

## **BACTERIOLOGICAL, CYTOLOGICAL AND BIOCHEMICAL STUDY OF ARTHRITIS IN COWS**

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**Keywords;** synovial fluid, *Corynebacterium pyogenes*, leucocytic count.

### **ABSTRACT**

Bacteriological, cytological and biochemical testing were performed on synovial fluid of 100 (50 female and 50 male) slaughtered cows seen in Basrah slaughter house. The bacterial isolation revealed that the incidence of infected cow was 17(34%) in female and 11(22%) in male. Bacterial isolates include *Staphylococcus aureus* and *Corynebacterium pyogenes*. The results of biochemical testing indicate that mucin clot test varied from poor to fair clotting, the total protein of infected animals significantly higher than that of control group. While the cytological analysis showed that the total leucocytic count was significantly higher ( $P < 0.01$ ) than the control group with high percentage of neutrophils. Low level of synovial fluid glucose is noted in infected animal in compare to control group.

### **INTRODUCTION**

"Arthritis" literally means inflamed joints: it is an unparallel term for different form of joint disease, it also attacks muscles and connective tissues surrounding organ. Arthritis disease stems from injuries, defects in the immune system, infections, or genetic predisposition. Whatever the cause, the effect is much in all individuals: where bones meet in the joints, they are actually disintegrating (1).

Arthritis may result from a variety of bacteria, mycoplasma and viruses, bacterial causes including *Pasteuralla*, *Streptococci*, *Corynebacteria*, *Staphylococci*, *Histophilus* and *Escherichia coli* (2).

Laboratory procedures commonly done on synovial fluid are anucleated cell count, the mucin clot test and microscopic examination that includes a differential cell count, the fluids protein and glucose content also be determined. Evaluating synovial fluid is one of the more common cytologic procedures in bovine practice. It can identify infections, traumatic or degenerative process affecting joints (3).

This study was carried out to determine some bacterial causes of arthritis in cow at Basrah slaughter house and determination of mucin clot test, estimation of total protein, glucose, total and differential leucocytic count of synovial fluid.

## **MATERIALS AND METHODS**

Animals: this study was carried in Basrah slaughter house, and includes 100 cows (50 female and 50 male). The control group includes 20 animals (10 female and 10 male).

Collection of Samples:

The synovial fluid was collected under aseptic conditions from the knee joint (6). The physical characteristics of the synovial fluid were noted immediately after collection. Bacterial analysis was conducted according to (3).

Mucin clot test was performed according to (1) by mixing one part of synovial fluid with four parts of glacial acetic acid in glass beaker with a glass stirring rod. A clot forms immediately as a result of the precipitation of the hyaluronated and the synovial fluid protein by the acid. The quality of the clot formed reflects the degree of hyaluronic acid polymerization.

Estimation of total protein and total glucose carried out according to Biomerieux kit information.

Estimation of total and differential leucocytic count to the synovial fluid was performed according to method of (9).

## **RESULTS**

By physical examination of the synovial fluid (2-3 ml) appear turbid with varied coloration, had low viscosity and clotted when kept without anticoagulant.

The results of bacteriological analysis revealed that the highest rate of bacterial isolates was found in female cow (34%) in compare to 22% in male. The bacterial isolates include *Staphylococcus aureus* and *Corynebacterium pyogenes* (table 1).

The total protein of infected cows were significantly higher at ( $P < 0.01$ ) than that of the control group (table 2). The total glucose synovial fluid is decrease in infected group in compare to control group (table 2).

The cytological examination revealed that there were significant difference at ( $P < 0.01$ ) between the total leucocytic count of infected and control groups (table 3). There were significant difference at ( $P < 0.01$ ) in differential leucocytic count between infected and control groups with high percentage of neutrophils in the synovial fluid (table 4).

The biochemical testing showed that the degree of polymerization of synovial fluid by hyaluronat (table 5) was varied from fair to poor. The rate of poor mucin clot was 88.23% in female and 90.9% in male cow. While the fair were 11.76% in female cows and 9.09% in male

caw (table 5). While the degree of mucin clot test in the control group was good ( firm tight with unclar solution ).

**Table (1): number of bacterial Sp. Isolated from infected animal:**

| Sex    | No. | Type of bacteria      |                          | Total    |
|--------|-----|-----------------------|--------------------------|----------|
|        |     | Staphylococcus aureus | Corynebacterium pyogenes |          |
| Female | 50  | 12(70.5%)*            | 5(39.4%)                 | 17(34%)* |
| Male   | 50  | 7 (36.6%)             | 4(36.36%)                | 11(22%)  |

\* Highly significant difference (P>0.01)

**Table (2): Measurement of the total protein and glucose from infected and control animal:**

| Animal groups  | Sex    | Protein level (mg/dl) | Glucose level (mg/dl) |
|----------------|--------|-----------------------|-----------------------|
| Control group  | Female | 1.8 ± 0.24*           | 20.4 ± 2.2*           |
|                | Male   | 1.6 ± 0.14            | 32 ± 1.5*             |
| Infected group | Female | 6.2 ± 1.4             | 3.9 ± 1.7             |
|                | Male   | 5.7 ± 1.3             | 4.5 ± 1.9             |

\* Highly significant difference (P>0.01)

**Table (3): Total leucocytic count of synovial fluid from infected and control group**

| Animal groups  | Sex    | No. | W.b.c cell/mm3 |
|----------------|--------|-----|----------------|
| Control group  | Female | 10  | 98 ± 64.104    |
|                | Male   | 10  | 101 ± 72.2     |
| Infected group | Female | 17  | 5575 ± 2251*   |
|                | Male   | 11  | 6950 ± 3029*   |

highly significant difference (P>0.01)

**Table (4): Differential leucocytic count of synovial fluid of infected and control group:**

| Cell        | Control group | Infected group |
|-------------|---------------|----------------|
| Neutrophils | 4%            | 96%            |
| Lymphocytes | 45%           | 3%             |
| Monocytes   | 50%           | 1%             |

**Table (5): Mucin clot test of synovial fluid of infected group:**

| Degree Mucin test | female      | male       |
|-------------------|-------------|------------|
| poor              | 15(88.23)%* | 10 (90.9)% |
| Fair              | 2 (11.76)%  | 1 (9.09) % |
| Total             | 17          | 11         |

\* highly significant difference (P>0.001)

good= a single tight clot in clear solution.

Fair= a soft clot in turbid solution.

Poor= fragile clot or numerous small flecks in turbid solution.

## DISCUSSION

The incidence of bacterial arthritis was 34% in female and 22% in male. The bacterial isolates were *Staphylococcus aureus* and *Corynebacterium pyogenes*.

The synovial fluid of low viscosity is usually indicat the presence of inflammation ( 9). The mucin clot test is qualitative assessment of the degree of polymerization of synovial fluid by hyaluronat and in his study the rate of positive mucin clot test was 88% in female and 90% in male in infected group, while in control group the degree of mucin clot test was good. This result because of a large volume of effusion is present in the joint, and the Mucin clot test is often poor in cases of septic inflammation (5).

The synovial fluid total protein in infected animal 1.8, 1.6 g/d in infected female and male respectively, while in control group of female and male 6.2, 5.7 respectively. The concentration of synovial fluid protein is known to vary with the degree of joint inflammation (8).

Low level of synovial fluid glucose is suggesting an infected joint (9). The total leucocytic count of synovial fluid of the infected group were significantly differ from that of the control group, there was a marked increase in neutrophils of the synovial fluid because of septic inflammation which is most common cause of increased neutrophils (7).

## دراسة بكتريولوجية وخلوية وكيمياء حيوية لالتهاب المفاصل في الأبقار

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### الخلاصة

أجريت الاختبارات الجرثومية، الخلوية، الكيمياء الحيوية على عينات السائل الزلالي 100 عينه من الأبقار والعجول (50 عينه من الإناث و50 عينه ذكور) في مجزره البصرة . التحليل الجرثومي يكشف أن نسبة التهاب المفاصل الجرثومي في اناث 17(34%) وفي الذكور 11(22%). وتم عزل كل من المكورات العنقودية الذهبية والوتدييات الفيجية . الفحص الكيميائي بين أن نتائج تخثر المخاطين تراوحت بين ضعيف إلى عديم التخثر . وكان معدل مستوى البروتين الكلي أعلى بشكل محسوس إحصائيا عن مجموعتي السيطرة. بينما لوحظ من التحليل الخلوي إن حساب العد الكلي لكريات الدم البيض أعلى بشكل مهم عن مجموعته السيطرة مع ارتفاع عالي في نسبه الخلايا لعدله.

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