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OCCUPATIONAL EXPOSURE TO STREPTOCOCCUS SUIS II, HANTAVIRUS, BRUCELLA ABORTUS, LYMPHOCYTE CHORIOMENINGITIS VIRUS, AND LEPTOSPIRA IN VETERINARIANS AND PIG FARMERS IN THE SOUTHERN NETHERLANDS

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Bien que la médecine vétérinaire puisse être un métier gratifiant, les vétérinaires praticiens doivent compter avec plusieurs facteurs de risque de santé. Les dangers liés à la profession sont communs en industrie agricole et des études cliniques et épidémiologiques ont montré que les vétérinaires sont menacés par plusieurs maladies professionnelles incluant des infections comme Streptococcus suis II, Toxoplasma gondii, Pasteurella multocida, Listeria monocytogenes, Leptospira, les hantavirus, la rage, Coxiella burnetii, Chlamydia psittacci, Brucella abortus, et la chorio-méningite lymphocytaire. En 1993, le Dutch Animal Health Service, en collaboration avec un hopital humain régional, a commencé une étude de la santé professionnelle des vétérinaires. Dans le cadre de cette étude, des échantillons de sang de 102 vétérinaires ont été soumis à la recherche d'anticorps contre S. suis II, l'hantavirus, B. abortus, la chorio-méningite lymphocytaire et les leptospires. De plus, des échantillons de 191 éleveurs de porcs, prélevés pendant la même période que pour les vétérinaires, ont été disponibles à partir d'une banque de sérums. Aucun vétérinaire (O p. cent) et 3 éleveurs de porcs (1,6 p. cent) possédaient des anticorps de l'hantavirus. Quatre vétérinaires (3,9 p. cent) et un éleveur (0,5 p. cent) possédaient des anticorps de leptospires. Aucun vétérinaire (O p. cent) et 5 éleveurs (2,6 p. cent) possédaient des anticorps du virus de la chorio-méningite lymphocytaire. Il y avait un nombre significativement plus élevé de vétérinaires possédant des anticorps contre la protéine muramidase-released, protéine des souches pathogènes de S. suis II, que d'éleveurs. Enfin, 5 vétérinaires et un éleveur avaient un titre agglutinant B. abortus ≥1/40ème et un titre CBR ≥1/1.

INTRODUCTION

Although veterinary medicine can be a rewarding occupation, veterinary practitioners must deal with distinctive health risk factors. Occupational hazards are common in agricultural industry, and clinical and epidemiological studies have suggested that veterinarians are at risk for many occupational illnesses.

Due to close contact to animals, animal products and occupational exposure to the animals' environment, veterinarians are prone to zoonotic infections (1, 4, 12). Veterinarians can be exposed to zoonotic infections like rabies, *Streptococcus suis* type 2, *Pasteurella multocida*, *Brucella abortus*, *Toxoplasma gondii*, *Listeriosis*, *Leptospirosis*, *Chlamydia psittaci*, *Coxiella burnetii* or Q-fever, *Ornithosis*, *Sporotrichosis* and lymphocyte choriomeningitis-virus (LCMV).

The periodic examination of various occupational groups for serological indicators of zoonotic infection is being increasingly recommended by the World Health Organisation and used by health authorities throughout the world. The first sero-epidemiological study of zoonotic infections in veterinarians (working predominantly with large animals) in the Netherlands was executed in 1984. Of a total of 222 veterinarians, 84% showed antibodies against *C. burnetii* and 19% against *B. abortus* (9).

In 1992-1993, the Animal Health Service in cooperation with a regional human hospital started an investigation into occupational health of veterinarians (2, 3, 15). In the framework of this study, blood samples of veterinarians and pig farmers were examined for antibodies against several zoonoses.

MATERIAL AND METHODS

A database with 493 veterinarians who participated in the questionnaire survey in 1992 ( ) was subdivided into five groups, depending on the professional activities: working ≥ 50% of time predominantly with swine, cattle, poultry, companion animals, and non-practitioners working for the government, industry, teaching etc.

The study population consisted of a random selection of approximately 20 veterinarians each from the five professional specialties in the database.A blood sample was drawn from the participating veterinarians in the Elkerliek Hospital in Deurne, The Netherlands during a medical examination (2). Furthermore, serum samples of 191 swine farmers, collected in the same time period as from the veterinarians, were made available from a serum bank. A total of 102 veterinarians were examined for antibodies against *Streptococcus suis* type II (Western Blot of two virulent characteristics of *S. suis* type II: Muramidase-Released Protein (MRP) and extra-cellular factor(EF)), Hantavirus (using an ELISA, described by Groen et al. (5)), *Brucella abortus* (agglutination test and complement fixation test), Leptospira (ELISA described by Terpstra et al. (13)), and LCMV (by means of an ELISA). Furthermore, serum samples of 191 swine farmers, collected in the same time period as from the veterinarians, were made

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available from a serum bank. Differences in prevalence of antibodies against specific zoonoses between occupational groups were tested by χ^2 - test or, when appropriate the Fisher exact test.

RESULTS AND DISCUSSION

None of the veterinarians, and a total of 3 swine farmers had antibodies against Hantavirus (Table I).
There was a significantly (p=0.03) higher prevalence of antibodies against Leptospira in veterinarians than in swine farmers. There was a tendency (p=0.10) of a higher prevalence of antibodies against LCMV in pig farmers than in veterinarians. There were significantly (p=0.02) more veterinarians with antibodies against Muramidase-Released Protein (MRP), a protein of pathogenic *S. suis II* strains, than pig farmers. Furthermore, there was a significantly higher (p=0.01) prevalence of antibodies against *Brucella abortus* (agglutination titre ≥ 1:40 and a CFT titre ≥ 1:1) in veterinarians than in pig farmers.

Table I
Presence of antibodies against *Streptococcus suis* type II, Hantavirus, *Brucella abortus*, LCMV, and Leptospira in veterinarians and pig farmers.

Occupational groups	Streptococcus suis type II MRP+	EF+	Hantavirus	Brucella abortus	LCMV	Leptospira
veterinarians (n=102)	6 (6%)	2 (2%)	0 (0%)	5 (4.9%)	0 (0%)	4 (3.9%)
pig farmers (n=191)	2 (1%)	1 (0.5%)	3 (1.6%)	1 (0.5%)	5 (2.6%)	1 (0.5%)

In the Netherlands, only a few cases of LCMV infections were observed in the past (16). From 1988 on, every year approximately 20 hospitalizations due to presumed infection with LCMV are reported in the Netherlands (11). LCMV infections are transmitted by rodents, and are mainly observed in Winter and early Spring, when rodents tend to come closer to and into houses for comfort and feeding. In Europe and the USA, prevalence of LCMV in wild rodents is considerable and sometimes LCMV infection is a problem in laboratory animals. It seems that pig farmers have a considerable chance of exposure to LCMV. In this respect, stringent and effective rodent control in farm-animal buildings should have a high priority, especially since also other zoonoses like Hantavirus and Leptospira are transmitted by the same rodents.
The severity of haemorrhagic fever with renal syndrome (HFRS), caused by Hantavirus, is largely dependent on the serotype of the virus involved. Hantavirus infections are transmitted to humans by feral rodents. In 1984, the first cases of Hantavirus infections in the Netherlands were documented among laboratory workers, who had been in contact with infected laboratory rats (6). Subsequently, a number of serologically confirmed cases, not related to contact with laboratory animals, was found in the eastern and southern parts of the Netherlands. Animal trappers, forestry workers, laboratory workers and farmers are indicated as individuals with a suspect occupational risk. The prevalence of Hantavirus infections in pig farmers in our study was higher than seen in farmers in general (6).
S. suis type II is a known pathogen in pigs, and infections in humans results in a meningitic/septicaemic condition similar to that in pigs. The meningitis is usually accompanied by permanent vestibular and auditory dysfunction. Although only a few affected people have died, the permanent hearing loss and problems of balance are serious consequences of infection with *S. suis* type II. In 83% of human cases of *S. suis* type II infection in the Netherlands between 1968-1984, patients were working in the meat-processing industry. Pig farmers, abattoir workers and butchers are indicated as individuals with a suspect occupational risk. In the Netherlands, no sero-epidemiological survey has been done to estimate prevalence of *S. suis* type II infections in occupational groups sofar. In New Zealand, 10% of meat inspectors and 21% of pig farmers had antibodies against *S. suis* type II (10).
Leptospira hardjo and *L. pomona* are serotypes associated with dairy and pig farming respectively. A small epidemic was reported in the Netherlands in meat workers of a poultry abattoir, probably caused by rats due to infection with *L. icterohaemorrhagiae* and *L. copenhageni* (7). Typical symptoms in human patients are fever, headache, meningitis, renal dysfunction. Transmission of Leptospira infections occurs mostly by means of contact with urine of infected animals. Dairy farm fever, the leptospirosis of cattlemen was first diagnosed in the Netherlands in 1984 (14). In 1985 and 1986, a survey on 98 dairy farms revealed 32% of the farms, and 60% of the animals to be infected with *L. hardjo*. A total of 5% of the people living and/or working on these farms were seropositive. The difference in prevalence observed in our study is probably an indication for a difference in occupational exposure, as veterinarians are more likely to be exposed to several different farm-animal species, possibly harbouring Leptospira.
Richardus et al. (9) examined 220 Dutch large-animal practitioners with respect to antibodies against *B. abortus* (9), 19% had antibodies (agglutination titre ≥ 1:40 and a CFT titre ≥ 1:1). The age distribution of their group and our group of veterinarians was the same, but only 40% of our group of veterinarians could be considered as large-animal practitioners. Therefor, the estimated prevalence is comparable to the investigation of 1984. Nowadays, occurrence of Brucellosis is almost negligible in the Netherlands, due to well organized eradication and surveillance programs. However, once in a while a B. abortus outbreak occurs, associated with import of infected animals. Vigilance is therefor still of major importance.

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