

An Epidemiological Study of 177 Cases of Human Rabies

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Lakhanpal U (Department of Social and Preventive Medicine, Medical College, Amritsar, Punjab, India) and Sharma R C. An epidemiological study of 177 cases of human rabies. *International Journal of Epidemiology* 1985, 14: 614–617. Of the 177 rabies patients admitted to various hospitals in Amritsar city, 80.8% were males and 31.1% were children under the age of 15 years. Incidence was found to be gradually increasing in urban areas, although 68.2% were still found in rural areas. History of second or third degree bites existed in all the cases. Dogs were the source of exposure in 97.3% of cases and they were all suspected of having rabies. 49.1% of cases had bites on the lower extremities and 70.8% were on uncovered parts of the body. The incubation period was observed to be between 30 and 120 days in 61.8% of cases; 90.0% of the patients developed the disease within six months of exposure. Short incubation periods were observed in a majority of the patients bitten on more than one part of the body, head, neck and face or bitten on uncovered parts. Hydrophobia and death occurred in 100% of cases and 93.4% of patients died within five days. Post-exposure injections were reported in 10.2% of cases and these showed no definite incubation period pattern.

Human rabies, though largely controlled in developed countries is still a public health problem in India, taking a heavy toll of life. Approximately 15000 people die of rabies and 3 million receive post-exposure treatment every year. In the anti-rabic clinic of the Medical College, Amritsar, about 3000 cases receive anti-rabic vaccine (ARV) every year.¹ Such a high incidence is probably due to lack of motivation on the part of both the authorities and the community in relation to destruction of stray dogs, and in licensing and immunization of pets. Through stringent regulations, for dogs and cats, some developed countries such as the UK, New Zealand, Cyprus and Hawaii have kept their islands free of the disease, and in the USA the incidence of rabies has decreased from 22 cases every year during 1946–50 to only 1–5 cases per year since 1960.² In the present study an endeavour has been made to understand the various epidemiological factors of the disease operating in the District of Amritsar in the Punjab in order to improve the prevention and control of the disease.

MATERIALS AND METHODS

A total of 177 cases of clinically diagnosed rabies who reported to various hospitals in Amritsar city during the period from September 1976 to January 1983 were included in the study. Complete details for 110 cases were recorded by interviewing the patients, their close

relatives or associates. Complete data for 67 cases could not be collected for administrative reasons.

RESULTS

Out of 177 cases studied, 31.1% were under the age of 15 years and 44.6% were between 16 and 45 (range: 3–85 years). Only three cases were under six years of age. Males constituted 80.8% of all the cases ($p < 0.01$). The greatest number of cases among males were observed under the age of 15 years whereas in females it was between the ages of 31 and 45 years (Table 1). The majority (68.2%) of the cases lived in rural areas. Farmers contributed 20.9% of the cases followed by labourers (18.2%), small shopkeepers and servicemen (15.5%), students and housewives (each 13.6%), rickshaw pullers (2.7%) and the remainder were among

TABLE 1 Age and sex-wise distribution of 177 cases of rabies.

Age in years	Male		Female		Total	
	No.	%	No.	%	No.	%
<15	48	33.5	7	20.6	55	31.1
16–30	30	21.0	6	17.6	36	20.3
31–45	33	23.1	10	29.4	43	24.3
46–60	18	12.6	9	26.5	27	15.3
61–	14	9.8	2	5.4	16	9.0
Total	143	100.0	34	100.0	177	100.0
Per cent	80.0		19.2		100.0	

$\chi^2 = 67.12$.
DF = 4.
P 0.001.

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TABLE 2 *Incubation period in relation to class of bite—analysis of 110 cases.*

Incubation period in days	Class of bite				Total	
	II		III		No.	%
-30	4	7.7	17	29.3	21	19.1
31-60	11	21.2	11	19.0	22	20.0
61-90	18	34.6	18	31.0	36	32.7
91-120	6	11.5	4	6.9	10	9.1
121-150	0	0.0	1	1.7	1	0.9
151-180	5	9.6	3	5.2	8	7.3
181-210	2	3.8	1	1.7	3	2.7
211-240	2	3.8	1	1.7	3	2.7
241-270	1	1.9	0	0.0	1	0.9
271-	3	5.7	2	3.4	5	4.5
Total	52	100.0	58	100.0	110	100.0
Per cent	47.3		52.7		100.0	
Mode	75 days		75 days			
Median	75 days		75 days			
Mean	85 days		71 days			

P = 0.05.

children and old people (15.5%) who were not engaged in any particular occupation.

The wounds were classified according to the classification followed at Central Research Institute, Kasuli.⁴ (Class I wounds were licks, class III were bites on the head, neck and face, palm and fingers and more than five bites on any part of the body; all other cases

were classified as class II wounds. There were no class I cases in this hospital series; cases with class II and III wounds constituted 47.3% and 52.7% respectively (Table 2). Bites on the lower extremities accounted for the majority (49.1%) of the cases, followed by bites on palms and fingers, head, neck and face and on more than one part of the body (Table 3). Cases with bites on unclothed parts constituted 70.8%. Dogs were the most important (97.3%) source of infection. The other sources of infection were an ass, a wild cat and a wild mongoose (0.9%) each. The majority of these animals (50.9%) were not traceable after the bite while 32.7% were killed on suspicion of being rabid and 16.4% died. Two pets dogs were reported alive at the time of collection of the data. However, exposure of the patients to some other source could not be ruled out as these pet dogs were sent to Central Research Institute, Kasuli, where, despite being observed for two years,³ their saliva was never found to be positive. The majority (86.5%) of patients had been bitten without any provocation.

The incubation period ranged between 15 days and 720 days with a mean of 79 days. It varied from 15 to 730 days in cases with class III bites and from 20 to 730 days with class II bites with a mean of 71 days and 89 days respectively. Most (89.1%) of the cases developed the disease within six months of being bitten. An incubation period as short as 15 days and longer than 270 days was found in 3.6% and 4.5% of cases respectively. In cases with class III bites 29.3% developed the disease within 30 days of exposure as compared to only

TABLE 3 *Incubation period in relation to site of bite—analysis of 110 cases.*

Incubation period in days	Head, neck and face		Palms and fingers		Arms		Lower extremities		Mixed		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
-30	6	50.0	7	24.1	0	0.0	6	11.1	2	33.3	21	19.1
31-60	3	25.0	5	17.2	3	33.3	10	18.5	1	16.7	22	20.0
61-90	1	8.3	7	24.1	4	44.4	22	40.7	2	33.3	36	32.7
91-120	0	0.0	5	17.2	1	11.1	4	7.4	0	0.0	10	9.1
121-150	0	0.0	1	3.5	0	0.0	0	0.0	0	0.0	1	0.9
151-180	1	8.3	1	3.4	0	0.0	6	11.1	0	0.0	8	7.3
181-210	1	8.4	1	3.5	0	0.0	1	1.9	0	0.0	3	2.7
211-240	0	0.0	1	3.4	1	11.1	1	1.9	0	0.0	3	2.7
241-270	0	0.0	0	0.0	0	0.0	1	1.8	0	0.0	1	0.9
271-	0	0.0	1	3.4	0	0.0	3	5.6	1	16.7	5	4.6
Total	12	100.0	29	100.0	9	100.0	54	100.0	6	100.0	110	100.0
Per cent	10.9		26.4		8.2		49.1		5.4		100.0	
Mode	20 days		75 days		60 days		75 days		30 days			
Median	38 days		75 days		75 days		75 days		67 days			
Mean	63 days		83 days		76 days		91 days		57 days			

 $\chi^2 = 34.61$.

Degree of freedom = 36.

p 0.10.

TABLE 4 Details of 18 cases who received anti-rabic vaccine (ARV).

Case no	Class of bite	No. of ARV injections received	Dose of ARV in CCs	Anti-rabic serum	Incubation period in days
1	III	2	4 CC	No	20
2	III	2	10	8 ml	30
3	III	5	25	No	30
4	III	5	10	No	20
5	III	7	35	No	30
6	II	7	14	No	45
7	III	11	55	No	47
8	II	11	55	No	30
9	II	13	65	No	24
10	III	13	65	No	180
11	II	13	65	No	70
12	II	14	70	No	24
13	III	14	70	No	60
14	III	14	28	4 ml	20
15	II	14	70	No	240
16	III	14 + 1	75	No	40
17	III	14 + 1 + 1	80	Yes	240
18	III	14 + 1 + 1	80	Yes	180

Correlation coefficient (R) = 0.5142

SE of correlation = 0.2425

Observed $r = SE = \frac{0.5142}{0.2425}$

$t = 2.2988$

$p = 0.05$

7.7% with class II bites. The most common incubation period was 75 days (Table 2). It was found to be short in cases with bites over more than one part of the body (mean 57 days) and over head, neck and face (mean 63 days) while in cases with bites over palms, fingers, and over lower extremities the mean incubation period obtained was 83 days and 91 days respectively. Of the cases with bites over head, neck and face 50.0% developed the disease within 30 days of exposure as compared to 33.3% of these with bites over more than one part of the body, 24.1% over palms and fingers and 11.1% over lower extremities (Table 3). Only 9.4% of the deceased who had bites over parts covered with clothes, developed the disease within 60 days of exposure as compared to 32.0% of those bitten on unclothed parts.

Deaths due to rabies were reported throughout the year but there were more (62.2%) in summer (April to September) than in winter. All the patients died with varied symptomatology: hydrophobia, aerophobia and restlessness was observed in 100% of cases; fever in 93.2%; severe pain in the body in 52%; headache and depression in 43%; pain and irritation at the site of the bite in 37.9%; abdominal pain in 12.5%; paralysis and convulsions each in 8%; retention of urine in 2.7% and

constipation and diarrhoea each in 1.9%. The majority (69.2%) of cases died within 3–5 days of the onset of illness. Only 4.4% of cases survived for 2 to 14 days and 2.2% for 15 days.

As regards local treatment of the wounds almost all the patients applied red chillies; only 18% had anti-septic dressing and in 0.9% cases wounds were stitched. The majority (86.5%) of the deceased had not taken ARV treatment. A total of 18 cases were given post-exposure treatment with anti-rabic nervous tissues vaccine (BPL inactivated) but only 12 received 11 or more ARV injections. Of these 12 cases only 2 had a full course of ARV along with two boosters and one initial dose of anti-rabic serum. They developed rabies in 180 and 240 days after exposure. Both had class III bites by rabid dogs and had started ARV treatment on the second and third days after the bite. Of the remaining 10 cases one had 14 injections with one booster and 9 had 2–14 injections. They were all bitten by rabid dogs and started the treatment from 1–35 days after exposure. All these cases had bites on unclothed parts and developed the disease between 20 and 240 days after exposure.

DISCUSSION

In the present series of 177 cases of rabies, 110 cases were studied in detail. The occurrence of disease was found to be four times more frequent in males than in females (Table 1) and was greatest in males between 0 and 15 years of age. Similar observations had been made by other workers.^{4–6} The higher incidence in males than in females could be due to the males being involved in more outdoor activities, and in boys more than girls because of the former's habit of playing with and teasing dogs. Although the youngest case we found in this series was three years old, Chakarabarti and Saha⁶ reported that 2.4% of their cases were infants.

The proportional increase in cases in urban areas from 17.0% in 1974⁵ to 31.8% recorded in the present study probably indicates that human rabies is increasing in urban areas.

It was found that the incubation period varied widely and tended to be short in class III wounds (bites on head, neck and face, and on more than one part of the body) and over uncovered parts. However, in a study done from records, no relation between incubation period and site and type of bite⁴ was ascertained. The chances of getting the disease were found to be greatest between 30 and 90 days of exposure. Except for five cases with an incubation period of more than one year, the remaining cases developed the disease within nine months of exposure. Even in these five adult patients, re-exposure could not be ruled out as it was not feasible

to elicit a detailed history from the patients or their close associates, because they were admitted in serious condition. Similar observations regarding the shortest and most common duration of incubation period were made by WHO.^{7,8} The majority (97.3%) of cases were bitten by dogs, who were untraceable, had died or been killed. Several studies confirm this finding.^{4-6,9} Most of the patients died between 3-5 days after the onset of symptoms while only two survived up to 15 days. These observations confirm those of other workers.^{4,5,7} The symptomatology of these cases of rabies was similar to that found in other studies.^{4,5}

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