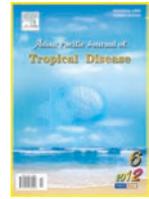


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Seroprevalence of brucellosis in slaughterhouse workers in Kerman city, Iran

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ABSTRACT

Objective: To evaluate the seroprevalence of brucellosis among the risk group of population between the periods from July 2011 to June 2011. **Methods:** A total of 75 sera samples of Kerman slaughterhouse workers were collected. Sera were tested by a commercial indirect ELISA kit. **Results:** The apparent seroprevalence was 58.6% by ELISA method. Significant relation were observed with clinical signs ($P < 0.001$) and duration of work ($P < 0.01$) but relation between age, job title and education level with seropositivity were not significant. **Conclusions:** The study indicates that the slaughterhouse workers in Kerman City are at high risk to infection with brucellosis.

1. Introduction

Brucellosis is a widespread zoonosis that infects several domestic and wild animals. *Brucella melitensis*, *B. abortus*, *B. suis*, and *B. canis* are considered to be potentially pathogenic to humans. Newly recognized species such as *B. pinnipediae* and *B. cetaceae* have also been reported to cause disease in humans^[1,2] although, little is known of their epidemiology. Transmission of brucellosis to humans occurs through the consumption of infected, unpasteurized animal–milk products, through direct contact with infected animal parts (such as the placenta by inoculation through ruptures of skin and mucous membranes), and through the inhalation of infected aerosolized particles. Brucellosis is an occupational disease in shepherds, abattoir workers, veterinarians, dairy–industry professionals, and personnel in microbiologic laboratories. One important epidemiologic step in containing brucellosis in the community is the screening of household members of infected persons^[3]. Consumption of unpasteurized dairy products – especially raw milk, soft cheese, butter, and ice cream – is the most common means of transmission. Hard cheese, yogurt, and sour milk are less hazardous, since both propionic and

lactic fermentation takes place. Bacterial load in animal muscle tissues is low, but consumption of undercooked traditional delicacies such as liver and spleen has been implicated in human infection After entering the human body and being taken up by local tissue lymphocytes, brucellae are transferred through regional lymph nodes into the circulation and are subsequently seeded throughout the body, with tropism for the reticuloendothelial system. The period of inoculation usually ranges from two to four weeks. The classic categorization of brucellosis as acute, sub acute, or chronic is subjective and of limited clinical interest^[4].

Human brucellosis is a protean disease, but most bacteremic patients have the typical presentations of recurrent fever, lassitude, joint pain, and sweating at night. There may be few, if any, constitutional manifestations in the localized form of the disease that have been described in almost every organ and system. The diagnosis is consequently more difficult on clinical grounds alone. Thus, the diagnosis of human brucellosis is invariably based on microbiological and serological laboratory tests^[5].

The purpose of this study was to investigate the seroprevalence of brucellosis among high–risk group slaughterhouse workers in Kerman city.

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2. Materials and methods

2.1. Population study and sampling

A cross-sectional serologic survey was performed from Jun 2011 to Jul 2011 among 75 Kerman slaughterhouse workers, working in slaughterhouses, exposed to fresh meat or blood of livestock.

2.2. Ethics

The study protocol was peer reviewed and cleared for ethics by the Committee Ethic of Kerman University of Medical Sciences. Verbal and written consents were obtained from all participants before being involved with the study.

2.3. ELISA analysis

Blood collection and analysis. A 5 mL venous blood sample was drawn from each person. Serum was separated by centrifugation at $1500 \times g$ for 10 min at room temperature and then sera were stored at $-20\text{ }^{\circ}\text{C}$ pending analysis. All the serum samples were analyzed for anti-Brucella antibodies by ELISA test. A Brucella IgG ELISA kit (IBL, Hamburg, Germany) was used to titrate the serum anti-Brucella IgG as described by company. Briefly, $1\text{ }\mu\text{L}$ of serum was diluted 1:101, and after buffer-washing, $100\text{ }\mu\text{L}$ of horseradish peroxidase-conjugated anti-human IgG was added. The mixture was incubated for 30 min at room temperature and was then treated with tetramethyl benzidine (TMB) for 20

min. A Brucella antibody-antigen reaction was indicated by a blue coloration. Subsequently, a TMB stop solution was added, and the optical density of the well was measured with an ELISA reader (Anthos 2020, Austria); at 450 nm. A serum titer of more than 12 U/mL was considered positive.

2.4. Statistical analysis

Data were entered into and most analysis was carried out using the Epi Info 6 program (Centers for Disease Control and Prevention, Atlanta, GA). Either the chi-square or Fisher's exact test were used to compute two-tailed P values for independent variables. Chi-square tests for linear trend were used in the determination of linear trends in stratified data^[6].

3. Results

A total of 75 persons, aged 20–65 years participate to the study. The median age was 38.4 ± 6.4 years and all of them were male. Brucella antibody positive subjects were detected in 44 of the 75 sera tested.

The seropositivity was not significantly found associated with age (Table 1), Education level or location of activity of participants (data not shown). Significant relation were observed with duration of work ($P < 0.01$) (Table 2) and clinical incidence of infection in slaughter workers based on clinical finding ($P < 0.001$) (Table 3).

Table 1

Age distribution of seropositivity against brucella in slaughter workers.

| Age | Total | Number pos. | % |
|-------|-------|-------------|------|
| 20–30 | 18 | 10 | 55.5 |
| 31–40 | 30 | 17 | 56.6 |
| 41–50 | 16 | 10 | 62.5 |
| 50< | 11 | 7 | 53.5 |

Table 2

Incidence of infection in slaughter workers based on duration of work.

| Duration of work | Total | Number pos. | % |
|------------------|-------|-------------|----|
| 1–5 | 10 | 5 | 50 |
| 6–10 | 20 | 11 | 55 |
| 11–20 | 29 | 16 | 55 |
| 20< | 16 | 12 | 75 |

Table 3

Incidence of infection in slaughter workers based on clinical finding.

| Clinical finding | Total | Number pos. | % |
|------------------|-------|-------------|-----|
| Yes | 8 | 8 | 100 |
| No | 67 | 36 | 54 |

4. Discussion

Several Middle East and central Asian countries have recently reported an increase in the incidence of human brucellosis and the appearance of new foci^[7]. Among the Middle East countries, Syria, Saudi Arabia, Iraq, Iran and

Turkey have reported the highest annual incidence rates of human brucellosis worldwide with the exception of Central and Inner Asian countries; 160, 21, 28, 24 and 26 cases/100 000 persons-years at risk, respectively^[7].

The present study was conducted to determine the seroprevalence of brucellosis in Kerman slaughterhouse workers for the first time in Southeast Iran. In this study the

seroprevalence estimated using ELISA method was found to be 58.6%. In Iran very few studies have been carried out on brucellosis especially on slaughterhouse workers, Nikokar et al in 2011 in Guilan (North of Iran) reported 9.8%^[8]. In a study by Karimi et al in Iran, seroprevalence of brucellosis was found to be 20% in slaughterers and 4% in butchers^[9].

The prevalence of brucellosis shows marked variation between countries. Our neighbouring country Pakistan has reported 21.7% by Mukhtar and Farkhanda^[10]. The seroprevalence of 25.45% and 25.5% determined by Kumar et al and Barbuddhe et al respectively, among abattoir workers in Delhi^[11,12]. The seroprevalence of brucellosis among slaughterhouse workers in Saudi Arabia was reported to be 35%^[13], in Argentina the seroprevalence of brucellosis was 4.1% among slaughterhouse workers^[14].

Asignificant association between duration of work was observed ($P < 0.01$) in the current study. Karimi et al and Mukhtar and Farkhanda have also highlighted a strong association between brucellosis and duration of occupational exposure^[9,10].

Out of 75 cases of subjects for brucellosis by ELISA, 8 individuals complained of intermittent fever, joint pain, weakness, history of chills, drenching sweat and given history of back pain and joint pain all of worker with clinical findings were seropositive ($P < 0.001$) (Tab.3).

One of the surprising finding of the study was SAT negative in a considerable number of workers with a positive ELISA IgG (unpublished data). ELISA test has offered a significant diagnostic advantage over conventional agglutination methods in the diagnosis of brucellosis in an area where brucellosis is endemic. Our data support the results of several previous studies^[15–18].

In Conclusion, seropositivity to *Brucella* has a high prevalence among slaughterhouse workers in Kerman city and maybe others province in Iran. ELISA test has offered a significant diagnostic advantage over conventional agglutination methods in the diagnosis of brucellosis in an area where brucellosis is endemic. The disease can be prevented in the slaughterhouse workers through the use of personal protective devices. Public health authorities should educate the general public regarding prevention of the disease with specific emphasis on people working in slaughterhouses. Thus, effective working guidelines for workers who participate in the slaughter of animals must be developed in order to protect them from zoonoses.

Conflict of interest statement

We declare that we have no conflict of interest.

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