

## **Original article**

# **Comparative study of current diagnostic method with clinical based method for brucellosis: presentation of diagnostic clinical criteria in limited resource area**

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## **Abstract**

**Introduction and objectives:** According to National Program against Brucellosis (NPB), diagnosis is based on serological tests (Wright $>1/80$  and 2 ME $>1/20$ ) in the presence of clinical finding. Regarding the lack of laboratory facilities in rural areas, diagnosis of the disease is faced with some difficulties. We conducted this study in order to present clinical criteria for the diagnosis of illness in limited resource area.

**Materials and methods:** In a retrospective study, a total of 109 medical records of admitted brucellosis patients in three educational hospitals in Ahvaz south-west of Iran, from 2005 to 2007 were studied. By using the offered clinical criteria (OCC) (three major, or one major and three minor, or five minor) and NPB guidelines, patients were rediagnosed. Major criteria are animal close contact, fever and joint involvement. Minor criteria are sweating, headache, weight loss, chills and malaise. Finally the results of two diagnostic methods were compared in SPSS 16 software using chi-square and Fishers exact test. Differences with  $P<0.05$  were considered significant.

**Results:** The most common findings were occupational exposure (75.22%), arthralgia (92.66%), fever (78.97%), sweating (65.13%), headache (56.8%), weight loss (51.37%), malaise (54.12%) and chills (45.8%). Of total 109 brucellosis, 84 (77.1%) were rediagnosed as brucellosis by NPB and 91(82.5%) by OCC. No significant difference ( $P=0.57$ ) was observed between the two methods in diagnosis of brucellosis.

**Conclusion:** Our offered clinical criteria are as effective as the Iranian NPB guidelines in the diagnosis of brucellosis. These clinical criteria may be useful in rural and limited resource area of Iran.

**Keywords:** Brucellosis, Clinical diagnostic criteria, National Program against Brucellosis (NPB)

## Introduction

Brucellosis affects human populations in many developing countries including the Middle East, and Latin America where it is still endemic [1]. It has been prevalent in Iran for years [2]. Patients suffering from this disease show unspecific signs and symptoms, most common of them are fever, night sweating and arthralgia [3]. A definite diagnosis requires the isolation of *Brucellae* from blood, bone marrow or other tissue samples [4]. However, cultural examinations are time-consuming, hazardous and not sensitive. Thus, clinicians often rely on the indirect proof of infection [3].

A variety of serological tests have been applied, but at least two serological tests have to be combined to confirm active infection. Usually, the standard tube agglutination (STA) test (Wright) is used first and two mercaptoetanol (2ME) test will confirm its results (with 97.1% sensitivity and 100% specificity) [3,4]. According to National Program against Brucellosis (NPB) diagnosis is based on serological tests (Wright $>1/80$  and 2 ME $>1/20$ ) in the presence of clinical finding suggestive of brucellosis [5].

In some rural areas of Iran, most of the cases of brucellosis may be misdiagnosed because of technical problems or lack of laboratory facilities such as culturing or serological examination. The aim of this study was to evaluate clinical manifestations and epidemiological aspects in order to present practical criteria for diagnosis of illness in limited resource area.

## Materials and methods

### Participants

One hundred and nine hospitalized patients in three educational hospitals (Razi, Golestan and Abuzar) affiliated to Jundishapur University of Medical Sciences in Ahvaz, south-west of Iran. This retrospective was conducted from June

2005 to May 2007. Patients were hospitalized due to brucellosis based on NPB criteria.

### Diagnostic criteria for brucellosis

Finding of  $\geq 1/80$  standard tube agglutination titer (STAT) of antibodies to *Brucellae* antigen (Wright) with a 2ME $\geq 1/40$ , in association with compatible clinical findings such as: back pain, sweating and fever according to NPB in Iran. All medical records of admitted patients suspected to have brucellosis regardless of serologic results were reviewed and recorded. According to the average values for epidemiological and clinical finding explained in previous reports and literature (Table 1) epidemiological and clinical finding with frequency of more than 75% and 75%-50% were considered major and minor criteria, respectively [6-13].

We considered major criteria as: animal close contact, fever and joint involvement, and minor criteria as: sweating, headache, weight loss, chills and malaise. By using these criteria (three major, or one major and three minor, or five minor) and NPB (with sensitivity 97% and specificity 100%) patient guidelines were rediagnosed. Rediagnosed patients were placed in two groups as; NPB-group and offered clinical criteria (OCC)-group (offered clinical criteria), and were compared. Data were analyzed in SPSS for Windows (version 16; SPSS Inc., USA) by using chi-square test and Fishers exact test. Results were regarded as significant when  $P < 0.05$ .

## Results

Of the total 109 patients 85 (78%) were men and 24 (22%) were women. The mean age was  $40.2 \pm 12.6$  years with the range of 6 to 65 years. Sixty seven percent were living in villages and 33% were in remote mountainous areas. More than 75% had high risk of occupational exposure to

*Brucellae*. Arthralgia and fever were the most common symptoms (Table 2). Other signs and symptoms as are shown in this table were: sweating, headache, weight loss, malaise and chills. Of total 109 brucellosis,

84 (77.1%) were rediagnosed as brucellosis by NPB and 91(82.5%) by OCC. After comparing these results, no significant difference ( $P=0.57$ ) was observed between the two groups.

**Table 1:** Frequency of clinical and epidemiological findings of brucellosis in literature

Variables	Mantue et al, 2004, India	Namidur, et al, 1999, Turkey	Al Dahouk, 2005, Germany	Yetkin, 2006, Turkey	Bataineh, 2006, Jordan,	Kozukeev, 2003, Kvrgezstan	Alavi et al, 2007, Iran
Animal contact	60-70	30	55-65	59	62-	81	100
Animal product consumption	40-55	70	45-50	25	49	56	100
Gender, male	78	-	54	56	78	66	69
Fever	79	78	88	72	68	-	79.5
Joint pain	9.5	72	43	22	20	-	80
Sweating	-	43	27	24	36	-	55-80
Rigor	25	29	18	37	-	-	16-35
Headache	-	29	41	39.2	-	-	16-37
Weight loss	-	-	13	41	-	-	36
Fatigue	54	-	49	39	33	-	52

**Table 2:** Frequency of clinical and epidemiological findings in studied patients with brucellosis

Variables	Number	Percent
Animal contact	82	75.2
Animal product consumption	27	24.8
Fever	86	78.9
Joint pain	101	92.6
Sweating	71	65.1
Chills	50	51.9
Headache	62	56.8
Weight loss	56	51.4
Malaise	59	54.1

## Discussion

In the present study we found that occupation is the most important epidemiological factor for the acquisition of *Brucellae* infection in human. This finding

is in consistent with previous studies conducted in Iran, Saudi Arabia, Egypt, India and Turkey [8,12-16]. In the northern highlands area of Khuzestan where people with sweating and arthralgia lasting more than two weeks are considered to have got brucellosis if other disease is not diagnosed [12]. In this study the most common clinical findings were fever and joint pain followed by sweating, chills, headache, weight loss and malaise.

This study showed that using epidemiological-clinical criteria as diagnostic tool were as effective as serologic tests recommended by Iranian NPB. Therefore we believe that in limited resource area such as nomad's residency in remote mountains and highlands villages of Khuzestan, where laboratory facilities are not available, our offered criteria may be

useful tool to initiate empirical therapy against brucellosis.

### Conclusion

To our knowledge and due to frequent search in Pub Med, Medline and other scientific medical journals we did not notice similar studies to address as reference and to compare our data with them. We believe this study is unique in this view and the most reasonable clue for short discussion is the lack of similar study.

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