Ecological study of brucellosis in humans and animals in Khoy, a mountainous District of the IR. of Iran

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ABSTRACT

Background and objective: Brucellosis is primarily a contagious disease of domestic animals causing abortion, so it is considered one of the most serious of the current public health problems, especially in developing countries. The main purpose of this study was finding the incidence of human and animal brucellosis and detection of any correlation between human and animal brucellosis in Khoy, one of the endemic regions in Iran.

Materials and Methods: We carried out an ecological study in Khoy district in North West of Iran. We ascertained all new cases of human and animal brucellosis in the 2001-2004 period. Data were analyzed using Pearson correlation coefficient (r) and square of correlation coefficient (r²). Seasonal incidence was calculated for each species.

Results: The cumulative incidence rate of human brucellosis was detected to be 175/100,000, cattle brucellosis was 391/100,000, and sheep and goat brucellosis was 105/100,000. We detected direct and incomplete correlation between human and cattle (r=0.096, r²=0.009, p value=0.742), human and sheep (r=0.267, r²=0.071, p value=0.355), and cattle and sheep (r=0.797, r²=0.635, p value=0.001).

Conclusion: The most effective routes to control the disease include pasteurization or boiling of milk for human consumption, cooking all food stuff derived from animal sources, vaccination of cattle against brucellosis, isolation and slaughtering of seropositive reactors for brucellosis and providing protective clothing for humans dealing with infected cattle.

Keywords: Brucellosis, Prevalence, Zoonosis, Khoy, Iran.

INTRODUCTION

Brucellosis has been an ambiguity since it was first identified by Sir David Bruce in 1886 (1). Brucellosis is mostly an infectious disease of domestic animals causing abortion, so it is considered one of the most serious of the current public health problems, in particular in developing countries. It can also cause decreased milk production and sterility of infected animals (2). The veterinary care and treatment expenses are very high (2).

Animals are considered reservoirs of human illness. Brucellosis is transmitted from animals to humans through direct contact or indirect contact by ingestion of animal products and/or inhalation of airborne agents (3). Disease is transmitted from infected animals by ingestion of raw milk or dairy products, especially cheese made from raw or lightly heated milk. Transmission also occurs through contact with farmers and veterinarians coming in contact with infected animals and frequent infection has been reported in staff of diagnostic laboratories. Diagnosis of brucellosis is done in general diagnostic laboratories and not in a specialized lab (4).

Human brucellosis is an acute or chronic systemic disease, which can involve any of the organs or systems of the body (5). The true incidence of human brucellosis is unknown for most countries (5). In developing countries the disease is endemic and underdiagnosed. The World Health Organization (WHO) estimates that half a million cases are reported universally every year, and that for every case identified there...
are four undetected cases (6).

The clinical picture can be very ambiguous and human brucellosis is often misdiagnosed and thus under-reported in the medical literature (2,6). The management of this disease in animals, and thus prevention of the disease in humans, depends chiefly upon the use of capable diagnostic procedures.

There is insufficient data on the prevalence of brucellosis in cattle and humans in Egypt and in the neareast region(4). Iran is an endemic area for brucellosis. Hasanjani Roushan et al. studied epidemiological features and clinical manifestations in 469 adult patients with brucellosis in the northern part of Iran. They found that the consumption of fresh cheese (22.4%), animal husbandry (11.3%), diagnostic laboratory work (8.1%), and veterinary professions (1.5%) were the main risk factors for brucellosis infection (7). Results of a study in Iran showed that significant risk factors for infection in humans are related to the existence of another case of brucellosis in the home (OR = 7.55, p = 0.0001) and consumption of unpasteurized dairy products (OR = 3.7, p = 0.014). Keeping cattle and cattle vaccination were also important risk factors. They concluded that pasteurization of dairy products and education regarding fresh cheese must be pursued for eradication of brucellosis (8).

The main purpose of this study was finding the Cumulative Incidence (C.I.) of human and animal brucellosis and detection of any correlation between human and animal brucellosis in Khoy, a mountainous area that is one of the endemic regions in Iran with high rate of consumption of unpasteurized dairy products that leads to a high endemic rate. In addition the upshot of age, sex, occupation, and season was considered.

MATERIALS AND METHODS

We carried out an ecological study in Khoy district in North West of Iran located in latitude 38, 32 and longitude 44, 58. Khoy is a mountainous city with more than 600 villages. We ascertained all new cases of human and animal brucellosis during spring 2000-summer 2003 to compute to calculate the case incidence (C.I). Human cases of brucellosis were detected based on Khoy medical centers' reports. Laboratory diagnosis of human brucellosis is based on Wright, Coombs-Wright and 2-Mercaptoethanol (ME) tests in Khoy medical centers. We employed veterinary organization reports for ruling cattle, sheep and goat brucellosis cases. Rose Bengal test, Card test and Ring test are carried out for brucellosis diagnosis in the Khoy veterinary laboratory. Wright and 2ME tests were performed for result confirmation. For each
case (human and animal) a questionnaire was completed. Age, sex, and occupation of human cases were recorded and the season of illness was recorded for all animal and human cases. Statistical analysis was performed using SPSS software version 15. Data were analyzed using Pearson correlation coefficient (r) and square of correlation coefficient (r²). Seasonal incidence was calculated for each species.

RESULTS

During the years of the study, the number of human brucellosis cases was 640 patients. The incidence rate of human brucellosis was detected at 175/100,000 individuals. Most of the patients were male (62.34%). Overall, 0.21% of males and 0.13% of females of the Khoy district population was affected. Among brucellosis cases, 10-29 years old individuals were most affected. Housekeepers (29.53%) and farmers (18.75%) were at high risk of brucellosis among other occupations. We found that disease frequency in Gharaziadin (1.97%) and Gharasou villages (1.92%) was more than other villages of Khoy.

In the survey of animal brucellosis we found 593 affected animals consisting of 143 cattle and 450 sheep and goats. Cumulative incidence of cattle brucellosis was 391/100,000, and sheep and goat brucellosis was 105/100,000.

We detected direct and incomplete correlation between human and cattle (r=0.096, r²=0.009, p=0.742), human and sheep (r=0.267, r²=0.071, p=0.355), and cattle and sheep (r=0.797, r²=0.635, p=0.001). Seasonal changes in cumulative incidence of brucellosis during 2000 to 2003 is shown is Fig. 1.

DISCUSSION

Brucellosis remains a major worldwide zoonosis (9). We show that the cumulative incidence rate of human brucellosis in Khoy, northeast of Iran, is 175/100,100. This is close to the prevalence that was reported by Refai in 2002 that mentioned prevalence reaching 132.4 per 100,000 and human brucellosis being endemic in all parts of the country (4). A seroprevalence study that was carried out in northeast of Iran during 2002-2006 showed that the prevalence rate of brucellosis in human was 37/100,000 (10).

An estimated 500,000 human infections per year still occur worldwide. Global variation ranges from incidence of <1/100,000 population in UK, USA and Australia, to 20–30/100, 000 in southern European countries such as Greece and Spain, and up to >70/100,000 in Middle Eastern countries. Incidence data from many areas afflicted with extreme poverty is not available, however, it is believed to be high (11).

In this study we found cumulative incidence of cattle brucellosis to be 391/100,000, and cumulative incidence of sheep and goat brucellosis to be 105/100,000. We detected a significant correlation between cattle and sheep (P<0.05) but between human and cattle and human and sheep we cannot find any significant correlation (P>0.05).

In Iran, the prevalence of brucellosis in animals reached 44% in 1956 and dropped to 5% in 1958 because of control programs but increased to 17.4% in 1977 following reluctance to follow the control programs. Animal prevalence reached 1.25% for a second time with control programs. The prevalence rate has been up and down. In 1980, the prevalence rate was 6.4% and 10.18% in 1991(4).

In northeast of Iran, the prevalence of brucellosis in sheep and goat was 340/10,000 and in cattle was 56/10,000. A significant correlation between humans and animals is shown in that study (P<0.05) (10).

Our data showed that most of the patients were male (62.34%). Among brucellosis cases, 10-29 years of age was the most frequent age group. Housekeepers (29.53%) and farmers (18.75%) were at high risk of brucellosis among other occupations. However, the age distribution of reported brucellosis cases from several countries of the Middle East region indicates that children are particularly at risk. The incidence has a seasonal pattern in the Middle East with a maximum number of cases in the spring and early summer periods (4).

Data from northeast of Iran show that human brucellosis is more common in males than females. The disease in the 20-40 years of age group is more frequent and most of the patients lived in villages. Most human brucellosis cases had been referred to medical centers in spring and summer (10).

Only 17 countries now claim to be free of disease, however, huge investment in surveillance is essential to maintain this status. Others still suffer as a result of enormous disease burden, not only through the loss of productivity and trade of livestock, but also as a result of severe and debilitating zoonotic disease in man. In order to eradicate or at least control this disease, good surveillance, reliable tests and efficacious vaccines are of paramount importance (11).
Most of the middle-eastern countries have already attempted to control the disease in ruminants by using various strategies with vaccination as the main measures of control. The control of the disease in most countries of the region is based basically on serological surveillance of target animals, followed by slaughter of positive animals and vaccination of heifers with full or reduced dose \textit{B. abortus} strain 19 and sheep and goat with Rev-1. These efforts were reported, in some cases, to significantly reduce the incidence of the disease in cattle. As an example, the situation in Egypt deserves to be mentioned in some detail (12).

The control of this disease in animals, and thus prevention of the disease in humans, depends mainly upon the use of efficient diagnostic procedures (13). These measures include pasteurization or boiling of milk for human consumption, cooking all food stuffs derived from animal sources, vaccination of cattle against brucellosis, isolation and slaughtering of seropositive reactors for brucellosis and providing protective clothing for humans dealing with infected cattle (1).

REFERENCES