

## Susceptibility of *Corynebacterium pseudotuberculosis* Isolated from Sheep and Goats with Caseous Lymphadenitis to Various Antimicrobial Agents

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### ملخص البحث

تم اختبار حساسية 66 معزولة لبكتريا وتدية السل الكاذب تم عزلها من الضأن والماعز في ولاية جنوب دارفور في الفترة من فبراير 2004 إلى مايو 2005 لـ 16 مضاد للميكروبات وكانت المعزولات عالية الحساسية للتتروفورانتوين، كلورامفنكول، ريفامبسين، كوتريموكسازول، اريثرومايسين، والأمبيسلين و متوسطة الحساسية لكل من ميثيسللين، كاناميسين، جنتاميسين والتتراسايكلين و مقاومة لحمض الناليديكسيك، كوليستين، نوفوبوسين، بنيسللين، كولكساسيللين والستريبتومايسين. مقارنة مع الدراسات السابقة لوحظ ظهور مقاومة لعقار البنسيلين في الفترة الأخيرة.

### Summary

Sixty-six isolates of *Corynebacterium pseudotuberculosis* isolated from sheep and goats in South Darfur State in the period from February 2004 to May 2005 were tested for their sensitivity to 16 antimicrobial agents. The isolates were highly sensitive to nitrofurantoin, chloramphenicol, rifampacin, cotrimoxazole, erythromycin, and ampicillin. Moderately sensitive to methicillin, kanamycin, gentamicin and tetracycline, but were resistant to nalidixic acid, colistin, novobiocin, penicillin, cloxacillin and streptomycin. When compared with previous studies, it was observed that resistance to penicillin began to emerge.

### Introduction

The sensitivity pattern of *Corynebacterium pseudotuberculosis* to antimicrobial agents varies among isolates obtained from various sources (Connor *et al*, 2000; Foley *et al*, 2004). Isolates of *C. pseudotuberculosis* from humans were found sensitive to erythromycin and penicillin (Lipsky *et al*, 1982). Muckle and Gyles (1982), in a study of 26 isolates isolated from lesions of caseous lymphadenitis in goats, reported that all of them were sensitive to ampicillin, chloramphenicol, lincomycin, gentamicin, tetracycline, penicillin G and sulfamethoxazole-trimethoprim. Only three isolates were sensitive to neomycin, and all isolates were resistant to streptomycin. It was reported that isolates of *C. pseudotuberculosis* were strongly resistant to penicillin but sensitive to neomycin; it was also stated that an isolate highly resistant to streptomycin (500 ug/ml) was observed among 22 isolates of *C. pseudotuberculosis* from sheep and goats' abscesses (Garg *et al*, 1985). Costa *et al* (1998) reported that the minimal inhibitory concentrations (MICs) of 17 antimicrobial agents for *C. pseudotuberculosis* were similar to those reported by Muckle and Gyles (1982), Adamson *et al* (1985), Prescott and Baggot, (1988) and Judson and Songer (1991). They stated that the slight variation of MIC of some antimicrobial agents for isolates from small ruminants vs. horses and cattle has questionable clinical significance, but may yet be another indication of differentiation between isolates obtained from different sources.

Fernández *et al* (2001) found higher MIC value for several antimicrobial agents in an analysis of *Corynebacteria* isolated from mastitic ewes. Olson *et al* (2002) grew *C. pseudotuberculosis* as a biofilm, in an attempt to reproduce the environment of a natural infection. They observed that this bacterium was highly resistant to all antimicrobials tested under such growth conditions.

This study was carried out in an attempt to determine the present situation of *C. pseudotuberculosis* susceptibility to 16 antimicrobial agents.

## Materials and Methods

### Bacteria:

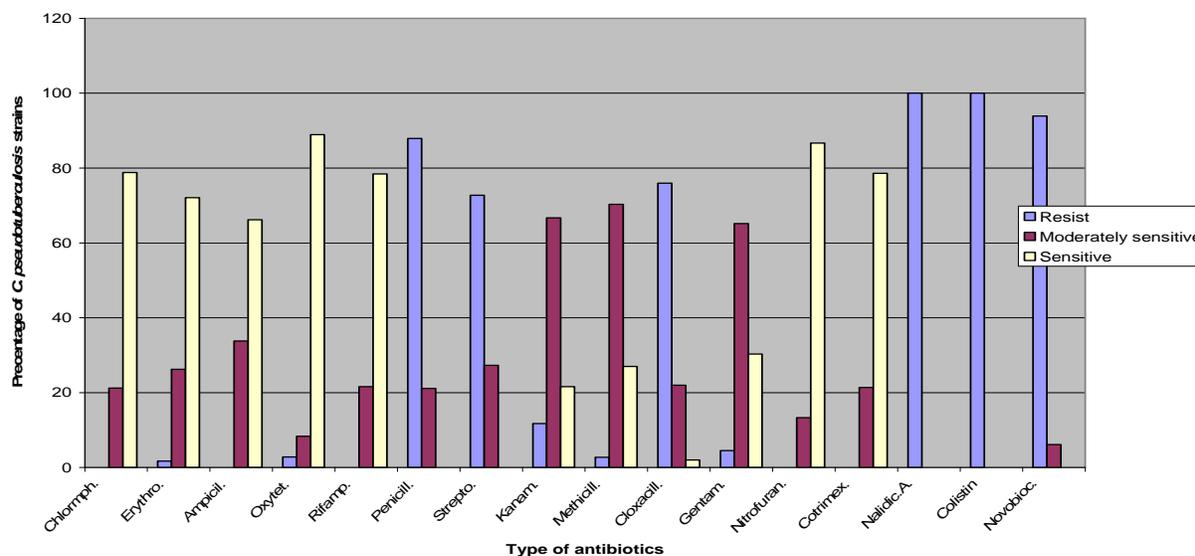
Sixty-six isolates of *C. pseudotuberculosis* isolated from sheep and goats in South Darfur State, Western Sudan, in the period from February 2004 to May 2005 were tested for antimicrobial susceptibility.

### Test procedure:

A colony of each *C. pseudotuberculosis* isolate was transferred from a 24-hour-growth on a Blood Agar to 5 ml Nutrient Broth and incubated at 37 °C for 24 hours. Two drops from the broth were mixed with 5 ml of normal saline and 1 ml of the mixture was spread over a dried DST Agar (Oxoid, CM261). The plates were left for 5 minutes before excess fluid was removed using a sterile pipette. Antimicrobial discs were dispensed on each plate with sterile forceps. They were incubated at 37 °C for 24 hr before the diameter of inhibition zone around each antimicrobial disc was measured with a caliper in millimeters; the diameter of these zones for each antimicrobial agent were categorized, according to NCCLS (1990), into sensitive, moderately sensitive and resistant isolates.

## Results

It was found that 86.7% of the isolates were highly sensitive to nitrofurantoin, 78.8% to chloramphenicol, 78.8% to rifampicin, 78.6% to cotrimoxazole, 72.1% to erythromycin and 66.2% to ampicillin. On the other hand, 70.3% of the isolates were moderately sensitive to methicillin, 66.7% to kanamycin, 65.2% to gentamicin and 59.1% to tetracycline. Whereas 100% of the isolates were resistant to nalidixic acid and colistin, 93.3% to novobiocin, 87.9% to penicillin, 76% to cloxacillin and 72.7% to Streptomycin (Fig 1).



**Fig.1: Sensitivity of *C. pseudotuberculosis* isolates to different antimicrobial agents.**

## Discussion

Results of sensitivity of *C. pseudotuberculosis* to antimicrobial agents were in agreement with those of Lipsky *et al* (1982) and Muckle and Gyles (1982) except that our isolates were resistant to penicillin. Our results agree with those of Judson and Songer (1991), but disagree on the sensitivity to penicillin and resistance to nitrofurantoin.

Our findings are in agreement with those of El gaddal (1997) and Musa (1998), but differ in that the latter author found his isolates to be sensitive to penicillin. Resistance of *C. pseudotuberculosis* to penicillin is emerging as a problem in this study as it reaches 87.9%. This finding is similar to that reported by Grag *et al* (1985). Localization of *C. pseudotuberculosis* inside macrophages suggests that lipophilic drugs such as the macrolides would be more effective than penicillin, and that prolonged administration would be required for effective treatment (Prescott and Baggot, 1988).

Careful use of antibiotics, strict preventive measures and periodic surveillance for resistance to antibiotic could provide useful means for controlling the disease.

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