

## Molecular Detection of *Staphylococcus aureus* in the Pork Chain Supply and the Potential Anti-Staphylococcal Activity of Natural Compounds

**Authors :** Valeria Velasco, Ana M. Bonilla, José L. Vergara, Alcides Lofa, Jorge Campos, Pedro Rojas-García

**Abstract :** *Staphylococcus aureus* is both commensal bacterium and opportunistic pathogen that can cause different diseases in humans and can rapidly develop antimicrobial resistance. Since this bacterium has the ability to colonize the nares and skin of humans and animals, there is a risk of contamination of food in different steps of the food chain supply. Emerging strains have been detected in food-producing animals and meat, such as methicillin-resistant *S. aureus* (MRSA). The aim of this study was to determine the prevalence and oxacillin susceptibility of *S. aureus* in the pork chain supply in Chile and to suggest some natural antimicrobials for control. A total of 487 samples were collected from pigs (n=332), carcasses (n=85), and retail pork meat (n=70). Presumptive *S. aureus* colonies were isolated by selective enrichment and culture media. The confirmation was carried out by biochemical testing (Api® Staph) and molecular technique PCR (detection of *nuc* and *mecA* genes, associated with *S. aureus* and methicillin resistance, respectively). The oxacillin ( $\beta$ -lactam antibiotic that replaced methicillin) susceptibility was assessed by minimum inhibitory concentration (MIC) using the Epsilon meter test (Etest). A preliminary assay was carried out to test thymol, carvacrol, oregano essential oil (*Origanum vulgare* L.), Maqui or Chilean wineberry extract (*Aristotelia chilensis* (Mol.) Stuntz) as anti-staphylococcal agents using the disc diffusion method at different concentrations. The overall prevalence of *S. aureus* in the pork chain supply reached 33.9%. A higher prevalence of *S. aureus* was determined in carcasses (56.5%) than in pigs (28.3%) and pork meat (32.9%) ( $P \leq 0.05$ ). The prevalence of *S. aureus* in pigs sampled at farms (40.6%) was higher than in pigs sampled at slaughterhouses (23.3%) ( $P \leq 0.05$ ). The contamination of no packaged meat with *S. aureus* (43.1%) was higher than in packaged meat (5.3%) ( $P \leq 0.05$ ). The *mecA* gene was not detected in *S. aureus* strains isolated in this study. Two *S. aureus* strains exhibited oxacillin resistance (MIC  $\geq 4\mu\text{g/mL}$ ). Anti-staphylococcal activity was detected in solutions of thymol, carvacrol, and oregano essential oil at all concentrations tested. No anti-staphylococcal activity was detected in Maqui extract. Finally, *S. aureus* is present in the pork chain supply in Chile. Although the *mecA* gene was not detected, oxacillin resistance was found in *S. aureus* and could be attributed to another resistance mechanism. Thymol, carvacrol, and oregano essential oil could be used as anti-staphylococcal agents at low concentrations. Research project Fondecyt No. 11140379.

**Keywords :** antimicrobials, *mecA* gen, *nuc* gen, oxacillin susceptibility, pork meat

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