

*Full Length Research Paper*

# The prevalence of human Brucellosis in Mazandaran province, Iran

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Accepted 17 January, 2012

**Brucellosis is a bacterial infectious disease shared between human and livestock caused by a bacterium of the genus *Brucella*. This disease is generally transmitted to human through direct contact with an infectious animal, drinking unpasteurized milk or milk products. Symptoms include weakness, lethargy, chills, fever, sweating, decreased appetite, headache, back pain and psychological symptoms; and the main cause of death is mainly endocarditic. This study was conducted with the aim to diagnose Brucellosis seroepidemiology in people referred to health and medical centers of Mazandaran province during 2010. Blood samples were taken from participants and after centrifugation and separation of serum, all the received samples first underwent Wright Tube Agglutination test and the samples of Wright tube test with negative or low titers of antibody were used for identifying Blukay antibodies of Standard Coombs Wright Test. To determine whether or not the disease is motile, 2ME Wright Test and Elisa were also conducted. During this study, 337 participants were found positive for Brucellosis. Of these, 25.72% lives in the city and 74.28% is in rural areas. Also, 54.37% were male and 45.63% female. Brucellosis is an important re-emerging zoonosis with a worldwide distribution and it's still an uncontrolled serious public health problem in many developing countries including Iran.**

**Key words:** Human Brucellosis, prevalence, Mazandaran, Iran.

## INTRODUCTION

Brucellosis is a bacterial infectious disease shared between human and livestock caused by a bacterium of the genus *Brucella*. Brucellae belong to  $\alpha$ -2 subdivision of proteobacteria. They are Gram-negative and non-motile coccobacillus that has aerobic metabolism (JoAfshani et al., 1995) and six species (*B. melitensis*, *B. abortus*, *B. Suis*, *B. ovis*, *B. neotomae*, and *B. canis*) is known (Badakhshan, 1991). This disease is generally transmitted to human through direct contact with an infectious animal, drinking unpasteurized milk or milk products, infectious meat, inhalation of dust containing

the organism in the laboratory or place of animal husbandry and as a weapon of war (bioterrorism). In addition, conjunctively secretions and penetration of needle spray to infected animals during the vaccination (or in laboratory) are the other causes of transmission to human. *Brucela* transmission, from human to human through blood transfusion, breast milk, bone marrow transplant, needle sharing in drug users, and also intrauterine transmission through the placenta is rare but possible (Haji Abdolbaghy et al., 2000). Symptoms include weakness, lethargy, chills, fever, sweating, decreased appetite, headache, back pain, and psychological symptoms and the main cause of death is mainly endocarditic. This disease predominantly infects those who work at abattoirs and veterinarians or deal with meat products such as butchers, veterinarians and

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shepherds.

In Iran, due to non-compliance with health problems and lack of high quality education issues on Malta fever disease among veterinarians' staff including butchers and abattoir staff, the real face of this disease especially in the chronic form remained hidden (Taravati et al., 1997). Totally, prevalence rate is unknown and various in different areas. In most Asian countries included in Iran however, based on evidence it is more prevalent in western parts of Asia, India, Middle Eastern, Southern European, and Latin American countries. (Mantur and Amarnath, 2008) Annual occurrence of more than 500,000 cases (Pappas et al., 2006). Thakur and Thapliyal (2002), revealed a prevalence rate of 4.97% in samples obtained from persons exposed to animals. The much higher prevalence rate has been also noted in specific risk groups such as abattoir workers.

Accordingly, *Brucella* infects hands through gastrointestinal mucosa and wounds during manipulation of dairy products and the slaughter of animals infected by Brucellosis and that staff may disseminate infection through smoking, drinking water or tea in the workplace, therefore, this study was conducted with the aim to diagnose Brucellosis seroepidemiology in people referred to health and medical centers of Mazandaran province during 2010.

## MATERIALS AND METHODS

### Sample

The present study was a descriptive cross sectional study. Samples selected by convenience method among all 625 referred to health networks in Mazandaran province during 2010. After preparing the demographic questionnaire including age, gender, occupation, residence (urban or rural), 3 ml blood was taken from all 625 participants who were represented a Brucellosis symptom signs and after centrifugation and separation of serum, all the received samples first underwent Wright Tube Agglutination test from 1 to 8 tubes. Questionnaire administered by laboratory expert and physician and completed by patients.

### Test

The samples of Wright tube test with negative or low titers of antibody were used for identifying Blukay antibodies of Standard Coombs Wright Test and the anti-*Brucella* antibody titer determined (Taravati et al., 1997). To determine whether the disease is motile, 2ME Wright Test (*2-Merchптоethanol*) and Elisa were also conducted (Alavi et al., 1997). 2ME test with equal titer or more than 1/40, identified disease as active and with titer less than 1/40 found it as inactive (Taravati et al., 1997). In patients with suspected Brucellosis (with) negative culture or low titers of STA (Serum Test Agglutination), it is possible to administer Coombs CF (complement fixing) or ELISA that is done in some medical diagnosis laboratories but is still not well standardized. Confidence was 95% in our tests.

### Statistic analysis

Descriptive statistics was run for all data to obtain percentage and

frequency. All data were analyzed by SPSS 18.

## RESULTS

During this study, 377 participants among all participated were found positive for Brucellosis, among them 97 (25.72%) located in urban area and rest 280 (74.28%) were in rural areas. 205 (54.37%) of participated were male and 172 (45.63 %) female. In different groups of samples positive respond found including: 80(2.12%) planter, 21(5.57%) farmer, 152(40.31%) housewives, 19(5.03%) worker, 31(8.22%) students, 74 (19.62%) had other occupations (Table 1).

Amol city with 94 (24.93%) and Feridoonkenar with 3 (0.79%) accounted for highest and lowest rate of human cases, respectively. The housewives and farmers accounted for maximum and minimum occupational groups, respectively (Table 1). Lowest prevalence was found among age group below 10 years (5.03%) and the highest occurred in the age group above 50 years (38.46%) (Figure 1).

87 (23.07%) of Brucellosis positive cases were infected through unpasteurized milk, 24 (6.36%) with raw local milk, 170 (45.09%) through unpasteurized cheese, 8 (2.12%) with unpasteurized cream, 24 (6.36%) with unpasteurized butter, 15 (3.97%) with colostrums, 12 (3.18%) with top milk, and 47 (12.46%) with other products. Therefore, consumed unpasteurized cheese formed the highest and consumed unpasteurized cream included lowest percentage of infection to Brucellosis (Table 2).

## DISCUSSION

Brucellosis is a primarily disease with diverse clinical manifestations and this diversity mostly lead to neglect it by physician in most cases; Diagnosis of this disease remain uncertain and inappropriate treatments such as surgery, non-specific treatments and relaxing medications and other related alternatives are used. In our study 25.72% were residence in urban and 74.28 in rural areas. In Kurdistan (west of Iran), the maximum number of patients (78%) was in rural areas and the rest (22%) lived in city. The residents of rural areas stand in high risk of infection compared to those living in cities, this is mainly due to cheese consumption, as result showed 45.09% of those who consumed were infected with Brucellosis and 23.07% were infected through unpasteurized milk, and 6.36% through unpasteurized butter and raw local milk. In no salt cheese organism survives about 2.5 to 3 months and in butter even if frozen, it takes 4 months to *Brucella* dies (Haji Abdolbaghy et al., 2000). In Iraq also same results obtained (Shareef, 2006).

In the present study, 54.37 were males and 45.63% females with Brucellosis. In the majority of other studies

**Table 1.** Determination of infection rate in patient according to residence place, gender and occupation in Mazandaran Province, 2010.

City	Number of Positive Case	Residence Place		Gender		Occupation					
		Urban	Rural	Male	Female	Planter	Farmer	Housewife	Worker	Student	Other
Galougah	18(4.77%)	3	15	16	2	5	-	1	1	5	6
Behshahr	15(3.97%)	8	7	10	5	3	-	3	3	1	5
Neka	52(13.79%)	8	44	38	14	20	-	15	7	6	4
Sari	26(6.89%)	1	25	15	11	8	8	9	1	5	3
Ghaem Shahr	6(1.59%)	2	4	4	2	-	2	2	-	1	1
Jouibar	4(1.06%)	1	3	4	-	1	1	-	-	-	2
Savad Kooh	21(5.57%)	10	11	8	13	3	-	12	-	1	5
Babolsar	7(1.85%)	4	3	4	3	2	1	3	-	-	1
Feraidoonkenar	3(0.79%)	1	2	1	2	1	-	2	-	-	-
Amol	94(24.93%)	44	50	37	57	8	2	49	2	3	30
Mahmoudabad	8(2.12%)	-	8	3	5	1	2	5	-	-	-
Nour	44(11.67%)	3	41	22	22	7	3	21	3	3	7
Noshahr	19(5.03%)	44	15	7	12	1	1	7	1	3	6
Tonkabon	32(8.48%)	5	27	18	14	4	1	15	1	-	3
Ramsar	28(7.42%)	3	25	18	10	16	-	8	-	3	1
Total	377(100%)	97	280	205	172	80	21	152	19	31	74
		25.72%	74.28%	54.37%	45.63%	2.12%	5.57%	40.31%	5.03%	18.22%	19.62%

also more frequency is found among males which would be cause of to the certain employments of men related with Brucellosis (Haji Abdolbaghy et al., 2000). Alavi and coworkers in a study on Khouzestan (south of Iran) nomads indicated that prevalence of Brucellosis in males is 38.02% and in females 61.98% (Alavi et al., 1997). In addition, Khosravi Nia in a study conducted in Gonabad city reported incidence rates of 59.06% in females and 40.04% in males (Khosravi Nia, 1990). In Greece male patients presented 74.9% of the cases, which differs significantly from that of females (Minas et al, 2007). But no *Brucella* seroreactive case was identified from females in Ethiopia (Haileselassie et al, 2011). These might be due to nomadic women's increasing contact

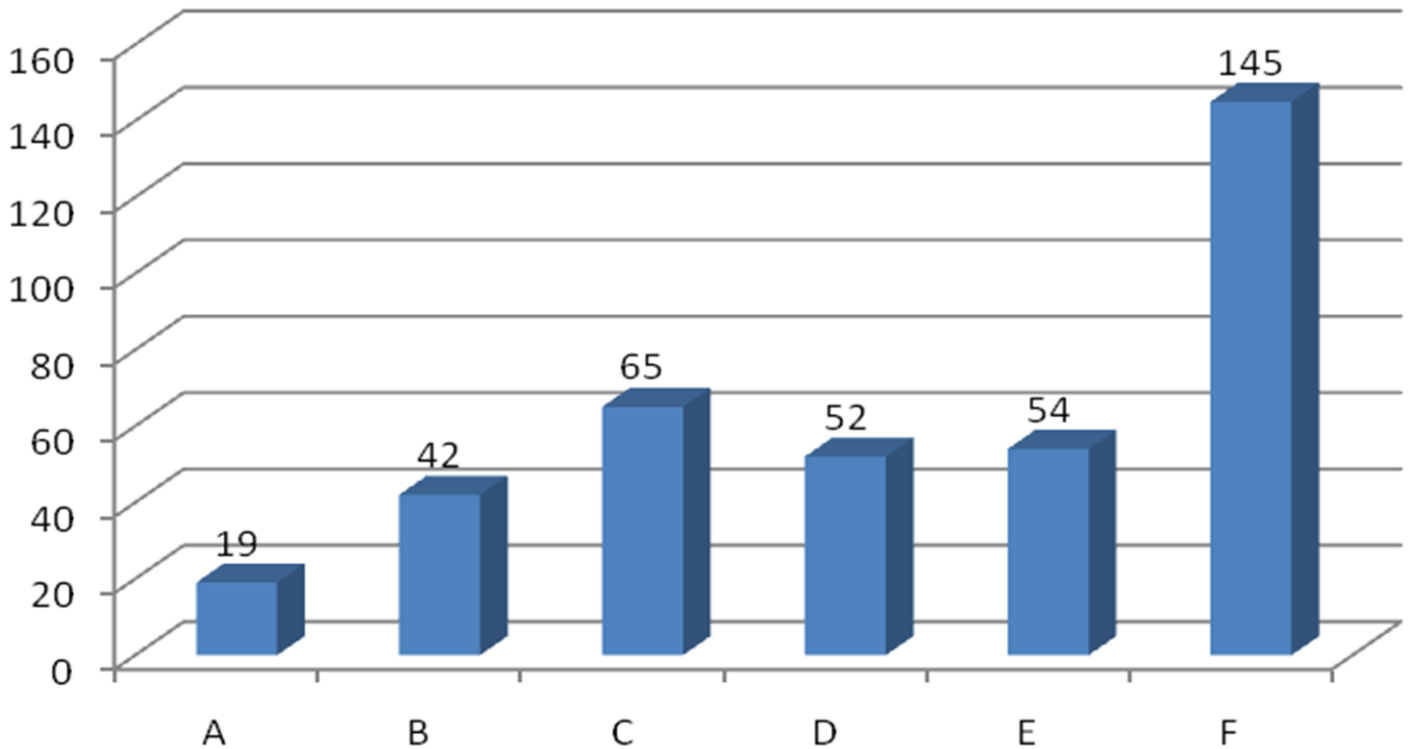
with the sources of infection. Because these women not only work along with men in daily activities, but also produce and distribute dairy products and feed the babies. Therefore, they are more subject to infection sources. And culture differences also are affected.

The highest rate of infection with Brucellosis was seen in a housewife (40.31%) that is similar to Minas et al study in 2007. Albeit, it must be noted that though rural women participate in farm activities, they do not consider farming an occupation. In regard with training this group, focus must be on television and radio programs, as they more use radio and television programs than other people. The second population at risk of Brucellosis is comprised of students (8.22%).

The significance of infection of this population in society is clear and as they gather together in a single educational context (schools), training them is not a difficult task.

The third group is farmers (5.57%) which their training is more challenging than two prior groups and it is necessary to utilize strategies such as holding group training classes considering some scores. Although providing this community with written training stuff is necessary but it has lesser impact on them than students (Ghasemi et al., 1994).

According to conducted studies, the highest rate of infection was seen in age group above 50 years (38.46%), that it indicates cases continue for years to cope with Brucellosis. Therefore, in the



**Figure 1.** Patients' age range (A= <10, B= 11-20, C= 21-30, D= 31-40, E= 41-50, F= >50).

**Table 2.** The cases infected with Malta fever in terms of consuming unpasteurized dairy products.

Number of positive case	Unpasteurized milk	Raw local milk	Unpasteurized cheese	Unpasteurized cream	Pasteurized butter	Colostrum	Top milk	Others
377	87	24	170	8	24	15	12	47
100%	(23.07%)	6.36%	(45.09%)	2.12%	6.36%	3.97%	3.18%	(12.46%)

Wright tube test, antibody titer also rises. Also, people are more prone to sources of infection because of doing farming and occupational activities. But according to reports on Khuzestan province nomadic tribes by Alavi, the highest rate of infection with Brucellosis was seen in age group lower than 4 years which it was due to this fact that the children food in this age is primarily composed of milk and dairy products (Alavi et al., 1997). But in Turkey the seropositive cases are particularly common in males aged 20-29 years (Ogutman, 2011). In another study more incidences reported in 15-39 years (40%) in Palestine (Awad, 1998). This difference would be due to cause in Iran young people mostly immigrated to urban area and mostly aged people are in direct contact with animals. In total, the results indicates that Brucellosis is still a health problem in Iran which initiatives such as health education and collaboration between Deputy

Ministry of Health and veterinary office for providing appropriate livestock vaccines and compliance with health principles and trainings are completely necessary in order to reduce its prevalence.

In addition, veterinary office mostly focused on specific measures through training programs on health and ways of transmission of disease. They must prioritize early diagnosis and treatment in veterinarians, butchers and abattoir staff in order to keep away this people from occupational infection. Based on acquired results in this study, the authors recommended to livestock vaccination in Mazandaran province (north of Iran) (Figure 2) emphatically and veterinary network is required to consider livestock health and their resistance to disease following vaccination. Designing and introduce training programs could enhance society and students' awareness in term of Brucellosis and the more important

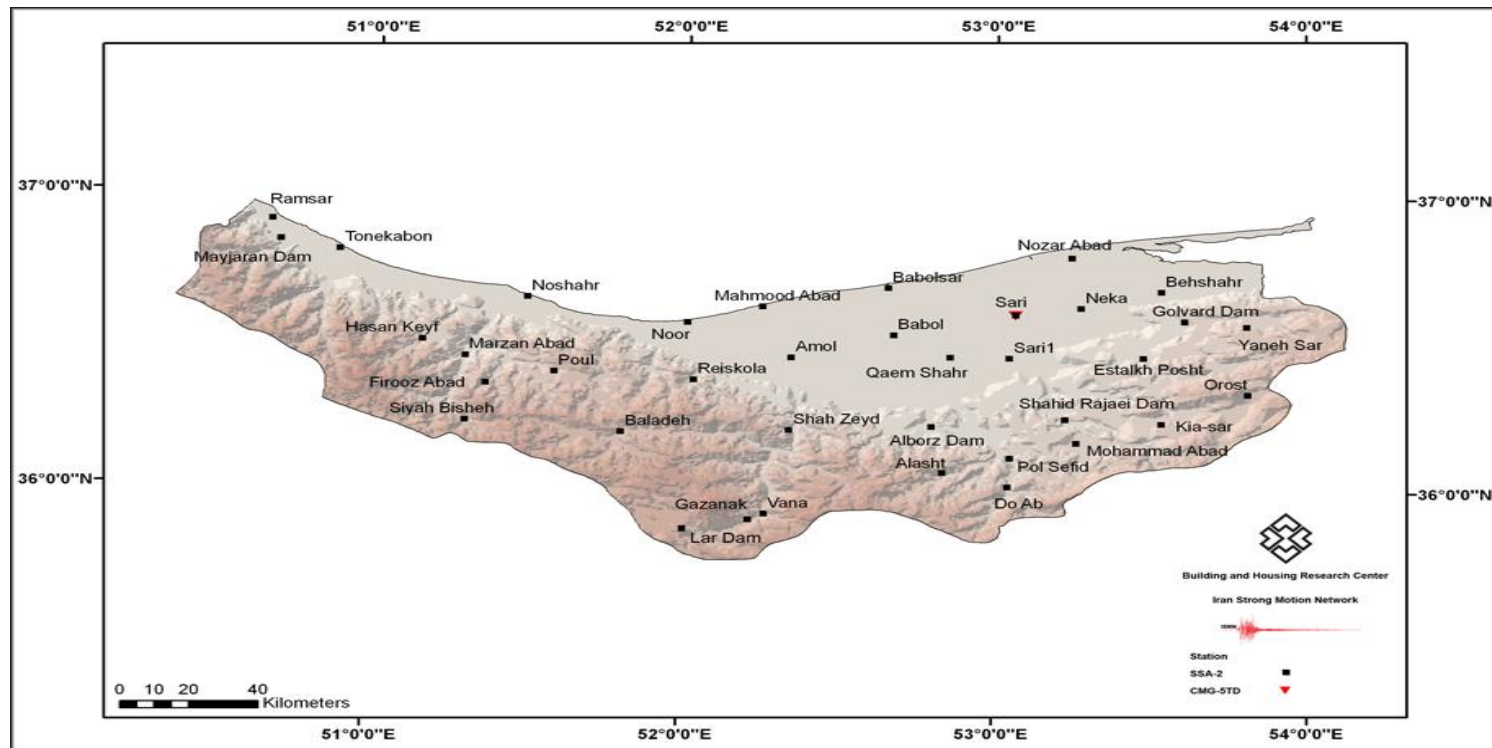


Figure 2. Map of Mazandaran province north of Iran.

point is administering comprehensive control on dairy production and distribution workshops, as they are one of the most important sources of infection in human societies.

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