex distribution. Both the groups had similar age-sex distribution.

Socioeconomic Status (Modified Kuppaswamy Scale)	Number of Patients	Percentage
I	0	0
II	5	7.4
III	36	52.9
IV	16	23.5
V	11	16.2
N=68		

Table 3. Socioeconomic Status Distribution

Based on modified Kuppaswamy scale, most patients belonged to the class III (n=36; 52.9%) followed by class IV (n=16; 23.5%). Thus, majority of the monkey bites were sustained by individuals belonging to lower middle and upper lower class as these individuals were involved in agriculture and other occupations necessitating outdoors exposure.

Time	Male	Female	Percentage
January	6	7	19.1
February	3	5	11.8
March	2	1	4.4
April	1	1	2.9
May	1	3	5.9
June	1	2	4.4
July	1	4	7.4
August	0	1	1.5
September	0	2	2.9
October	2	5	10.3
November	3	6	13.2
December	4	7	16.2
N=68			

Table 4. Distribution of Monkey Bite Timing and Sex

Monkey bites were reported mostly during the month of January (n=13; 19.1%). In addition, majority of the incidents took place during the months of winter season. However, there was no statistically significant difference between the distribution of sex and timing of monkey bite. All the patients sustaining bites from monkeys were vaccinated.

Site of Dog Bite	Number of Patients	Percentage
Head	4	5.9
Trunk	6	8.8
Upper extremity	27	39.7
Lower extremity	31	45.6
N=68		

Table 5. Monkey Bite Site Distribution

Majority of the bites involved the lower extremities (n=31; 45.6%) followed by upper extremities (n=27; 39.7%). Bites are more common in lower extremity, in the person running away from the monkeys out of fear or running. Upper extremity bites in children were mostly sustained when feeding the monkeys.

WHO Category of Contact	Number of Patients	Percentage
I	0	0
II	49	72.1
III	19	27.9
N=68		

Table 6. Distribution of Wound Category

Based on WHO guidelines for wound categories, most patients belonged to category II (n=49; 72.1%) followed by category III (n=19; 27.9%). Category I contacts require no vaccination. Category II and III contacts require vaccination and local treatment of wound. Category III contacts require, in addition, administration of rabies immunoglobulin.

DISCUSSION

Rabies is a serious illness and continues to be a major public health problem in India. Rabies is endemic in India, a vast country with a population exceeding 1.02 billion and a land area of 3.2 million km.^[9] Multiple factors contribute to high mortality and morbidity due to animal bites.^[10] Animal bites and so also the incidence of rabies in India are on rise. There are regional differences in the animal responsible for the bite. Different practices including use of traditional remedies are prevalent for wound treatment.^[11] Monkey bites are frequently reported among children traveling to tropical countries and can be associated with the transmission of zoonoses.^[12,13]

Almora is a hill town in Kumaon region of Uttarakhand located at 5262 feet above the mean sea level. It is a saddle shaped hill top, surrounded by thick forests of pine and a variety of plants. The ecological environment is rich with diverse population of animals, birds and other type of fauna & flora. As per the census of 2011, Almora had a population of 35,513 with 18,306 males and 17,207 females. The market place on the hilltop has gradually expanded overtime and covered almost 70% of the hilltop. There are a lot of temples throughout Almora. The ecology and culture of this place makes it a most suitable place for animals like dogs & monkeys. In recent years, there has been a great rise in the population of monkeys in the town leading to man & monkey conflict with a resultant increase in human injuries by the monkeys. Monkey bite is reported to be the most common bite after dog bite in wounds inflicted by animals.^[14] Human injuries from monkeys in the wild forests are rarely encountered. In urban areas, the *Rhesus macaque* & man live in harmony. Monkey is a respected animal in Hinduism; therefore, many temples are home to a large population of monkeys. *Macaca mulatta* (*Rhesus macaque*) is very much adapted to the human surroundings and lives as a commensal in towns, cities and villages, homes & shops etc.^[15] These urban monkeys are in regular & close contact with man at all times and are not afraid of humans.

In our study of 68 patients, 24 (35.3%) were males and 44 (64.7%) were females. Majority of the patients belonged to the age group of 11-40 years in both male (n=20; 83.33%) and female (n=34; 77.27%) patients. Mean age group of patients in the study was 28.29 years. This generally reflects the greater exposure of young adults to the monkeys. Also of significant importance is the involvement of children younger than 18 years age (n=24; 35.29%) who are at a greater risk due to shorter incubation period for rabies. Based on modified Kuppaswamy scale, most patients belonged to the class III (n=36; 52.9%) followed by class IV (n=16; 23.5%). All the patients sustaining bites from monkeys were vaccinated. Majority of the bites involved the lower extremities (n=31; 45.6%) followed by upper extremities (n=27; 39.7%). Its clinical significance lies in the fact that the incubation period is usually short in persons bitten on the face or head, and long in those bitten on the legs. This may be related to the distance the virus has to travel to reach the brain.

Most of the bites and injuries occur when people try to feed, carrying food items, shopping or protecting their household items like food, grains, vegetables or clothes on roof or balcony. Monkey tries to snatch the objects and shows

aggression when countered. Attacks are by claws or teeth; scratches & bites (Figure 1). Body fluids of *Rhesus macaque* contain various infective agents: viruses like rabies, herpes, polyoma, simian retrovirus etc. and bacteria. Risk of rabies transmission is the most important which deserves urgent attention and prevention. Though no case of rabies transmission is recorded in our study every patient was given post-exposure prophylaxis with three doses of antirabies vaccine on 0, 7 and 21 days. Based on WHO guidelines for wound categories, most patients belonged to category II (n=49; 72.1%) followed by category III (n=19; 27.9%). Animal bites deposit the virus in the wound. Therefore, the wound should be scrubbed well immediately with soap and water.^[16] This is a very important step in the prevention of rabies as soap destroys the virus effectively.^[5,6] After washing the soap away completely, the wound was treated with povidone iodine. In category III wounds, HRIG was applied topically and infiltrated around the wound. Suturing was postponed in most wounds.^[7] Anti-tetanus measures and antibiotics to prevent sepsis were utilized as necessary.

CONCLUSIONS

In our study, we found that majority of patients sustaining monkey bites were young adults and belonged to lower middle & upper lower class. There was no difference with respect to gender. Most common sites of monkey bite were upper & lower extremities and belonged to WHO category II. No cases of rabies were observed in our study.

Recommendations

Communities and travelers should be informed about risks of monkey bites and prevention techniques. Health-care providers should be educated on the appropriate management of these injuries. Health authorities and policy-makers should ensure rabies control within monkey populations, and appropriate supplies of post-exposure rabies treatment and antibiotic prophylaxis for bitten people. They should also support research initiatives directed at providing more information on the burden of monkey bites.

Monkey bite is commonly encountered in the clinical practice at almost all levels of health care. Majority of patients encountered in the tertiary care center were managed on outpatient basis. However, patients sustaining severe injuries will require hospitalization and planned management based on WHO guidelines. A larger multicenter study is necessary to determine the actual situation so that specific measures can be planned to reduce the risk of monkey bite and its appropriate management.

Limitations

The present study reports the profile of monkey bites in a single hospital of the town. Small hill town of Almora does not have a separate center to register the cases of animal bite, rabies or other diseases. Multiple health facilities private or public are authorized to treat animal bites. Man-monkey ratio needs to be counted to estimate the problem of monkey attacks in the region. Thus, the study is limited by the sample size, the factors responsible for the attacks and the indoor-

outdoor attacks. Authors do agree that a multicenter and multidisciplinary study would be necessary to estimate the real threat to the human surroundings by the simian menace. The scope of this study is limited to the presentation of monkey bites at a tertiary care hospital in Almora town.

REFERENCES

- [1] Warrell MJ, Warrell DA. Rabies and other lyssavirus diseases. *Lancet* 2004;363(9413):959-96.
- [2] Coleman PG, Fevre EM, Cleaveland S. Estimating the public health impact of rabies. *Emerg Infect Dis* 2004;10(1):140-2.
- [3] Turner GS. A review of the world epidemiology of rabies. *Trans R Soc Trop Med Hyg* 1976;70(3):175-8.
- [4] Conti LA, Tucker G, Heston S. Rabies in a dog vaccinated by its owner. *J Am Vet Med Assoc* 1994;205(9):1250.
- [5] Rupprecht CE, Gibbons RV. Clinical practice. Prophylaxis against rabies. *N Engl J Med* 2004;351(25):2626-35.
- [6] World Health Organization. Emerging and Other Communicable Diseases Branch: WHO recommendations on rabies post-exposure treatment and the correct technique on intradermal immunization against rabies. Geneva: World Health Organization 2000.
- [7] Cantor SB, Clover RD, Thompson RF. A decision-analytic approach to post exposure rabies prophylaxis. *Am J Public Health* 1994;84(7):1144-8.
- [8] Bernard KW, Smith PW, Kader FJ, et al. Neuroparalytic illness and human diploid cell rabies vaccine. *JAMA* 1982;248(23):3136-8.
- [9] Sudarshan MK. Assessing burden of rabies in India: WHO sponsored national multi-centric rabies survey. *Assoc Prev Control Rabies India J* 2004;6:44-5.
- [10] Ichhpujani RL, Mala C, Veena M, et al. Epidemiology of animal bites and rabies cases in India. A multicentric study. *J Commun Dis* 2008;40(1):27-36.
- [11] Bhargava A, Deshmukh R, Ghosh TK, et al. Profile and characteristics of animals bites in India. *J Assoc Physicians India* 1996;44(1):37-8.
- [12] Ritz N, Curtis N, Buttery J, et al. Monkey bites in travelers: should we think of herpes B virus? *Pediatr Emerg Care* 2009;25(8):529-31.
- [13] Johnston WF, Yeh J, Nierenberg R, et al. Exposure to Macaque Monkey Bite. *J Emerg Med* 2015;49(5):634-7.
- [14] Singla SL, Kaur M, Lal S. Monkey bites: a public health problem in urban setting. *Indian J Public Health* 1997;41(1):3-5.
- [15] Bharti OK. Human rabies in monkey (*Macaca mulatta*) bite patients a reality in India now! *J Travel Med* 2016;23(4):taw028.
- [16] Dendle C, Looke D. Management of mammalian bites. *Aust Fam Physician* 2009;38(11):868-74.