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MICROBIOLOGICAL RESEARCHES OF THE VIRULENT SPECIES OF *Staphylococcus aureus* IN PATHOLOGICAL ABCESSES AT SWINES

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Abstract

Current researches are important due to the frequency of cases caused by some pathologies of abscesses recorded at pigs slaughtered in slaughterhouse conditions. In this context, samples from various internal abscesses of slaughtered pigs and the assessment of virulence and incidence of identified bacterial microflora species were studied. Microbiological researches on abscesses of different origins at slaughtered pigs has demonstrated the presence of the important bacterial microflora consisting of species of Staphylococcus aureus in all cases of microbiological laboratory investigation. S.aureus strains isolated from various sources of pathological abscesses at slaughtered pigs in slaughterhouse conditions expressed a higher proportion of quantitative bacterioscopic and bacteriological microbiological values in heart abscesses, followed by samples invaded with staphylococci in the chest, leg, jaw and so on. The Staphylococcus aureus strain expressed high virulence factors sampled by a phenotypic mechanism, and it was found that this strain showed the gene encoding the collagen binding protein and at the same time mediates the binding of Staphylococcus aureus to fibrinogen.

Key words*: abscesses, Staphylococcus aureus, pigs, pathologies, microbial cultures.*

INTRODUCTION

Staphylococcus aureus is one of the main colonizers of the human and animal body. In some cases this strain can become a pathogen, producing localized or systemic infections, less often staphylococcal infections occur as a result of exogenous contamination. Colonization with staphylococcal microorganisms can persist for months and even years, until they cause an infection, and colonized animals can contaminate other animals, as they are the most important reservoir of staphylococcal germs (Dall, 2018; Golban, 2015).

Staphylococcal infections may be unfavorable due to increased aggression of the bacterial strain, reduced ability of the animal body to defend itself against infection, or difficulty in treating an infected animal with an antibiotic-resistant strain (Brown, 2013; Carp-Carare, 2015; Dan, 2012). It has been found that approximately 15-40% of animals colonized with *S. aureus* can develop an infection with this germ at various times, the most common being abscesses of various etiologies, and colonized animals are a source of infection for other animals (Carp-Carare, 2014; Colobatiu, 2014; Enne, 2012).

Infections caused by *Staphylococcus aureus* are a major problem for swine abscesses lately due to their high share of infection and potential for severe evolution. Some factors are associated with the onset and spread of abscess infections favored by *Staphylococcus aureus* due to animal overload factors in maintenance rooms; failure to test for the presence of *Staphylococcus aureus*; ignoring the need to group swine-infected/colonized pigs in a demarcated area of the maintenance rooms; deficiencies in the application of contact precautions (Fiț, 2015; Ulea, 2011; Wang, 2013).

According to bibliographic studies, the statement that the most persistent bacterium present is the species *Staphylococcus aureus*, followed by other no less important microbial species, is interesting. Parasites can rarely cause abscesses, and they are more common in developing countries. In terms of the etiological agent of the nature of abscesses, they can be suggested by their location and their predisposing cause (Stevens, 2014).

For this reason, the main objectives of this research are the microbiological investigation of the virulent species *Staphylococcus aureus* in the pathological abscesses of different regions of pigs in slaughterhouses and the interpretation of data obtained from quantitative microbiological aspects.

MATERIALS AND METHODS

The microbiological researches were carried out from samples from different sources of slaughtered pig abscesses from the slaughterhouse of the Porco Bello LLC, Cimișeni, Criuleni district.

Microbiological investigations to identify the species *Staphylococcus aureus* were performed from various samples of slaughtered pigs. Bacteriological research has been subjected to a classical laboratory microbiological conduct, where the bacterial microflora characteristic of the species *Staphylococcus aureus* has been found, regarding the bacterioscopic and cultural characters and the differentiation of quantitative aspects in various samples of investigated abscesses of body regions in slaughtered pigs. For research, samples were taken from abscesses and investigated in the microbiology laboratory of the Faculty of Veterinary Medicine of SAUM, where the bacterial microflora was determined, the differentiation criteria, the morphological and cultural characteristics of the predominant *Staphylococcus aureus* species, the number of microorganisms in microscopy and microbial colonies specific to this species on common and special culture media. The microbial preparations made from the pathological samples were stained according to the Gram method, stained with gentian violet and fuchsia dyes, then microscopized at the immersion objective 90.

RESULTS AND DISCUSSIONS

Microbiological investigations of slaughtered pig abscesses from different regions show microbiological assessments in the following tables, which represent the quantitative study of bacterial microbiological investigation of the number of isolated microorganisms of *Staphylococcus aureus*, bacterial colonies found on common and special culture media.

The data from Figure 1 demonstrate the characteristics of the study of bacterial bacterioscopic microflora of the isolated species of *Staphylococcus aureus* from various regions of pigs slaughtered in slaughterhouse conditions. Thus, following the values of the microorganisms of this species visualized under microscopy from various samples in comparative aspect, a higher number of staphylococcal microorganisms is observed, evidenced by the abscess of the pathological sample, the highlighted values of *Staphylococcus aureus* with a number of 36 microbial cells determined in the sample with chest abscess in slaughtered pigs and other values of 28; 18; 16; 14; 12 to other samples with abscesses identified in slaughtered pigs.

Analyzing the microflora characteristic of the species *Staphylococcus aureus*, a higher number of microbial cells is observed under microscopy, however, in samples with characteristic abscesses, where the number of cases was more frequent: cord and swine chest, compared to with abscesses recorded in the ribs, leg, muscles, jaw and ears (Figure 2).

The data from Figures 3 and 4 reveal the characteristics of the study of bacterial bacteriological microflora from various abscesses taken after examination of microbiological passages on various common culture media: agar / broth on plates / test tubes and special: blood agar / plaque. Observing the indices of the colonies obtained from various samples in comparative aspect, a higher number of bacterial colonies is observed on the plaque agar medium 24 in number from the heart abscess sample of the identified species *Staphylococcus aureus*, compared to the abscesses from the mandible, chest, rib, leg etc., where the number of colonies on the agar / plate medium was 20; 19; 16; 14 and 12 microbial colonies. Hemolysis, characteristic to the species *S. aureus*, was determined in all cases on the blood agar medium.

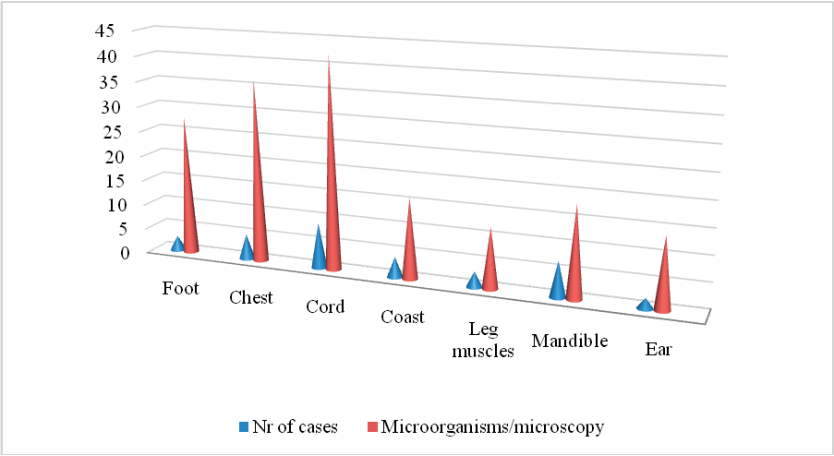

Figure 1. Bacterioscopic values of *Staphylococcus aureus* microflora in abscesses of slaughtered pigs

Figure 2. Abscesses

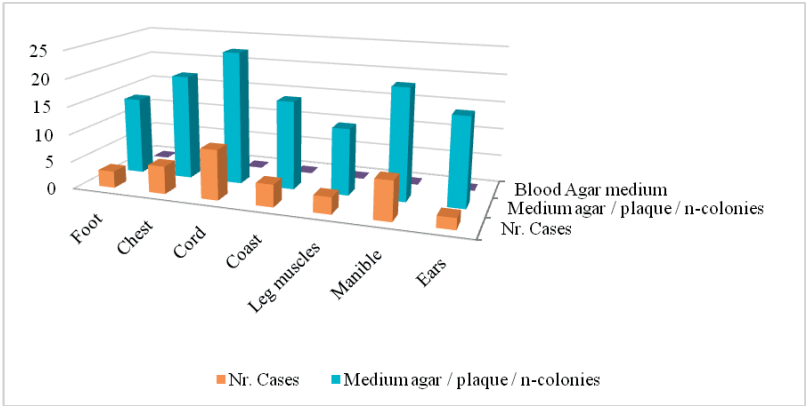

Figure 3. Bacteriological values of *S. aureus* microflora on agar/plaque in slaughtered pig abscesses

Observing the indices of the colonies obtained from various samples in comparative aspect, a higher number of bacterial colonies is observed on the plaque agar medium 24 in number from the heart abscess sample of the identified species *Staphylococcus aureus*, compared to the abscesses from the mandible, chest, rib, leg etc., where the number of colonies on the agar / plate medium was 20; 19; 16; 14 and 12 microbial colonies.

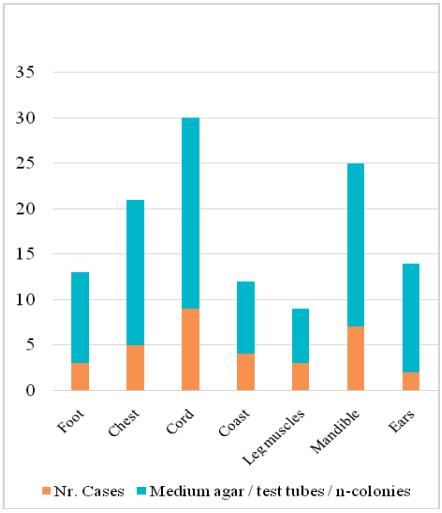

Figure 4. Bacteriological values of *S. aureus* microflora on agar / test tubes in slaughtered swine abscesses

Analyzing the results obtained regarding the values of the identified colonies from the abscesses of the investigated samples from the pigs slaughtered in slaughterhouse conditions compared to the number of registered cases of samples with identified abscesses, a number of colonies of 24 is observed; 20 and 19 higher correlated with the higher number of cases detected by abscesses in slaughtered pigs.

Therefore, these findings suggest that Staphylococcus aureus is present in a higher concentration in cor abscess samples; chest; mandible etc. On the special agar / blood medium in all cases of research through passages in the sampled abscesses investigated, hemolysis areas were observed, characteristic of the *Staphylococcus aureus* species.

At the same time, the values of the microbial colonies in Figure 5 developed on the jelly and broth culture media in test tubes also determined aspects characteristic of the species identified from the samples with investigated abscesses. Thus, as a result of the differentiation of the number of colonies, the highest number of colonies was found on the agar culture medium -21, identified from the sampling with heart abscess, followed by the sampling with abscess from the mandible, where the number of colonies determined 18 colonies and other samples investigated with a number of colonies of 18; 16, 12 and 10 microbial colonies of Staphylococcus aureus. The cultural aspects of the species *Staphylococcus aureus* identified in the liquid medium agar in all pathological samples with abscesses caused turbidity in test tubes.

Therefore, the bacterial microflora of the *Staphyloccoccus aureus* species has important aspects in the pathology of abscesses in various samples taken from pigs slaughtered in slaughterhouse conditions. These aspects indicate that the microflora of the abscesses of the porcine heart, chest, leg and sacrificed mandible are invaded by the species *Staphylococcus aureus* in a higher amount compared to other pathological specimens.

In these cases, according to our studies and reports, we conclude that the Staphylococcus aureus strain expressed higher virulence factors in these samples with a phenotypic mechanism, and that this strain showed the gene encoding the *Staphylococcus aureus* virus. collagen binding and at the same time mediates the binding of *Staphylococcus aureus* to fibrinogen.

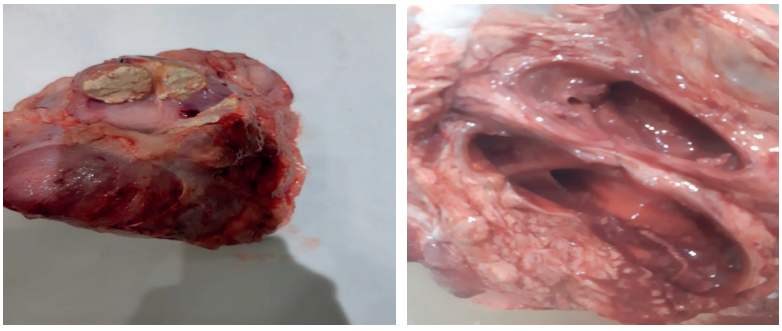

Figure 5. Abscesses investigated from sample

CONCLUSIONS

1. *S. aureus* strains isolated from various sources of pathological abscesses at pigs slaughtered in slaughterhouse conditions expressed a higher proportion of bacterioscopic and bacteriological quantitative microbiological values in heart abscesses, followed by samples invaded with staphylococci in the chest, leg , mandible, etc.
2. The *Staphylococcus aureus* strain expressed high levels of virulence factors in a phenotypic mechanism, and it was found that this strain showed the gene encoding the collagen binding protein and at the same time mediated the binding of *Staphylococcus aureus* to fibrinogen.
3. This study demonstrates the need to avoid damaging the skin and observing body hygiene in animals, which is the cause of the migration of bacteria that trigger microbial infections and abscesses.
4. In the context of the prevention of abscess pathologies, the timely administration of anti-inflammatory drugs to suspicious pigs is recommended.

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