

METICILLIN RESISTANT *Staphylococcus aureus* (MRSA) IDENTIFIED IN A RABBIT FARM

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ABSTRACT

Staphylococcus aureus infection may economically affect rabbit production due to superficial and deep dermal infections, mastitis, pododermatitis and septicaemia. ORSA/MRSA antibiotic type represents a potential risk for public health. The aim of this work was to identify ORSA/MRSA *S. aureus* antibiotic type in a rabbit farm. An ulcerative dermatitis case was studied, from a farm located in Toluca Valley in which the rabbit population had dermal infections and chronic abscesses. Swabs were taken and a biopsy performed for histopathologic examination, after sedation with xylazine - ketamine (0.1mg/kg/25mg/kg) and butorfanol (0.4 mg/kg) intramuscularly. Manitol salt agar plates were cultured at 37° C for 24 hrs. *S. aureus* was identified using bacteriological routine procedures. Gram stain, catalase and coagulase tube tests using rabbit plasma, Voges Proskauer, nitrate broth, anaerobic manitol fermentation and aerobic maltose tests were performed. *In vitro* sensibility tests to β -lactamic antibiotics were evaluated through diffusion method in Mueller-Hinton (MH) agar using amoxicillin/clavulanic acid discs (10/20mg), which were incubated at 37°C (NaCl 4%) and oxacillin-meticillin discs (1 μ g and 6 μ g) incubated at 35 and 42°C. Results showed *S. aureus in vitro* resistance to all antibiotics.

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Histopathologically, a proliferative granulomatose reaction was observed, tissue necrosis and capilar neoformation. It is concluded that *S. aureus* ORSA/MRSA antibiotic type was present in the rabbit farm, therefore representing a public health risk due to the possibility of developing human infections from animal sources.

Key words: *Staphylococcus aureus*, antibiotic type, resistance, ORSA/MRSA



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Introduction

The State of Mexico is ranked in the first place regarding rabbit production and consumption. 80% of the meat production comes from small family farms and only 5% from technified ones (SAGARPA, 2012). *Staphylococcus aureus* (*S. aureus*) in humans and animals may produce a broad variety of infections from superficial ones in the skin up to deep ones as well as septicaemia (Peton and Le Loir, 2013).

In the farms, two types of infections caused by *S. aureus* may be distinguished. The first one, caused by low virulence strains, is limited to a small number of animals. In the second one, produced by highly virulent strains, *S. aureus* disseminates through the farm, causing production loss (Hermans *et al.*, 2003).

In rabbits, *S. aureus* infections produces similar signs such as pododermatitis lesions, subcutaneous abscesses and mastitis. Abscesses are present in internal organs such as lungs, liver and uterus causing production problems, infertility and death (Meulemans *et al.*, 2007). *S. aureus* meticillin resistant strains (MRSA) is nowadays one of the most problematic antibioresistant bacteria. Added to meticillin resistance, it is also resistant to other antibiotics, with the possibility of cross transmission between humans and animals and therefore potential risk for public health (Morales and Chaves, 2006). Studies have demonstrated a high proportion of *S. aureus* associated to pathologic processes in intensive breeding rabbit farms, thus deserving special attention from the sanitary point of view, due to the fact that it is pathogenic not only for animals but for humans too, which could affect animal and public health (Ortega *et al.*, 2009).

The objective of this study was to detect *S. aureus* MRSA in rabbit farms from the Toluca Valley.

Material and Methods

An isolated case from a rabbit presenting skin lesions in a farm in Toluca Valley was studied. After sedation with xylacine - ketamine (0.1mg/kg/25mg/kg) and butorfanol (0.4 mg/kg) intramuscularly, swab samples and a biopsy of the affected region were taken, for further

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analysis (Bimonte *et al.*, 2007). for *S. aureus* bacteriological identification , manitol salt agar plates were incubated at 37°C for 24 hrs. For *S. aureus* identification, CFU were observed and identified through routine bacteriological procedures. Gram stain, catalase and coagulase in tube using rabbit plasma tests were performed, as well as Voges Proskauer and nitrate broth, anaerobic manitol and aerobic maltose fermentations (Manjarrez *et al.*, 2012). *In vitro* sensibility to β -lactamic antibiotics was evaluated through the difussion method in Mueller-Hinton (MH) agar, using using amoxicillin/clavulanic acid unidiscs (10/20mg), which were incubated at 37°C (NaCl 4%) and oxacillin-meticillin unidiscs (1 μ g and 6 μ g) incubated at 35 and 42°C (López *et al.*, 2011).

Results and Discussion

Results showed *S. aureus in vitro* resistance to all antibiotics, which indicates phenotypical MRSA. Histopathologically, a proliferative granulomatose reaction was observed, tissue necrosis and capilar neoformation, which indicate chronic inflammation and infection. *S. aureus* may cause infections in animals and humans due to its capacity of colonizing skin as well as other tissues, producing acute and chronic infections in humans that may require treatment and hospitalization if more virulent strains produce them (Díaz *et al.*, 2006). Mammals as carriers of *S. aureus* represent an infection source for animals as well as a potential risk for cross infections between animals and humans, through direct contact or animal cohabitation (Weese *et al.*, 2006). In this sense, MRSA strains constitute an important worldwide epidemiological alert due to the fact of producing severe infections which could compromise health and life (Kim *et al.*, 2014) by epidemic clone existence affecting humans and animals in acute and chronic infection. MRSA strains from animal origin have been identified in humans (Peton and Le Loir, 2013). In rabbits, low and high pathogenic strains have been identified, which could affect humans from rabbit carriers of *S. aureus* (Ortega *et al.*, 2009). This microorganism has been initially considered as a nosocomial pathogen. Isolations are multiresistant to several antibiotic groups including betalactamics. During the last decade, numerous colonization and infection reports due to MRSA



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in community members have been published, including people without previous hospital contact, with prevalence in several body zones including skin, perineum, underarm and inner thigh (Fosch *et al.*, 2012). An increasing phenomenon is the pathogens' resistance to conventional antibiotics considered as a public health problem, due to the turning up of multiresistant strains, which makes them difficult to treat and reducing therapeutical options (Acosta *et al.*, 2012).

Conclusion

It is concluded that *S. aureus* ORSA/MRSA antibiotic type was present in the rabbit farm, therefore representing a public health risk due to the possibility of developing human infections from animal sources.

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