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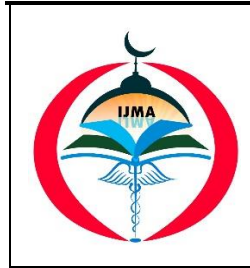
Original Article

Occupational Health Hazards among Veterinary Workers in Sohag Governorate, Egypt

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ABSTRACT

Background: Veterinarians perform different tasks that can be counted among those at risk of health and safety, in particular herds of animals, slaughter houses, farms larvae, stables, horse stables and meat processing plans, and much different tasks that relate in various ways to the problem. Brucellosis is a zoonotic infection that is responsible for substantial economic losses along with human morbidities. Brucellosis is principally affecting animals; however, it can be transmitted from animals to humans.

The Aim of The Work: This study aims to identify health hazards among veterinarian workers, risk factors for infection with zoonotic diseases and the prevalence of brucellosis among veterinarian workers.

Patients and Methods: A cross-sectional epidemiological study conducted over a representative sample from eight districts in Sohag Governorate chosen through a map sample, from each district a representative sample was taken among a sector of the high-risk occupational group [veterinarians] as exposed group, school teachers and workers as non-exposed group. Subjects were submitted to interviews, history, and laboratory tests, Latex agglutination test for B Abortus and B Melitensis.

Results: Brucella seroprevalence among the exposed group [Veterinians]. Workers using agglutination test was 26% included veterinary workers [46.2%] followed by veterinary doctors [23.1%], veterinary butchers or peelers [23.1], then employer [7.7%]. While in the non-exposed group was 16%, teachers [93.8%] and school workers [6.2%]. The logistic regression model identified eating raw milk product OR 6.6, handling aborted animals OR 6.2, Slaughtered animal OR 5, animal injury OR 3.1 as risk factors for Brucella seropositivity among veterinary workers.

Conclusion: Zoonosis like brucellosis and injuries remain the main occupational risk of veterinarians Brucellosis is an important public health problem worldwide. It is associated with significant morbidity and mortality. It may affect any organ system and can present with a variety of clinical features.

Keywords: Zoonotic diseases; Brucellosis; Seroprevalence; Veterinary Workers.

INTRODUCTION

Veterinary medicine is the science that deals with the health and welfare of animals, particularly concerning prevention and cure of diseases. Since the health of humans are connected to the health of animals and the environment, a veterinarian protect human health by controlling diseases that are transmitted from animals to humans [zoonosis] and ensuring the health check on foodstuffs of animal origin [1].

A German study [1998–2002] reported that zoonotic infections accounted for 14% of all reports of occupational diseases filed with the mandatory accident insurance service [2].

Gün *et al.* investigated the prevalence of occupational infections among veterinarians in Turkey using serological analysis. This study found seropositivity for brucellosis and toxoplasmosis in a significant number of subjects [3].

Other studies had demonstrated the risk of infections acquired from animals and the need for infection control practices in veterinary clinics [4].

Brucellosis is a major zoonosis that continues to be of public health and economic concern in many parts of the world. The disease is usually transmitted from infected animals to man by direct contact or by consumption of raw milk infected with Brucella organisms [5].

Brucella species are small, non-motile, non-spore-forming, encapsulated Gram-negative coccobacilli. There are seven species, of which only four can cause human brucellosis: *Brucella Abortus*, *Brucella Melitensis*, *Brucella Suis* and *Brucella Canis* [6].

Domestic animals such as cattle, goats, sheep, pigs, camels, buffalo and dogs serve as a reservoir of human infection. Transmission of brucellosis to humans occurs through the consumption of infected, unpasteurized milk and milk products, through direct contact with infected animal parts, through ruptures of skin and mucous membranes and through inhalation of infected aerosolized particles [7].

Brucellosis causes acute febrile illness–undulant fever– which may progress to a more chronic form and can also produce serious complications affecting the musculoskeletal, cardio-vascular, and central nervous systems [8].

THE AIM OF THE WORK

The aim of the study was to identify health hazards among veterinarian workers, risk factors for infection with zoonotic diseases. and the prevalence of brucellosis among veterinarian workers.

PATIENTS AND METHODS

A cross-sectional epidemiological study conducted over a representative sample from eight districts in Sohag Governorate chosen through a map sample, from each district a representative sample was taken among a sector of the high-risk occupational group [veterinarians] as the exposed group, school teachers and workers as the non-exposed group. The study took twenty-four months duration from [the First of July 2019   till the end of June 2021].

All participants of exposed and non-exposed groups were subjected to interview sheet including sociodemo-graphic characteristics [age, sex, marital status, residence, etc.], occupational history [employment category, duration of occupation, and previous occupation, brucellosis or hearing problems history, medical care [vaccines or therapy], and administrative rules of provided safety measures.

Also, blood samples [3 ml.] were collected in sterile coded tubes from workers and analyzed by Rose Bengal plate test [RBPT] to confirm the presence of seropositivity for B. Abortus and B. Melitensis which were common in Egypt. In addition, abdominal ultrasound was done for positive cases in both groups.

Ethical consideration:

The study protocol was approved by the Council of the Department of Community Medicine and industrial medicine. Aims and procedures of the study, security, and confidentiality were assured to the participants. Informed consent was taken from each subject to participate in the study.

Statistical analysis:

Analysis of data was done by IBM computer using SPSS [statistical program for social science version 20] as follows. Description of quantitative variables as mean, SD. Description of qualitative variables as number and percentage. Student t-test of two independent samples was used to compare two groups as regard quantitative variable. *Chi-* square test was used for testing significant differences in qualitative variables. For cross-tables, where the number of cells whose expected count less than 5 was >25% of cells, Fisher's Exact tests and Exact chi-square test was used. Odds ratios were calculated for estimation of the magnitude of the risk of different risk factors. Backward conditional logistic regression analysis was done for risk factors of brucellosis seropositivity. The level of significance was considered equal to or less than 0.05 [P ≤ 0.05].

RESULTS

The mean age of the exposed group was 46 ± 6.5 years, while the non-exposed group mean was 45 ± 7.7 years. Also the mean work duration was 18.4 ± 4.5 years in exposed group while in non-exposed was 16.7±6 years.

In addition, more than 2/3 of subjects were male in both groups while females in the exposed group 1/2 the number of the non-exposed group. The residence of the exposed group subject's nearly equal residence in rural and urban area while more than half of non-exposed subject's urban residence. Regarding, the results of seropositivity between groups our results revealed about 26% in exposed group while 8% in non-exposed group the difference between groups statistically significant [p < 0.05] [Table1].

Concerning the distribution of positive and negative serology according to age groups we showed that most of seropositivities more with the age group [40-] 50% followed by the age group [50+] 34.6% but the least age group [30-]15.4% the difference between both groups statistically non-significant [p >0.05] [Table 2].

As regard distribution of positive and negative serology groups according to occupation our results revealed that highest percentage of seropositivities was among veterinary workers [46%] followed by doctors and butchers [23%] while the least positivity was employers [7.7%] the difference between them statistically non-significant [P > 0.05] [Table 3].

Respecting relation between symptoms and serology results of the studied sample we showed that the most frequent symptom among seropositive subjects in exposed group was fever and fatigue 44 [84.6%] followed by headache 40[76.9%], back pain and myalgia 36 [69.2%], anorexia and arthralgia 32[61.5%], and finally abdominal pain 24[46.2%] **[Table 4]**.

A conditional logistic regression analysis for occupational risk factors of Brucellosis seropositivity among studied groups. Predictors of Brucellosis seropositivity detected by logistic regression were eating raw milk product [p=0.000, OR 6.6 95%CI3.1-14.1],handling aborted animals [p=0.000, OR 6.2, 95%CI 3.1- 12.4], Slaughtered animal[p=0.000, OR 5, 95%CI 2.4-10] , animal injury [p=0.008, OR 3.1, 95%CI 1.3-7.5], Milk unpasteurized[p=0.001, OR 0.6, 95%CI 0.01-0.3] and finally eating raw meat with non-significant [p=0.581, OR 1.3, 95%CI 0.5-3.3][Table 5].

Table [1]: Relationship of seropositivity among exposed and non-exposed groups

	Exposed N=200		Non-exposed N=200		P-Value
Seropositivity					
Seropositive, N, [%] = 68, [17]	52	26.0	16	8.0	0.001 S
Seronegative, N = N, [%] = 332, [83]	148	74.0	184	92.0	

Table [2]: Results of Brucella serum agglutination test in different age groups exposed to N=200.

Age group[exposed]	Seropositive		Seronegative	
	N	%	N	%
30-	8	15.4	40	27
40-	26	50	62	41.9
50+	18	34.6	46	31.1
Total	52	**100.0**	**148**	**100.0**
Chi-square	2.89			
P-Value	0.235 [NS]			

Table [3] Results of Brucella test among different occupations in exposed group:

Jobs [exposed]	Seropositive		Seronegative	
	n	%	n	%
Veterinary doctor	12	23.1	28	18.9
Veterinary workers	24	46.2	68	45.9
Butchers or Pealers	12	23.1	40	27
Employer	4	7.7	12	8.1
Total	52	100.0	148	100.0
Chi-square	0.572			
P-Value	0.903 [NS]			

Table [4] Relationship between brucellosis seropositivity and different clinical symptoms in exposed group

Symptoms [exposed]	Seropositive N=52		Seronegative N=148		P-value
	N	%	N	%	
Fever	44	84.6	32	21.6	0.000S
Anorexia	32	61.5	32	21.6	0.000S
Arthralgia	32	61.5	52	35.1	0.001S
Fatigue	44	84.6	40	27	0.000S
Back pain	36	69.2	44	29.7	0.000S
Abdominal pain	24	46.2	28	18.9	0.000 S
Myalgia	36	69.2	28	18.9	0.000S
Headache	40	76.9	40	27	0.000S

Table [5]: Predictors of Brucellosis seropositivity among groups being studied [Total number =400]

Occupational exposures	β coefficient	p-value	OR [95%CI]
Handling aborted animal	1.82	0.000 S	6.2 [3.1-12.4]
Slaughtered animal	1.62	0.000 S	5 [2.4-10]
Eating raw meat	0.263	0.581 NS	1.3 [0.5-3.3]
Milk unpasteurized	-2.81	0.001 S	0.6 [0.01-0.3]
Raw milk product	1.89	0.000 S	6.6 [3.1-14.1]
Animal injury	1.16	0.008 S	3.1[1.3-7.5]
Constant	-3.72	0.009S	0.24

Binary logistic regression was used, no statistically significant difference, P>0.05. *S: Statistically significant difference, P≤0. The dependent variable was serological status: seropositive=1, seronegative=2; independent variables include handling aborted animal, slaughtered animal, and eating raw meat.

DISCUSSION

There is an important concern to establish surveillance and control for emerging and re-emerging zoonotic diseases. There is an increase in the incidence of human brucellosis, especially in Middle Eastern countries [9].

Regarding the prevalence of brucellosis, results from the current study corroborate with the work of Mekky *et al*. [10] who reported that workers in occupations dealing with animals had a 2.4- fold higher risk of brucellosis than those in occupations not dealing with animals [p=0.009] the overall prevalence of brucellosis among workers in occupations dealing with animals in that study was found to be [29.6%]. Similar rates were previously reported in other developing and Middle East countries. A prevalence rates of 20%, 21.7% and 25.5% were reported by Barbuddhe *et al*. [11], Karimi *et al*. [12], Mukhtar [13] in Delhi, Pakistan, and Iran, respectively. The high prevalence rate reported by Grushina *et al*. [14] detected seropositivity in 42.5% of human sera by ELISA in Kazakhstan. Farghaly *et al*. [15] in Egypt reported prevalence rate of 57.3% among workers occupationally exposed to livestock animals, and a higher prevalence rate of 58.6% was recorded by Khalili *et al*. [16] in Iran. Lower prevalence rates of 8.2% and 9.8% have been reported by Nikokar *et al*. [17] in Iran, and El-Okda and Hamed [18] in Egypt.

Regarding the age grouping and seropositivity, our results revealed the fifth decade was the most commonly affected with brucellosis [50%] followed by sixth decade [34.6%]. These go in accordance with Embarek [19] who found that, the middle age groups [30-39 and 40-49 years] were the most common. This is explained by the work activity in both age groups which have been long established in practices that bring them regularly in close contact with animals. Confirming this study results are reports in Pakistan [20], India [21] and Egypt [22]. Other studies revealed no significant association between brucellosis serostatus and age of subjects [23, 24].

As respect brucellosis seropositivity and occupation, our results revealed highest percentage of seropositivity among veterinary workers was [46.2%] followed by doctors [23.1%], butchers or peelers [23.1], then employer [7.7%]. These results go in accordance with Elmoselhy *et al*. [22], El-Okda and Hamed [18], and Mukhtar [13]. However, Farghaly *et al*. [15] revealed highest infection among veterinarians [44.2%] followed by animal service workers [23.3%], then butchers and veterinary assistants [6.0% and 14.0% respectively].

As regard clinical symptoms and seropositivity, the most frequent symptom among seropositive subjects in exposed group were fever and fatigue [84.6%] followed by headache [76.9%], back pain and myalgia [69.2%], anorexia and arthralgia [61.5%], and finally abdominal pain [46.2%]. These results go in accordance with Embarek [19], Geyik *et al*. [25], Namidura *et al*. [26], Tasbkaan *et al*. [27], Hasanjani *et al*. [28], and Alsubaie *et al*. [29]. Predictors of Brucellosis seropositivity detected by logistic regression were eating raw milk product, handling aborted animals, slaughtered animal, animal injury, milk unpasteurized and finally eating raw meat with non-significant. Similar results were obtained by Farghaly *et al*. [15], Earhart *et al*. [30], El Okda *et al*. [18] and Bamaiyi *et al*. [31].

Conclusion and recommendation: Zoonosis and injuries remain the main occupational risk of veterinarians. Brucellosis is an important public health problem and has been recognized as a prevalent occupation-related disease, 26% among veterinary workers in Sohag governorate. The disease is preventable, so we must encourage the implementation of infection control programs for workers at risk of infection with brucellosis. Prevention measures through health education, food hygiene, environmental protection, personal hygiene, and PPEs are urgently needed and an important complementary issue. Control measures through early detection and prompt treatment are must. Further studies should be done to understand the true prevalence and risk factors of this occupational disease in different areas, occupations, and populations in Egypt.

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