

AN EPIDEMIOLOGICAL INVESTIGATION OF RABIES IN JORDAN

K. M. AL-QUDAH*, O. F. AL-RAWASHDEH*, M. ABDUL-MAJEED** and F. K. AL-ANI

**Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid, Jordan. **Zoonosis Control Division, Department of Diagnostic Laboratory, Ministry of Health, Amman, Jordan.*

(Received, 2. April 1997.)

Histopathological examination and fluorescence antibody test for demonstration of the viral antigen in brain smears of 419 animals suffering from clinical signs of rabies revealed that 164 animals were positively infected with rabies. Surveillance of rabies in different animal species in Jordan indicated that 12.77% cases occurred in wild animals such as the wolf, fox, badger and hyena. Stray dogs were the most common rabid animals and represented 45.12% of the total cases. Other domestic animals included cattle 19.51%, donkeys 4.87%; camels 2.43%; sheep and goats 3.65%; domestic cats 1.21% and pet monkeys 0.6%. The distribution of rabies in 11 provinces of Jordan is as follows: Irbid 29.26%; Mafrak 16.46%; Amman 21.34%; Madaba 10.97%; Zarka 5.48%; Ma'an 4.26%; Jordan valley 3.65%; Ramtha 3.65%; Tafileh 2.43%; Balka 1.82% and Aqaba 0.60%. Rabies was also reported in five men following dog bites indicating the seriousness of rabies as a zoonotic disease in Jordan

Key words: Rabies, Epidemiology, Middle East, Jordan, Wildlife

INTRODUCTION

Rabies, caused by a rhabdovirus (Lyssavirus), is a highly fatal disease reported in most countries of the world. It was mentioned in early Mesopotamian Laws before 2300 BC (Martin et al. 1983). During this century rabies has been eradicated completely from Great Britain and Scandinavian countries and has not been reported in Australia and New Zealand (Clark et al. 1994). In the United States the majority of rabies cases has always been reported in dogs (Sedmak et al. 1984). However, following the immunization program in dogs, canine rabies was decreased significantly: and wildlife accounted for 85% of the cases, the remaining 15% being distributed among cats, cattle, and other livestock (Winkler 1983).

According to the Ministry of Health reports, rabies is prevalent in almost every country of the Middle East region. Surprisingly, only a few published reports have appeared with regards to the occurrence of rabies in different animal species. According to the available literature, the epidemiology of rabies was reported from Sudan, the Sultanate of Oman, Saudi Arabia and Tunisia (Barker

et. al. 1991); Ata et. al. 1993; Hameid 1991; and Kharmachi et al. 1992). This paper describes the incidence of rabies in Jordan.

MATERIALS AND METHODS

From 1982 to 1995 the heads of 419 animals were submitted to the diagnostic laboratories for confirmation following human bites. Each case of animal rabies was investigated by the Department of Disease Control, Ministry of Health, using a standardized format that included data pertaining to the location of the incident, the animal medical history (if known) and its vaccination status. The animal heads were removed by an authorized person and transported intact to the diagnostic laboratory in cold ice chambers. At the laboratory the brains were removed under aseptic conditions and the following procedures were carried out to establish the diagnosis. The brain tissues were divided into two parts. One part was fixed in 10% buffered neutral formalin and paraffin and 6 μ m thick sections were prepared according to standard methods (Luna, 1968) and stained by haematoxylin and eosin. Also, samples were cut into 1.5 -2.0 mm pieces with a sharp blade and immediately prefixed in phosphate buffered 2% glutaraldehyde solution at 4°C and post-fixed in 1% osmium tetroxide (OsO₄) for electron microscopic examination. The other part of the brain tissue was subjected to fluorescence antibody test (F. A.) for the demonstration of the viral antigen in the brain smears. Brain homogenates were also inoculated into weanling mice, intracerebrally. The mice were also inoculated into weanling mice, intracerebrally. The mice were killed 5 days post inoculation, and during this period they were observed daily for neurological signs or death. The brain of each mouse was removed and examined using fluorescent and light microscopy.

RESULTS

Fifty three percent of all confirmed cases of rabies were in dogs. Cattle constituted 19.51% of positive cases while wildlife animals (fox, wolf, and hyena) constituted 12.77%. Donkeys, camels, sheep and goats, and cats represented 4.87%, 2.43%, 3.65% and 2.42% of the cases respectively (Table 1). Among all reported cases 40.8% were reported in owned animals. In addition 5 fatal cases of human rabies were recorded and all these cases followed the bite of stray dogs. The results indicate that 39.14% cases were positive for rabies using the FA technique (Table 2). A total of 164 cases were reported in 11 provinces (Table 3).

Three provinces reported 100% of cases in stray dogs. Reported cases of rabies in foxes and wolves were increased markedly in El-Mafraq province.

The number of confirmed rabid animals increased from 4 cases in 1984 to 23 cases in 1994 (Table 2). This was also associated with a 75% increase in the number of patients who attended hospitals for treatment following animal bites. Moreover, 5 men died of rabies following a bite from a rabid animal or contact

with infectious saliva from a rabid animal through broken skin or mucous membranes.

Histologically, the brains of affected animals had a diffuse non-suppurative polioencephalomyelitis. Lesions consisted of neuronal degeneration, glossitis and lymphocytic perivascular cuffing. Large eosinophilic cytoplasmic inclusions (Negri bodies) were present in neurons and were of diagnostic significance.

Table 1. Animal species confirmed to be rabid from 1982 - 1995.

Animal species	Number	%
Stray dogs	74	45.12
Cows	32	19.51
Pet dogs	14	8.53
Foxes	13	7.92
Wolves	5	3.04
Donkeys	8	4.87
Camels	4	2.43
Sheep and Goats	6	3.65
Stray cats	2	1.21
Pet cats	2	1.21
Hyena	1	0.60
Pet Monkey	1	0.60
Badgers	2	1.21
TOTAL	164	100

Table 2. Number and percentage of positive cases of rabies per year from 1982 to 1995

Year	No. of Positive Cases of Rabies	%
1982	12	7.32
1983	21	12.80
1984	4	2.43
1985	12	7.32
1986	5	3.05
1987	5	3.05
1988	6	3.65
1989	6	3.65
1990	9	5.49
1991	7	4.27
1992	24	14.63
1993	14	8.54
1994	23	14.02
1995	16	9.75
Total	164	100

Table 3. Geographical distribution of confirmed rabies cases during 1982-1995.

District	No of Positive Cases	%
Irbid	48	29.26
Mafrak	27	16.46
Amman	35	21.34
Madaba	18	10.97
Zarka	9	5.48
Ma'an	7	4.26
Ramtha	6	3.65
Tafileh	4	2.43
Balka	3	1.82
Aqaba	1	0.60
Jordan Valley	6	3.65
Total	164	100

DISCUSSION

In Jordan, the policy adopted for the control of rabies includes vaccination of owned dogs and cats, destruction of stray animals and post exposure treatment of bitten people. However, on important factor impeding the control of rabies is the failure to vaccinate the existing large population of stray dogs and wild animals. In thee United States wild animals accounted for 85% of the cases and the remaining 15% were distributed among other livestock (Winkler 1983; and Krebs et al. 1995). It has been stated that the red fox is probably the animal most susceptible to rabies (100 times more susceptible than skunks and 1000 times more susceptible than raccoons) Martin et al. 1983). In Europe, foxes account for a very large proportion (85%) of wildlife rabies and the control program is aimed at reducing their population using poison or traps, but this method of population reduction has failed to control outbreaks of rabies (Baer 1975; Teulieres et al. 1995; Chomel et al. 1992; Aubert 1994; and Barrat et al. 1993). Scince 1978. oral rabies vaccination of foxes with one attenuated vaccine was tried in the field in Switzerland with the use of chicken heads as bait (Baer et al., 1988). In Jordan, cases of rabies in cattle and small ruminants (sheep and goats) decreased 22% and 9% respectively. In the meantime cases of rabies in dogs had increased by 42% for the year 1994 compared with the number in 1982.

The F. A. test is most widely used in diagnostic laboratories and identifies at least 98% of rabies-infected brains (Martin et al. 1983). The hippocampus and cerebellum are most commonly chosen for examination.

In Jordan, only laboratory confirmed cases of rabies are reported in the records of the Ministry of Helth. The human diploid cell rabies vaccine has been used for postexposure treatment. The cost per five years (1991-1995) has been estimatedat S 261 865 per year. Preexposure treatments are usually used for

veterinarians, wildlife workers, laboratory staff and health department workers who are at high risk in handling potentially rabid animals.

REFERENCES

1. Ata F. A., Tageldin M. H., Al-Sumery H. S., and AL-Ismaiy S. I. 1993. Rabies in Sultanate of Oman. *Vet. Rec.* 132, 68-69.
2. Aubert M. 1994. Control of rabies in foxes: What are the appropriate measures?. *Vet. Rec.* 134, 55-59.
3. Baer G. M. (Ed) 1975. *The Natural History of Rabies*. Vol. 12, New York. Academic press, pp. 261-266.
4. Baer G. M., Bridbord K., Hui F. W., Shop R. E.; Wunner W. H. (Ed). 1988. Research towards rabies prevention. A symposium, Washington, D. D., 3-5 November 1986. *Reviews of Infectious Diseases.*, 10 (suppl. 4) S573-S815.
5. Barker M. S. and Strunk H. K. 1991. Serious infectious and communicable diseases of the Arab Gulf and Saudi Arabian peninsula, *Mil. ed.* 156: 385-390.
6. Barrat J. and Aubert M. F. 1993. Current status of fox rabies in Europe. *Onderstepoort J. Vet. Res.* 60: 357-363.
7. Chomel B. B. and Trotignon J. 1992. Epidemiologic surveys of dog and cat bites in the Lyon area / France. *Eur. J. Epidemiol.* 8: 619-624.
8. Clark K. A., Neil S. U., Smith J. S. 1994. Epizootic canine rabies transmitted by coyotes in south Texas. *J. A. V. M. A.* 204; 536-540.
9. Hameid O. A. 1991. Rabies in Sudan: An epidemiological review. *Vet. Rec.* 128: 61-62.
10. Kharmachi H., Haddad N. and Matter H., 1992. Tests of four baits for oral vaccination of dogs against rabies in Tunisia. *Vet. Rec.* 130: 494.
11. Krebs J. W., Strine T. W., Smith J. S. 1995. Rabies surveillance in the United States during 1994. *J. A. V. M. A.* 207; 1562-1575.
12. Luna L. G. 1968. *Manual of histologic staining methods of the armed forces institute of pathology*. 3rd edn., McGraw-Hill. New York.
13. Martin M. L. and Sedmark P. A. 1983. Rabies. Part I. Epidemiology, pathogenesis, and diagnosis. *Compendium on Continuing Education for the Practicing Veterinarian* 5: 521-529.
14. Sedmak P. A., and Martin M. L. 1984. Rabies. Part II. Prophylaxis and Control. *Compendium on Continuing Education for the Practicing Veterinarian*. 6: 49 - 60.
15. Teulieres L. and Saliou P. 1995. Rabies in France, 100 years after Pasteur. *Press Med. (France)*. 24: 134-135.
16. Winkler W. G. 1983. *Rabies control for domestic animals. Report on Rabies*. Grafton, WI. Fromm Laboratories. pp. 17-22.

EPIDEMIOLOŠKO ISPITIVANJE BESNILA U JORDANU

K. M. AL-QUDAH., O. F. AL-RAWASHDEH., M. ABDUL-MAJEED i F. K. AL-ANI

SADRŽAJ

Histopatološkim ispitivanjem i primenom testa sa fluorescentnim antitelima za otkrivanje virusnih antigena u mozgu otkriveno je da od 419 životinja koje su ispoljavale kliničke znake besnila, 164 životinje su bile inficirane sa virusom besnila. U radu je izneta procentualna zastupljenost besnila kod pojedinih vrsta životinja u pojedinim pokrajinama u Jordanu.

