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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How to cite this article:

Received: March 2010 Accepted: May 2010

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 mercaptoetanole (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>1/40) in the presence of 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.

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 $2\text{ME} \geq 1/40$, 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.
**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

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Animal contact</td>
<td>60-70</td>
<td>30</td>
<td>55-65</td>
<td>59</td>
<td>62-</td>
<td>81</td>
<td>100</td>
</tr>
<tr>
<td>Animal product consumption</td>
<td>40-55</td>
<td>70</td>
<td>45-50</td>
<td>25</td>
<td>49</td>
<td>56</td>
<td>100</td>
</tr>
<tr>
<td>Gender, male</td>
<td>78</td>
<td>-</td>
<td>54</td>
<td>56</td>
<td>78</td>
<td>66</td>
<td>69</td>
</tr>
<tr>
<td>Fever</td>
<td>79</td>
<td>78</td>
<td>88</td>
<td>72</td>
<td>68</td>
<td>-</td>
<td>79.5</td>
</tr>
<tr>
<td>Joint pain</td>
<td>9.5</td>
<td>72</td>
<td>43</td>
<td>22</td>
<td>20</td>
<td>-</td>
<td>80</td>
</tr>
<tr>
<td>Sweating</td>
<td>-</td>
<td>43</td>
<td>27</td>
<td>24</td>
<td>36</td>
<td>-</td>
<td>55-80</td>
</tr>
<tr>
<td>Rigor</td>
<td>25</td>
<td>29</td>
<td>18</td>
<td>37</td>
<td>-</td>
<td>-</td>
<td>16-35</td>
</tr>
<tr>
<td>Headache</td>
<td>-</td>
<td>29</td>
<td>41</td>
<td>39.2</td>
<td>-</td>
<td>-</td>
<td>16-37</td>
</tr>
<tr>
<td>Weight loss</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>41</td>
<td>-</td>
<td>-</td>
<td>36</td>
</tr>
<tr>
<td>Fatigue</td>
<td>54</td>
<td>-</td>
<td>49</td>
<td>39</td>
<td>33</td>
<td>-</td>
<td>52</td>
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</table>

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

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal contact</td>
<td>82</td>
<td>75.2</td>
</tr>
<tr>
<td>Animal product consumption</td>
<td>27</td>
<td>24.8</td>
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<tr>
<td>Fever</td>
<td>86</td>
<td>78.9</td>
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<tr>
<td>Joint pain</td>
<td>101</td>
<td>92.6</td>
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<tr>
<td>Sweating</td>
<td>71</td>
<td>65.1</td>
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<tr>
<td>Chills</td>
<td>50</td>
<td>51.9</td>
</tr>
<tr>
<td>Headache</td>
<td>62</td>
<td>56.8</td>
</tr>
<tr>
<td>Weight loss</td>
<td>56</td>
<td>51.4</td>
</tr>
<tr>
<td>Malaise</td>
<td>59</td>
<td>54.1</td>
</tr>
</tbody>
</table>

**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 artheralgia 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.

Acknowledgement
We wish to thank the medical file archivists in Razi, Golestan and Abuzar teaching hospitals and Jundishapur Infectious and Tropical Disease Research Center for their kindly cooperation. We also thank Mr. Albaji and Mr. Meripur for their cooperation in some data collection.

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10) http://www.cdc.gov/MMWR/

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