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OCCUPATIONAL RISK OF SPOTTED FEVER: AN EVALUATION OF KNOWLEDGE, ATTITUDES AND PREVENTION PRACTICES AMONG VETERINARY MEDICINE STUDENTS

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ABSTRACT

Spotted fever (SF) is a tick-borne rickettsial disease that in Brazil affects mainly the economically active population. The occupational risk attributed to veterinarians, biologists and animal handlers is due to exposure to disease vectors. This study assessed the knowledge, attitudes and preventive practices relating to SF in a group of veterinary medicine students. A descriptive analysis was conducted among 173 students at a private higher education institution in the Brazilian Federal District. The participants were asked about their knowledge of SF, their attitudes when they found ticks on their body and practices relating to tick handling, treatment and prevention. The results showed that 84% of the respondents had heard about SF. Almost half of the respondents answered that SF is a tick-borne disease. Most respondents knew about prevention methods, and the main method cited was treatment of the animals with acaricides. Regarding attitudes towards SF, it was observed that most respondents removed ticks by hand. None of the respondents were using appropriate protective equipment when exposed to the vector. Although this population was well informed about SF and its preventive measures, this knowledge was not reflected in implementation of prevention practices.

KEY WORDS: Tick-borne diseases; occupational health; health education.

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RESUMO

Risco ocupacional para febre maculosa: uma avaliação dos conhecimentos, atitudes e práticas de prevenção entre estudantes de medicina veterinária

A febre maculosa (FM) é uma riquetsiose transmitida por carrapatos que, no Brasil, acomete principalmente a população economicamente ativa. O risco ocupacional atribuído aos profissionais veterinários, biólogos e tratadores de animais se deve à exposição aos vetores da doença. O presente estudo avalia os conhecimentos sobre a FM, as atitudes e práticas preventivas contra a doença em um grupo de estudantes de medicina veterinária. Uma análise descritiva foi realizada com 173 alunos de uma instituição de ensino superior privado do Distrito Federal. Os participantes foram questionados sobre seus conhecimentos em relação à FM, suas atitudes ao encontrar carrapatos no corpo, práticas relacionadas ao manuseio dos carrapatos, bem como o tratamento e a prevenção da doença. Os resultados mostraram que 84% dos entrevistados já ouviram falar da FM. Quase a metade respondeu que a FM é uma doença transmitida por carrapato. A maioria conhecia os métodos de prevenção e o mais citado foi o tratamento dos animais com carrapaticidas. Quanto às atitudes relacionadas à FM, predominou a declaração de que removiam carrapatos com as mãos. Nenhum dos entrevistados usou equipamento de proteção adequado quando exposto ao vetor. Embora a população esteja bem informada sobre a FM e suas medidas preventivas, tal conhecimento não se refletiu na implementação de práticas de prevenção.

DESCRITORES: Doenças transmitidas por carrapatos; saúde do trabalhador; educação em saúde.

INTRODUCTION

Spotted Fever (SF) is an emerging zoonosis in Brazil that worries public health authorities because of its effects, mainly on the economically active population and its high coefficient of lethality (Ministry of Health, 2009).

It is an acute, febrile, infectious disease caused by the bacterium *Rickettsia rickettsii*. It is difficult to diagnose, given that it presents variable nonspecific clinical symptoms that are common to other infectious diseases such as dengue, leptospirosis and hantavirosis. This gives rise to low levels of suspicion and delayed treatment, with consequent severe complications or a fatal outcome (Xu & Raoult, 1998; Lemos, 2002; Ministry of Health, 2009; Dantas-Torres, 2007; Del Fiol et al., 2010).

There are reports of a bacterium differentiated from *Rickettsia rickettsii*, causing spotted fever with eschar and adenopathy in the states of Bahia and São Paulo. The characterization shows similarity to the species *R. parkeri*, *R. africae*, and *R. sibirica*. Due to the fact that its identification has occurred in the Atlantic Forest, the name assigned for this agent was *R. parkeri* (strain Atlantic Forest) (Spolidorio et al., 2010; Silva et al., 2011).

The occupational risk attributed to veterinarians, biologists, and animal handlers is due to their exposure to ticks, which are the main vectors of the disease (Dantas-Torres, 2007; Lemos, 2002; Ministry of Health, 2009; Del Fiol et al., 2010). Ticks are currently considered to be the second largest group of pathogen vectors (Parola & Raoult, 2001).

Cases of SF have been confirmed in twelve Brazilian states; however, the highest incidences are concentrated in the southern and southeastern regions of Brazil, especially the states of São Paulo, Santa Catarina and Minas Gerais (Ministry of Health, 2009). However, it is recognized that there may be limitations in this information due to underreporting of cases in other states (Barros-Silva et al., 2014).

The lack of knowledge regarding SF, and the occupational risk attributed to veterinarians highlight the need for studies assessing these professionals' basic knowledge of the mechanisms of infection, as well as preventive and educational measures. Human and animal health academic departments need to address this subject, which constitutes a weakness in professional training (Bosh et al., 2013).

In the field of health surveillance, an approach considering knowledge, attitudes and practices relating to vector-borne diseases has been widely applied (Souza et al., 2012; Oliveira et al., 2012; Maeda et al., 2012; Bosh et al., 2013; Júnior, et al., 2013; Lobo et al., 2013; Wang et al., 2013; Rosecrans et al., 2014). These studies have sought to support health education for exposed groups, taking into account regional peculiarities and specific risk factors.

The present study aimed to assess the knowledge, attitudes and prevention practices relating to SF among veterinary medicine students, who are potentially exposed to SF infection.

MATERIALS AND METHODS

Knowledge, attitudes and practices relating to SF were assessed through a questionnaire using descriptive categorical variables, which was applied during interviews with veterinary medicine students. The target population consisted of students in their first to tenth semesters at a higher education institution named FACIPLAC, in Gama, Federal District, Brazil, who were chosen randomly. The number of participants to be interviewed was calculated by means of a sample calculator (Santos, 2011), taking into consideration the total number of students (N. 300) enrolled in veterinary medicine at this institution from the first to tenth semesters. The calculation of the sample was adjusted by semester. The following questions were asked: What do you know about SF and how SF is transmitted? In what kind of places do you think one can get SF? What are the symptoms and prevention measures for SF? What do you do when you find a tick? Have you ever found ticks on your body? In which environment? What did you do? Do you use personal protective equipment in practical classes?

To calculate proportions, the sums of the interviewees' responses were used in the numerator and the size of the population interviewed or who had answered the questions was taken as the denominator. The calculations were performed using the Microsoft Office Excel 2007 software.

The study was approved by the Research Ethics Committee of FACIPLAC (Protocol: 340 882). The participants were informed about the purpose

of the research, and were asked to sign an informed consent statement form. They were given assurances that they would remain anonymous.

RESULTS

In total, 173 students were interviewed. Regarding knowledge about SF, 84.4% of the respondents had heard of the disease, and most of them had received this information during classroom teaching (62.3%). The other students had received this information through other means, such as television/radio (15.7%), friends/family (10.3%) and health care services (7.5%).

Almost half of the respondents answered that SF is a tick-borne disease and among them, 65.7% stated that SF is acquired through tick bites, although other mechanisms were also cited (Table 1). Few respondents knew what the etiological agent of SF is (22.6%) but various hosts were cited (Table 1). Protozoa, viruses and bacteria were cited as responsible for SF.

Table 1. Knowledge of spotted fever, according to veterinary medicine students in a higher education institution in the Federal District, Brazil.

Questions/responses	n	%
*How SF is transmitted?		
Tick bites	96	65.7
Contact with ticks	4	2.7
Don't know	27	18.5
Contact with vertebrate animals	2	1.4
Person-to-person contact	1	0.7
**Which animals are hosts of SF?		
Horses	18	18.0
Dogs/cats	17	17.0
Cattle	18	18.0
Wild Animals	11	11.0
Don't know	42	42.0

*Proportions calculated assuming 146 respondents. ** Proportions calculated assuming 100 respondents. (n) - number of respondents.

The participants cited many sites where they had encountered ticks (Figure 1) and listed several symptoms of SF (Figure 2). Most of the interviewees knew that SF is a serious illness (93.1%) but none of them knew anyone who had already had SF or another tick-borne disease.

Most respondents knew about prevention methods: animal treatment with acaricides and avoiding contact with ticks were the main prevention methods cited (Table 2).

Most respondents knew about tick-borne diseases other than SF (76.0%). babesiosis (78.4%), ehrlichiosis (73.9%), anaplasmosis (32.4%) and borreliosis/ Lyme disease (3.6%) were also cited.

Most participants had found a tick on their body and had removed it by hand. They had come into contact with the vector in a rural environment (Table 3).

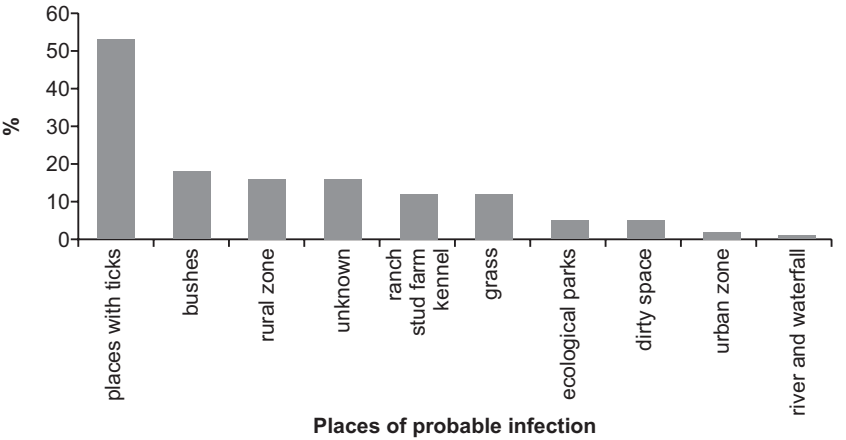

Figure 1 Knowledge of spotted fever, according to veterinary medicine students in a higher education institution in the Federal District, Brazil: percentages of responses regarding the likely site of infection of spotted fever.

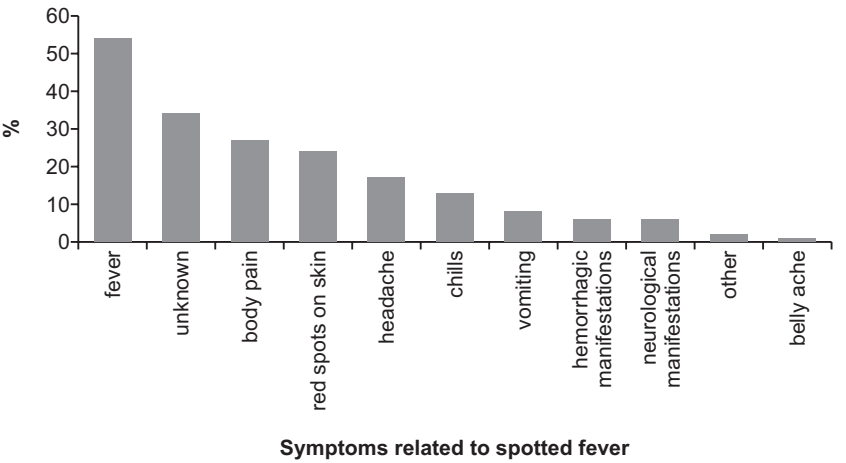

Figure 2. Knowledge of spotted fever, according to veterinary medicine students in a higher education institution in the Federal District, Brazil: percentages of symptoms reported to relate to spotted fever.

After contact with ticks, only 13.4% of participants had had symptoms, which consisted of itching and allergic reactions (77.7%), red spots on the skin (22.2%) and other symptoms (11.1%). Among these individuals, 66.6% waited

for the symptoms to disappear naturally, 22.2% self-medicated and 11.1% sought medical assistance.

Table 2. Knowledge of spotted fever, according to veterinary medicine students in a higher education institution in the Federal District, Brazil.

Questions/responses	n	%
*Do you know how to prevent SF?		
Yes	84	57.5
No	62	42.5
**If yes, how?		
Use of protective equipment	7	8.3
Use of acaricide on animals	61	72.6
Keep vegetation level low	13	15.5
Check the body every 3 hours	6	7.1
Use some type of repellent	9	10.7
Avoid contact with ticks	33	39.3
Others	2	2.4

*Proportions calculated assuming 146 respondents. **Proportions calculated assuming 84 respondents. (n) - number of respondents.

Table 3. Attitudes about spotted fever, according to veterinary medicine students in a higher education institution in the Federal District, Brazil.

Questions/responses	n	%
*Have you ever found ticks on your body?		
Yes	67	70.5
No	28	29.5
**If yes, how often?		
Rarely	45	67.2
Sometimes	16	23.9
Frequently	6	8.9
**What did you do?		
Removed them by hand	59	88.0
Crushed them	3	4.5
Removed them with tweezers	4	6.0
Used alcohol	9	13.4
Used fire	1	1.5
Other actions	2	3.0
**In which environment was the contact with the tick?		
University	2	3.0
Home environment	7	10.4
Rural environment	53	79.1
Others	4	6.0

*Proportions calculated assuming 95 respondents. **Proportions calculated assuming 67 respondents. (n) - number of respondents.

Most participants (87.4%) had pets, mainly dogs (91.6%), followed by cats (22.9%), horses (15.6%) and other animals (14.4%). Most also reported that their animals had already shown tick infestation (68.7%).

In assessing practices, it was found that 95 participants did not use protective equipment and appropriate clothing when exposed to ticks, while 85.3% only used overalls and galoshes, and 14.7% used ordinary clothes.

None of the respondents checked their body every 3 hours starting from the beginning of the practical class in which they were exposed to ticks. None of them was bitten during these classes.

DISCUSSION

The results from the study showed that most participants had heard about SF, knew how infection occurs and were aware that the disease is severe.

It was observed that none of the students were using suitable personal protective equipment and that they were not practicing body inspection, i.e. they were not following the recommendations of the prevention protocols (Ministry of Health, 2009). Similar results were observed by Baker & Gray (2009), who concluded that veterinarians are at higher risk of infection from zoonotic pathogens than the general population. In particular, work-related accidents were associated with a higher likelihood of zoonotic infection, and veterinarians were often noncompliant with wearing appropriate protective equipment. Considering that there is no effective vaccine on the world market and prophylactic antibiotics for exposed groups are not recommended, promotion of individual and collective preventive measures in this group is necessary (Dantas-Torres, 2007; Del Fiol et al., 2010).

Preventive measures need to be prioritized, such as the use of collective and personal protective equipment (Ministry of Health, 2009). It is very important that veterinarians should take these measures because field activities in areas with presence of hosts and vectors are widely recognized as risk factors for SF (Ministry of Health, 2009; Barros-Silva, 2014). It is known that the ticks of the genus *Amblyomma* have low host specificity and may infest various mammals (including humans) (Labruna et al., 2011; Szabó et al., 2013). Thus, the whole population analyzed is exposed to the risk of having SF, even if the characteristics of the natural history of the disease are known.

Although rickettsial diseases are not included in the list of occupational infectious and parasitic diseases in Brazil (Ministry of Health, 1999), they are mentioned, in the manual of procedures from the Ministry of Health and the Pan-American Health Organization, as important occupational diseases (Ministry of Health and Pan-American Health Organization, 2001). Moreover, SF is now on the Brazilian list of infectious diseases for which immediate notification is compulsory (Ministry of Health, 2014).

The National Center for Infectious Diseases in the United States (CDC) has drawn attention to the epidemiological profile of rickettsial diseases (Rocky Mountain spotted fever, ehrlichiosis and anaplasmosis), as potential zoonoses with an occupational profile, due to their transmission by tick vectors (Chapman et al., 2006).

Also in the United States, it appears that Lyme disease is responsible for over 95% of all tick-borne diseases (National Center for Infectious Diseases, 2014). Moreover, the Department of Occupational Health in that country has drawn attention to the need for preventive practices to be used by professionals who conduct field activities in places that are considered to be at risk due to the presence of the vector (Piacentino & Schwartz, 2002).

In Brazil, little information has been recorded on the occupational risks of zoonoses. In an analysis on the potential of plague as an occupational disease, Oliveira et al. (2011) highlighted that the main factor for this comes from the low incidence of this disease, which leads to underinvestment in health education and professional training and contributes towards inability to prevent the disease, detect cases and implement early control measures. In the United States, a biologist died with a diagnosis of plague after unprotected exposure to animals (Bosh et al., 2013). This result shows that there is a need to promote preventive measures among workers exposed to risk.

A seroprevalence survey showed hantavirus and *Yersinia pestis* antibodies in professionals working with rodents in the field and in the laboratory (Costa et al., 2013). This result highlights the importance of protective measures for these professionals.

Although the population studied was well informed about SF and its preventive measures, this knowledge was not applied to development of preventive practices, such as the use of personal protective equipment. Thus, it would be important to include more hours in the course program addressing infectious and parasitic diseases of interest to veterinary public health.

As a recommendation, it is suggested that biosafety practices in the field and laboratory activities should be promoted, thereby seeking to create individual and collective preventive protocols. Furthermore, creation of biosafety committees within the academic context should be promoted, with the aim of stimulating analysis on this topic and dissemination of results, so as to promote preventive practices.

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