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Chlamydial Complement Fixing Antibodies in Cows, Horses and Pigs from 1980 to 1983

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SUMMARY

Chlamydial complement fixing (CF) antibodies were investigated for 1,048 cow and 544 pig sera from Aichi and Gifu Prefectures, and 1,103 horse sera from Ibaragi, Gifu and Tokyo Prefectures from 1980 to 1983 in Japan. An average positive rate of cow sera was 30.2%. Geographical differences were observed in the positive rate of cows. The horse sera containing CF antibody were found in Ibaragi and Gifu Prefectures, at positive rates of 2.7% (22/809) and 1.0% (1/97), respectively. The pig sera mainly derived from boars were found to possess CF antibodies at 0.7% (4/544). This sero-epidemiological study suggested the presence of chlamydial infections in domestic animals in Japan.

INTRODUCTION

Chlamydia psittaci has been demonstrated as the cause of a number of naturally occurring diseases in domestic animals including cows, sheep, goats, horses and pigs throughout the world¹⁾. It has been described as diseases including enzootic abortion, pneumonia, encephalomyelitis, polyarthritis, keratoconjunctivitis and enteritis. Recently, most chlamydial infection of domestic animals has been reported as enzootic or sporadic abortion in European countries^{2~4)}. Vaccine has been developed to control abortions by chlamydial infections in ewes⁵⁾. In Japan, during a period from 1950 to 1960, Omori *et al.*^{6~8)} reported the isolation of chlamydial organisms from a non-bacterial pneumonia of goats and encephalitis of cows. They described experimental infections with the isolated chlamydial organism in various animals. Since then, however, no chlamydial infection of domestic animals has been reported in Japan.

Etiological and serological investigations of infectious diseases in imported and domestic birds and animals by our laboratory have revealed the prevalence of chlamydial infections in pet birds^{9~12)}, feral pigeons¹³⁾, and cats and dogs¹⁴⁾ in Japan since 1980, although the present state of chlamydial infections in domestic animals is not known. This report describes the presence of complement fixing (CF) antibodies to *C. psittaci* in cows, horses and pigs in Japan from 1980 to 1983.

MATERIALS AND METHODS

Sera : Sera from 1,048 cows, 1,103 horses and 544 pigs were examined for antibodies to *C. psittaci* CF antigens. The cow sera were collected from Aichi and Gifu Prefectures, originally for annual surveillance of brucellosis and tuberculosis (Table 1). The horse sera were sampled at a training center for racing horses in Ibaragi Prefecture, a horsemanship training park in Metropolitan Tokyo, and a race course in Gifu Prefecture at a periodic inspection (Table 2). The pig sera, most of which were derived from boars, were collected from Aichi and Gifu Prefectures originally for toxoplasmosis

Table 1. Chlamydial CF antibodies in cows

Prefec- tures	Years	Prevalence of positive sera	Titers of CF antibodies						
			< 1 : 8	1 : 8	1 : 16	1 : 32	1 : 64	1 : 128	1 : 256≤
Aichi	1980—1982	259/ 800(32.4) *	534	7	195	60	3	0	1
Chita	1980	28/ 156(17.9)	128	0	19	7	1	0	1
	1981	88/ 161(54.7)	71	2	76	12	0	0	0
	1982	48/ 112(42.9)	63	1	38	10	0	0	0
Okazaki	1981	11/ 129(8.5)	118	0	10	1	0	0	0
	1982	84/ 242(34.7)	154	4	52	30	2	0	0
Gifu	1983	57/ 248(23.0)	188	3	48	8	1	0	0
Total		316/1048(30.2)	722	10	243	68	4	0	0

* No. of positive sera/No. of examined (percentage)

Table 2. Chlamydial CF antibodies in horses

Prefec- tures	Years	Prevalence of positive sera	Titers of CF antibodies				
			< 1 : 8	1 : 8	1 : 16	1 : 32	1 : 64≤
Ibaragi	1983	22/ 809(7.7)*	786	1	22	0	0
Gifu	1983	1/ 97(1.0)	96	0	1	0	0
Tokyo	1981	0/ 197(0)	197	0	0	0	0
Total		23/1103(2.1)	1079	1	23	0	0

* No. of positive sera/No. of examined (percentage)

Table 3. Chlamydial CF antibodies in pigs

Prefec- tures	Years	Prevalence of positive sera	Titers of CF antibodies				
			< 1 : 8	1 : 8	1 : 16	1 : 32	1 : 64≤
Aichi	1980—1982	4/355(1.1)*	351	0	4	0	0
Okazaki	1981	3/ 89(3.4)	86	0	3	0	0
	1982	0/ 89(0)	89	0	0	0	0
Chita	1980	0/ 70(0)	70	0	0	0	0
	1981	1/ 56(1.8)	55	0	1	0	0
	1982	0/ 51(0)	51	0	0	0	0
Gifu	1982	0/189(0)	189	0	0	0	0
Total		4/544(0.7)	540	0	4	0	0

* No. of positive sera/No. of examined (percentage)

surveillance (Table 3).

Complement fixation test : The CF antigen was extracted with sodium deoxycholate¹⁵⁾ from highly purified elementary body¹⁶⁾ of *C. psittaci* GCP-1 strain which was isolated from an imported psittacine bird in our laboratory in 1980¹¹⁾. Sera examined were treated with 0.05% trypsin at 57°C for 30 min to eliminate anti-complement reaction. Titers of 1:16 or higher were considered as significantly positive. The χ^2 -test was used for the statistical calculations.

RESULTS

The prevalence of chlamydial CF antibody in cows is shown in Table 1. The average positive rate of cows examined was 30.2% (316/1,048). The positive rate in Aichi Prefecture was significantly higher than that in Gifu Prefecture (0.01>P). In Aichi Prefecture, the positive rate of Chita area (54.7 and 42.9%) was significantly higher than that of the Okazaki area (8.5 and 34.7%) in 1981 and 1982

($0.01 > P$). The distribution of antibody possessing animals varied from 0 to 59.1% at each farm in Aichi Prefecture.

The incidence of the positive rate of horse sera examined was 2.1% (Table 2). The sera derived from a horse training center contained chlamydial CF antibody in 22 out of 809 sera examined (2.7%) in 1983. In 15 out of 106 barns, a few antibody possessing horses were detected in the same barn of the horse training center. The positive rate was 1.0% (1/97) of sera from Gifu Prefecture in 1983. Chlamydial CF antibody was not detected in Metropolitan Tokyo in 1981.

The pig sera examined possessed chlamydial CF antibody in 4 out of 544 (0.7%) (Table 3). Four positive sera were sampled in Aichi Prefecture in 1981. In Gifu Prefecture, chlamydial CF antibody was not detected in 1982.

DISCUSSION

The presence of chlamydial antibody in domestic animals is reconfirmed by this serological surveillance. The positive rate of cows has varied in different reports, ranging from 5 to 50% throughout the world^{4,17,18,19,20}. Omori et al.⁸) reported that the chlamydial CF antibody positive rate of 577 cow sera collected from various districts in Japan from 1954 to 1955 varied from 9.4 to 52.4% among districts, and that it was 35.0% for all the cows and 34.7% in the Chubu district. This rate was similar to our result of 30.2% in Aichi and Gifu Prefectures in the Chubu district from 1980 to 1983. It should be noted that the antibody prevalence has been maintained at the same rate over the past 20 years in Japan.

Chlamydiosis in horses and pigs has not been reported in Japan. The positive rate of horses and pigs examined was lower than that reported in other countries. In Australia, 69% of horses examined were chlamydial antibody positive²¹). Neuvonen and Estola¹⁸) reported that 7.1% of horses examined were positive in Finland from 1968 to 1972. The positive rate of horses was 14.8% in Germany²⁰). The positive rate of pigs in other countries was 7.7% in Czechoslovakia⁴), 8% in the United States²²) and 10.9% in Scotland²³), although no antibody was detected in Denmark in 1968¹⁷). The sera examined, however, were derived from limited places and times. Therefore, a more continuous and comprehensive investigation would be required to determine the correct state of chlamydiosis in these animals in Japan.

The clinical history was not always obtained in sera examined in this report. A few sera with chlamydial CF antibody were derived from cows with abortion, abnormal birth or pneumonia, but CF antibody was also detected in sera derived from clinically healthy animals. Many abortions caused by chlamydial organisms have been reported in cattle⁴), sheep²), and goats³) in European countries. Encephalitis and chlamydial infection have been related in cows^{24,25}). Several researchers described respiratory infection by *C. psittaci* in horses^{26,27}) and pigs²⁸). Stellmacher et al.²⁸) described the importance of chlamydial infection in pig pneumonia. Chlamydia was isolated from a pig with lesions in methra and prostate gland²⁹). The possible chlamydial infection in diseases of undetermined etiology must be kept in mind. Further studies are in progress to reveal any relationship between serological and pathological findings.

Recently, mammalian species also have been considered as a possible source of human zoonotic chlamydial infections³⁰⁻³²). Stepánek et al.⁴) suggested the possible relationship of bovine chlamydiosis and human chlamydiosis. Roberts et al.³³) reported human abortion associated with infection by ovine abortion agents. In the present investigation, no data on humans contacted with

chlamydial CF antibody possessing cows were obtained. Close cooperation between veterinarians and medical doctors is required to control chlamydial infections in animals and humans.

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ウシ，ウマおよびブタにおける クラミジア抗体の保有状況について

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要 約

クラミジア補体結合抗体の保有状況を愛知および岐阜両県のウシ1,048頭，ブタ544頭，ならびに茨城県，岐阜県および東京都のウマ1,103頭について調査した。ウシの平均抗体保有率は30.2%で地域差が認められた。ウマでは茨城および岐阜両県で2.8%および1.0%にそれぞれ抗体が認められた。ブタでは主に種雄豚で0.7%が抗体陽性であった。このように，わが国の家畜にクラミジア感染症が存在することが示唆された。

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