# Brucella Synovitis in Ninevah Province

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**الخلاصة**

مائتان وإثنان وعشرون مريضاً كانت تعتورهم أعراض تثير الشك بإصابتهم بالحمى المتموجة، ٣٩ منهم (١٦ ذكراً و ٢٣ أنثى) إضافة لتلك الأعراض كانوا يعانون من ألم المفاصل و / أو تورمها لذا أخضعت عينات من دمائهم لاختبارات مختلفة (مصلية واستنباتات)، وكذا عينات من السائل الزليلي (المفصلي) بهدف تشخيص التهاب الزليل البروسيلي لديهم بصورة مؤكدة. أجريت الفحوصات المصلية على نماذج الدم وكذلك زرعها على مستنبتات خاصة. أما عينات الزليلي المفصلي فعلاوة على ذلك أجري عليها الفحص الظاهري بالعين المجردة. كما تم تحديد كمية البروتين وفارق السكر بين الدم وسائل المفصل الزليلي، والتعداد الكمي والتفريق لكريات الدم البيضاء ثم اختبارات أخرى وصولاً إلى تحديد أصناف العتر الجرثومية المعزولة.

أظهرت الفحوصات أوصافاً ظاهرية غير سوية ومقادير عالية في مكونات هذا السائل التي شملتها الاختبارات، كذلك عياراً عالٍ للملزنات. أفلح الباحثان في عزل جرثومة البروسيلا من ٣٦ من نماذج المفصل الزليلي ومن ٣٤ عينة دم من بين ٣٩ مريضاً. تبين كذلك أن بروسيلا الإجهاض (Brucella abortus) هي السائدة (٢٣ من مجموع ٣٦).

تؤكد الدراسة على ايلاء التهاب الزليل المفصلي عناية خاصة لكل من يشتبه بإصابته بالحمى المتموجة وأن يعنى بزرع نماذج الزليل من أجل تشخيص مؤكد والذي يفضي إلى استطباب نوعي ومركز ورؤية وبائية واضحة عن المنطقة، إضافة إلى إمكانية اختبار تحسس الجرثومة لمضادات الجراثيم والوقوف على ما يطرأ للعتر المعزولة من مقاومة للمضادات.

## Abstract

Out of 222 patients complaining from signs and symtomps raised suspicion for brucellosis, 39 (16 males and 23 females) further more they suffered from joint and/or swelling. Blood and synovial fluid (SF) from each patient were subjected to serological tests and culture. Concerning SF specimens the investigations were extended to gross examination, Blood-Synovial Fluid Glucose Difference (G-S.F.G.D), protein determination, total and differential W.B.C. count. The investigations revealed high agglutinin titres in both blood and SF specimens, abnormal gross appearance, high value (beyond normal) of B-S.F.G.D., protein, total and differential W.B.C. count.

The authors succeeded in isolating brucellae 34 and 36 of blood and SF specimens respectively, with predominance of Brucella abortus (26 out of 36). Therefore this study recommends on looking after synovitis due to brucella whenever symptoms rais the suspicion of brucellosis or even when a patient complain from joint pain and also on doing culture for exclusive diagnosis and specific medication. Eventually to have an epidemiological concept, and determining resistance emergency of the isolates.

## Introduction

Brucellosis, as defined by Ugartemedia and his colleges[(1)] is a disease in which all organ system can be involved, and may present insidiously with evidence of localized infection in specific organs notably bones and joints[(2)]. In a study by Stephen[(3)], joint involvement has been found in 10% of patients.

Diagnosis of brucella synovitis was depended by some investigators[(4)] on clinical feature, radiological changes, bone scanning for those showing agglutinin over 1/320 or a positive blood culture. Others[(5)] as in this country(Iraq), they relied on clinical feature and the presence of Serological test.

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Hence this study aimed a confirmative diagnosis by isolation of the microorganism and its identification to know the prevalent causative species in this area. Isolation of the microorganism is an avenue to proceed for precise therapy, epidemiological purposes and offers an opportunity to perform antimicrobial susceptibility test to follow any resistance emergency against a drug or more.

## Methodology

Patients: out of 222 complained from symptoms raised the suspicion of brucellosis, 39 were suffering furthermore from joint pain and / or swelling. They comprised 16 males and 23 females ranging in age between 11 and 60 years with mean of 44.7 ± 15.8.

Methods: In addition to the blood specimen withdrawn from each of the 39 patients used for serological and cultural investigations, SF specimen was aspirated too from each and subjected to gross examination, viscosity grade test, mucin, fibrin production tests, Blood-SF glucose difference (after 8-12 hours fasting[6]), leucocytes total[7] and differential[8] counts.

Rose-Bengal Antigen Card–Test (BioMerieux) and/or the Standard Slide Method (Wellcome Antigen) were used for determination of agglutinin titers. Culture and identification methods were carried out following those mentioned formerly by the authors[9].

## Results

**Gross examination**, Thirty four out of 39 specimens were yellow, but 20 were turbid, 8 cloudy and 6 bloody, The nex 5 specimens were lemon in colour and turbid too, that is none of the 39 specimens being clear.

Agglutinin titers ranged between 1/160 (in 6 specimens), 1/320 (in 14) and 1/640 (in 19), (table 1 and Fig. 1).

B-SF.G.D. and protein mean values were found to be (46 ± 12 gm. /dl. and 5.4±1.01 gm./dl. respect ively), that is highly elerated. Total W. B. C. count (mean value) was found to be 10, 286 cells/ cu. mm. in which the neutrophils formed the higher percentage (61.4) than lymphocytes (table2).

Viscosity grade test was found to be as follows, 24 gave low grade, 11 poor and 4 were good.

Mucin production test, 16 gave poor results, 19 fair and 4 were good. Fibrin production test, all specimens gave positive result.

Concerning culture result (table 3), brucellae (Fig. 2) have been recovered from 34 and 36 blood and SF specimens respectively out of 39 (table 3).

Identification of the isolates indicated the predominance of *brucella abortus* (23) *versus brucella melitensis*.

**Table (1): Gross examination and agglutinin titres of 39 SF specimens**

| Number of specimens | Gross examination | | | | | Agglutinin titres | | |
|---|---|---|---|---|---|---|---|---|
| | Yellow bloody | Yellow opalescent | Yellow turbid | Lemon turbid | Yellow clear | 1/160 | 1/320 | 1/640 |
| | 6 | 8 | ٢0 | 5 | 0 | 6 | ١٤ | ١٩ |

**Table (2): Showing values of B-SF.G.D., protein, total count and differential counts**

| Values | Mean values | | | | | |
|---|---|---|---|---|---|---|
| | B-SF.G.D. mg/dl | Protein gm/dl | W,B.C. count /Cu.mm. | Differential count % | | |
| | | | | Neutrophils | Lymphocytes | Monocytes |
| Normal | <10 | 1-3 | <200 | <25 | >70 | <5 |
| Test | 46±12 | 5.4±1.01 | 10,286 | 61,4 | 33,5 | 4,3 |

B-SF. G.D.= Blood-Synovial.Fluid Glucose Difference

**Table (3): Comprising culture result and identified brucella species**

| Culture result | Specimens | | Brucella species out of 36 | |
|---|---|---|---|---|
| | Blood | SF | *abortus* | *melitensis* |
| Positive | 34 | 36 | 23 | 13 |
| Negative | 05 | 03 | 13 | 23 |
| Total | 39 | 39 | 36 | 36 |


**Figure 1 Rose-Bengal Antigen Card Test (positive)**

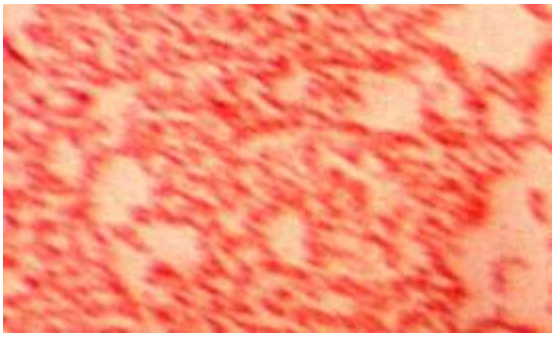

**Figure 2 slide showing brucella microorganism**

## Discussion

Even with brucella synovitis, female patients in this study (23) predominate males (16). It seems that females are more prone than males to this disease in Ninvah Province as stated and indicated previously by the authors[9].

Agglutinin titer (table 1) was ranged between 1/160 to 1/640 or showed obvious agglutination by Rose-Bengal (Fig. 1) Antigen Card Test (BioMerieux). Agglutination positive test raise the suspicion for brucellosis especially with those showed highly elevated titer as 1/320 and more. It is worthwhile to pay attention to those patients who showed high agglutinin titers to be investigated before establishing any therapy against brucella and to look at their joints whether there is swelling with or without pain, since majority of those gave culture positive were among those having high agglutinin titers (1/320 – 1/640).

Gross examination: It could be a guide for searching about the causative agent exhibited such abnormality. The normal colour and appearance of SF is yellow and clear[6] which differ apparently than specimens of this study.

The viscosity was varied in grade which may attributed to brucellae effect exhibited whether in the blood or in the joint, since the fluid is produced by dialysis of plasma across the synovial membrane and active secretion.

Mucin test on other hand showed results varied from poor(16), fair(19) to good(4), that is mostly their grades are abnormal[6].

Fibrin test with normal SF specimens gives negative result while with specimens of this study , it gave positive result.

Concerning with the glucose and protein estimation, the value of Blood-SF glucose (46 ± 12mg/dl) was exceeded the normal (< 10) and this applicable too to the protein value (54 ± 1.0 gm/dl) where the normal value is 1-3gm/dl[6], (Table 2).

Total leucocytes count, 10286 cells/cu.mm. (Table 2) is also much higher than normal ( < 200)and so is the neutrophils percentage (61.4% of the test versus < 25% of the normal value)[6].

From the above cited results of our investigations carried out on the patients SF, the specimens in addition to the high agglutinin titer shown, they apparently were abnormal in their gross appearance, consistency and in some of their constituents (table 2). In spite of these findings, synovitis due to brucella was definitely confirmed by isolation of the micro-organism, where 34 of blood specimens gave positive culture and 36 of SF (both out of 39), forming a good percentage (87.2 and 92.3 respectively).

Culture failure has met the authors in five of blood and three of SF specimens. Although these specimens obtained from individuals receiving antimicrobial therapy especially among those showed low agglutinin titer (that may be in early period of infection) but exact interpretation remains to the authors somewhat mysterious. Therefore, they recommend doing 2-Mercapto ethanol Test to know whether the agglutination is due to IgG or IgM. The difference in positivity between blood specimens and the SF specimens (2 cases) was among those showed higher titer of agglutinin. To the authors this difference may attributed to the delay in establishing therapy till they exhibited 1/640 agglutinin titer. For this reason, establishing therapy after this delay may offer an opportunity for the microorganism to invade the joints, thus therapy effect will be exhibited primarily on the microorganism in the blood (bacterimia). The antibacterial drugs to reach the joint and effect the MO their, is a matter of time consuming which gives a chance for isolating the microorganism from the aspirated fluid.

Identification of species; indicated the predominance of *Brucella abortus* (23) on *Brucella melitensis* (13). Such findings are going on with those indicated formerly

by the authors[9] in Ninvah Province. So this study indicates the role and importance of the brucella micro-organism in causing joint synovitis. Therefore, a patient suffering from joint pain or swelling, investigations for brucella should be included with any others. Another point, the culture of brucellae although being some what not easy but its performance is essential for definite diagnosis, to facilitate a straight forward therapy, giving an epidemiological concept about the disease in the area and offering opportunity for doing antimicrobial susceptibility test to follow the microorganism pattern at least from time to other and determining any resistance emergency as the authors did[10].

## References


1. Ugartemendia M., Curo-Abadal A., Pujol-Rakasn M., Pujadas-Capmany R., Esceriva-Montserrat, E. and Jane-Pesquer, J.: Brucella melitensis pericarditis. **American Heart Journal**, 109(5),part 1,May 1985 , p.1108.
2. Zammit-Maempel J.V. **Brucellosis. Medicine International**, (1984), pp. 85-88.
3. Stephen G-Wright: Brucellosis**. Medicine International** ,1988, p. 2138.
4. Rajapkse, N. and Al-Aska, A.: Spinal brucellosis. **British Journal of Rheumatology**, 26, 1987, pp. 28-31.
5. Al-Rawi Z.S., AlKhateeb N. ,and Khalifa S.J.: Brucella arthritis among Iraqi patients. **Brithish Journal of Rheumatology**,26, 1987, pp. 24-27.
6. Davidsohn I. and Henry J., Todd Sanford Clinical Diagnosis by Laboratory Methodss. 15th ed., Philadelphia, W. Saunders Company, 1974, pp. 1265, 1269, 1270, 1266.
7. Schimid F.R., and Ogata R.L. Synovial; fluid evaluation in joint disease. **Med. Clin. N. Amer**., 49, 1965, p. 165.
8. Ropes M.W., and Bauer W.: **Synovial fluid changes in joint disease**. Cambridge Harvard University Press, 1953 .
9. Mohammad –Ali, R., and Baghdasarian, Z.: Brucellosis in Ninvah Province . **J. Fac. Med. Baghdad** , 35(11), 1993, pp. 43-49.
10. Al-Khalidi R.Y., and Baghdasarian Z.S., In vitro antimicrobial Susceptibility Pattern of Brucella isolates in Ninvah Province. **Ra.Jour.Sci,14(2)**, November 2003 , pp. 10-15.