

Isolation and identification of bacteria causing arthritis in chickens

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Abstract

Sixty chickens 30-55 days old with arthritis symptoms, were collected from different broiler chickens farms, all samples were examined clinically, post mortem and bacterial isolation were done. The results revealed isolation of 26 (50.98%) of *Staphylococcus aureus*, which were found highly sensitive to amoxycillin. The experimental infection of 10 chickens was carried out on 35 days old by intravenous inoculated with 10^7 cfu/ml of isolated *Staphylococcus aureus*. Arthritis occurred in 8 (80%) chickens. Clinical signs and post mortem findings confined to depression, swollen joints, inability to stand.

Keywords: Bacteria, Arthritis, Chicken.

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عزل وتشخيص المسببات الجرثومية لالتهاب المفاصل في الدجاج

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فرع الاحياء المجهرية، كلية الطب البيطري، جامعة الموصل، الموصل، العراق

الخلاصة

جمعت ستون دجاجة بعمر 30-55 يوم يظهر عليها علامات التهاب المفاصل من حقول فروج اللحم، وفحصت جميع العينات وسجلت العلامات المرضية والصفة التشريحية واجري العزل الجرثومي لها. أظهرت النتائج عزل 26 عزلة (98، 50%) من جراثيم المكورات العنقودية وكانت هذه العزلات عالية الحساسية للاموكسيسيلينز. أجري الخمج التجريبي على 10 دجاجات وبعمر 35 يوم حيث حقنت بالمكورات العنقودية المعزولة وبجرعة 10^7 مستعمرة/سم³ في الوريد أدى ذلك إلى حصول التهاب المفاصل في 8 (80%) دجاجات بينت العلامات السريرية والصفة التشريحية حصول خمول وتورم المفاصل وعدم القدرة على الوقوف.

Introduction

The term leg weakness is symptomatic word describing a condition resulting from several causes. It is assumed that purulent arthritis may constitute a significant proportion of the cases of leg weakness (1). The disease has been seen in birds ranging from 14 to 70 days of age, but most cases occurred around 35 days old (2). Bacterial arthritis in poultry after septicemia or localized is reported to be associated with *Erysipelothrix*, *Listeria*, *Mycoplasma*, *Staphylococcus*, and *Escherichia* (3). Disease is most commonly caused by *Staphylococcus aureus* (2), and sometimes involved *Escherichia coli* (4) which is of veterinary importance in broiler breeders. In such birds, the most common form of infection involves tenosynovitis

(inflammation of tendon sheaths) and arthritis of the hock and stifle joints (1). In broiler breeders, stress caused by uneven feed distribution or predispose to Staphylococcal infection. The affected joints, usually the hocks, are hot, swollen and painful and affected birds are usually depressed, lameness and reluctant to walk-in tenosynovitis, the synovial membranes of tendon sheaths become thickened and oedematous, with fibrinous exudate within and around the tendon sheaths (5), secondary to the stress of moving, mating and onset of egg production, Male aggression and injuries associated with feed equipment, nest boxes also contribute, to the development of infections during this period, experimental work has shown that early infection with staphylococcus can cause inflammation of the hock joint and nearby tendons (6). The aim of this study

is to diagnose the bacterial causes of arthritis in chickens farms.

Materials and methods

Sixty broiler chickens were collected from different flocks suffering from arthritis used in the present study. Samples of affected hock joints were cultured on 5% blood agar base, Mannitol salt agar, MacConkey agar (7). Bacterial isolates were identified by biochemical tests (8). Antibacterial sensitivity tests carried on these isolates and included, streptomycin 30µg, novobiocin 30µg, amoxycillin 10µg, ampicillin 10µg, gentamicin 10µg produced by Oxoid (England) (9).

Experimental infection was carried out on 20 chickens of 35 days old divided into 2 groups of 10 birds each. The chickens first group were inoculated intravenously with 0.2 ml 10⁷ CFU/ml of live cells of isolated *Staphylococcus aureus* then all joints changes of these inoculated chickens were measured after 24, 48, 72, 96 and 120 h post inoculation (10). The second group was kept as a control. All birds were kept under observation for 14 days.

Results

Fifty one isolates of bacteria were isolated from 60 broiler chickens suffering from arthritis which included 26 (50.98%) isolates of *Staphylococcus aureus* and one of them was β-hemolytic, coagulase (+ve) which selected for experimental purpose carried out in the present study other isolates included *Pseudomonas aeruginosa* 14 (27.45%), *Staphylococcus saprophyticus* and *Escherichia coli* 4 (7.84%) for each one, *Proteus spp* 2 (3.9%) and *Erysipelothrix rhusiopathiae* 1 (1.9%).

In vitro sensitivity of *Staphylococcus aureus* isolate to antibacterial agent was used. Isolate was sensitive to amoxycillin but showed resistance to gentamicin and novobiocin. Table (1) shows antibiotic susceptibility testing for *Staphylococcus aureus*.

The joints of inoculated chickens shows swollen of both left and right due to sever arthritis, the average size of hock joints were measured in table 2.

Table 1: Susceptibility of *Staph. aureus* to antibiotics under study.

Antimicrobial agents	Code	Disk potency	
amoxycillin	AMX	10µg	S
streptomycin	S	30µg	I
ampicillin	AMP	10µg	I
gentamicin	CN	10µg	R
novobiocin	NOV	30µg	R

S: sensitive, R: resistant, I: intermediate.

Table 2: Range size (mm) of hock joint infected in chickens.

Time post infection (hr)	Size of hock joint in infected (mm)	Negative control size (mm)
24	2	1.8
48	2.1	1.8
72	2.4	1.8
96	2.5	1.8
120	2.5	1.8

Clinically experimental infected chickens showed, swollen of hock joints and lameness of (80%). Post mortem changes were white-to yellow colored purulent exudate of infected joints (Fig. 1). The liver and spleen showed hyperemia. Also *Staphylococcus aureus* reisolated from experimental infected joints after 24 h of inoculation at (80%).

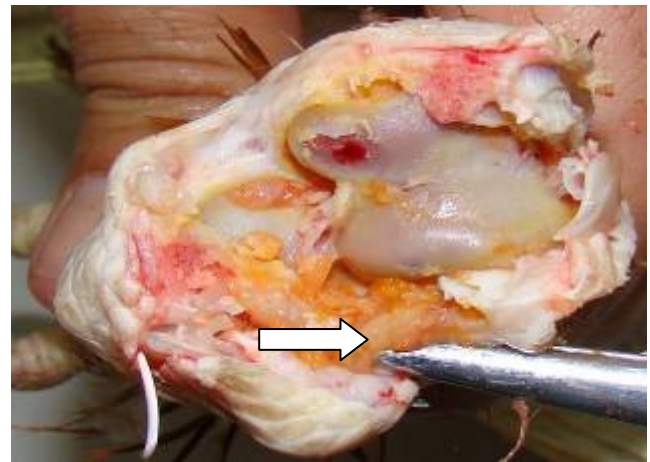


Figure 1: Synovial fluid which was turbid and yellowish in color.

Discussion

The most frequent sites of *Staphylococcus aureus* infections in poultry were bones, tendons, sheaths and joints, especially tibiotarsal and stifle joints (11). In the present study *Staphylococcus aureus* was isolated at the percentage of 50.98%, same results (11,12). The bacterium is considered to be normal resident of the chicken, located on the skin, feathers and in the respiratory tracts. This organism must enter the circulatory system to cause disease, thus probability of infection is increased by any injury that provides the bacteria with rout of entry (2,6). Arthritis is most commonly caused by *Staphylococcus aureus*, but *Escherichia coli* and *Erysipelothrix rhusiopathiae* are some times involved as are, rarely other

bacteria (12,13). This result was similar to (11). Antibiotic Susceptibility of *Staphylococcus aureus* was found to be sensitive to amoxicillin and resistant to gentamycin, novobiocin the same results reported (11). Experimental inoculation of *Staphylococcus aureus* isolate to 35 days old chickens showed bacteremia after 24 hours and increased during 96 hours (14). Bacteremia is an essential prerequisite to occur diseases this agreed (15). Clinical signs and post mortem findings confined to depression, lameness, swollen joint, and unable to stand (5,16). Joint infections occurred with in 48-120 hours. The affected joints showed increase of synovial fluid which was turbid and yellowish this founded (17). Staphylococci have a high affinity for collagen-rich surfaces such as the articular surface of joints, and synovial sheaths located around joints and tendons. This organism also tends to localize in the growth plate of actively growing bones (18). Staphylococcal infection is the most real important causes of arthritis leading to economic losses in the broiler chickens as high morbidity swollen joint thus we must take care to control the Staphylococcal infection in poultry.

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