

Study of antibiotic susceptibility and molecular identification of antibiotic resistance genes of staphylococci stains isolated from bovine mastitis in central region of Algeria

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Abstract:

Mastitis has been recognized as a complex and the most costly disease in dairy herds. It imposes serious economic losses for the farmers and the dairy industry. Among the various pathogens isolated as agents responsible for bovine mastitis, *Staphylococcus aureus* is an etiological agent predominant in the subclinical and clinical forms of mastitis. Coagulase Negative Staphylococci (CNS) have traditionally been considered as minor pathogens but, during the last years, their importance has clearly increased and that they became the predominant pathogens isolated from subclinical mastitis in several countries [8-9]. These bacteria can cause mainly subclinical mastitis [6], but some authors reported high percentage of clinical cases evoked by CNS [10-11]. The disease is the most frequent reason for the use of antimicrobial agents on dairy farms. In many parts of the world, cure rates for staph infections are low after antibiotic treatment. In addition, multi-antimicrobial resistance was often observed in staphylococci. In fact, the main reason for the poor efficacy of antibiotic treatment for staphylococcal mastitis is, among other things, the resistance of bacteria. On the other hand, during the past decade, bacteria that cause human diseases have developed resistance to many of the antibiotics commonly used for treatment. Furthermore, the number and proportion of MRS infections in different countries has increased. Similar results were reported for many countries in the world but, in Algeria a little information was available on diversity of bovine staphylococcal mastitis isolates and their antibacterial resistance, because this problem is not well investigated before. Furthermore, there's dearth of data on MRS from food products including milk in Algeria. The study was administered to research the phenotypic and genotypic identification of in vitro antimicrobial susceptibility of 21 Staphylococci (10 *Staphylococcus aureus* and 11 Coagulase Negative Staphylococci) isolated from bovine mastitis to 12 antimicrobial drugs frequently using in medicine in Algeria. Bovine mastitis staphylococcus isolates have been tested for antibiotics with a disc diffusion method in accordance with the

guidelines of the National Committee for Clinical Laboratory Standards in Mueller-Hinton agar and the resistant genes *mecA*, *blaZ*, *aac-aph*, *ermA*, *ermC*, *tetK* and *tetM* were detected by PCR. *Staphylococcus* isolates showed high resistance to penicillin (95.23%), oxacillin (80.95%), clindamycin (80.95%) and erythromycin (76.19%) , but no resistance of these strains was detected for gentamicin. In the study, incidence of vancomycin-resistant isolates of *S. aureus* was observed with frequency of 76.2%. Among 21 staphylococcal isolates, 20 were found to be resistant to methicillin and several drugs. The multidrug-resistant strains presented several antibiogram profiles (antibiotic I to XIII). The distribution of antibiotic resistant genes was *mecA* (100%), *tetM* (100) followed by *blaZ* (42.85%). In spite of the presence of some phenotypic resistance against erythromycin, no genotypic resistance genes were detected following researching *erm* (C) and *erm* (A).

In the present work, the many determination was the high prevalence of methicillin-resistant Staphylococci, which were immune to multiple antibiotics. The finding of methicillin-resistant staphylococci (MRS) from bovine mastitis is that the first report in Algeria and revealed the status of resistant isolates in herd which may be helpful in treatment, controlling of resistant strains and for deciding culling of cows. The occurrence of such isolates, among the mastitis cases needs attention of veterinarians and managers of herds. The present work demonstrated that the existence of alarming level of resistance of frequently isolated mastitis agents to commonly used against antimicrobial agents in the farms in Algeria. Consequently, it's vital to implement a scientific application of an in vitro antibiotic susceptibility test before the utilization of antibiotics in both treatment and prevention of mastitis. The increasing occurrence of MRSA and MR-CNS should be into account from the purpose of view of antibiotic selection for mastitis treatment and prevention, especially if the likelihood exists of the resistance transfer in or between bacteria. The results of this study can be used as a baseline for further investigations.

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