



ASSESSMENT OF THE SENSITIVITY OF STAPHYLOCOCCUS AUREUS STRAINS TO ANTIBACTERIAL DRUGS.

Murodova Ijobatxon Abdulbosi qizi

Basic Doctrine of the Tashkent Research Institute of Vaccines and Serums, UZ

Ibragimov Adil Axmedovich

Head of the High Technologies Laboratory of the Tashkent Research Institute of
Vaccines and Serums, Doctor of Biological Sciences

Sharafitdinova Gulnora Xashimovna

Head of the bacteriology laboratory of the Republican Scientific Center for
Emergency Medical Care, independent researcher of the Tashkent Research
Institute of Vaccines and Serums

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Annotation. In order to assess the sensitivity of *Staphylococcus aureus* strains to antibacterial drugs, bacteriological studies conducted in February 2025 on clinical samples were analyzed in the bacteriology laboratory of the Republican Scientific Center for Emergency Medical Care. From 1694 samples from various therapeutic departments, 892 genera of the family *Staphylococcus* spp were identified. *S. aureus* 465 isolates were identified from various clinical samples, throat smears (64.90%), urine (17.50%), venous blood (3.10%), sputum (4.12%) and other samples (1.03%). Isolation and identification of isolates include standard biochemical tests such as colony morphology, Gram staining, catalase reaction, and coagulase test, as well as analysis of isolates for antimicrobial sensitivity.

Keywords: *Staphylococcus aureus*, antibiotic sensitivity, disc diffusion MRSA, resistance.

Staphylococcus aureus infections are a global health problem. The resistance of this bacterium to antibiotics creates serious difficulties in the effective treatment of infection. In particular, MRSA (Methicillin-Resistant *Staphylococcus aureus*) strains limit treatment possibilities. Therefore, assessing the level of sensitivity to various antibiotics is crucial in choosing the optimal therapeutic approach. *Staphylococci* produce various enzymes that break down tissues, such as protease, lipase, and hyaluronidase. These bacterial products may facilitate the spread of infection to adjacent tissues, but their role in the pathogenesis of the disease is not well understood. β -lactamase is an enzyme that inactivates penicillin. Penicillin-binding proteins are enzymes located on the cytoplasmic membrane and involved in cell wall binding. The new penicillin-binding protein is responsible for staphylococcal resistance to penicillinase-resistant penicillins and cephalosporins. Coagulase, a prothrombin activator, converts fibrinogen to fibrin.



Staphylococcus aureus causes various infections, and their treatment relies on antibiotics. A number of antibiotics are used to treat staphylococcal infections, and they focus on key bacterial processes such as cell wall synthesis, translation, transcription, and DNA synthesis. However, antibiotic resistance is a growing problem, and failures in treatment are associated with large human and medical costs. Antibiotic resistance occurs through several different mechanisms, such as modified drug targets, enzymatic drug inactivation, increased flow of antimicrobial compounds, and altered access to drugs, and many mobile genetic elements contribute to the spread of resistance. Although resistance was observed for almost all compounds, individual strains resistant to all drugs did not appear. Nevertheless, resistance still creates difficulties in treatment. Fully resistant strains are rare, but common moderately resistant, despite a slight increase, is associated with more severe infections and longer duration of treatment than sensitive strains. This suggests that we have limited knowledge of how resistance genes and mutations affect the overall biology of resistant strains and how resistance affects pathogenesis. In this article, we focus on the biology of antibiotic resistance of *S. aureus* and the behavior of resistant strains, and we conclude with a description of some new therapeutic approaches that may become ways of treating infections with antibiotic-resistant staphylococci in the future.

MATERIALS AND METHODS. In accordance with the purpose of the microbiological study, 892 genera of the family Staphylococcus spp were identified from 1694 samples from various therapeutic departments in the bacteriological laboratory of the Republican Scientific Center for Emergency Medical Care (RSC EMC). *S. aureus* 465 isolates were isolated from various clinical samples, throat smears, urine, venous blood, sputum, and other samples and studied in detail using bacteriological methods. In particular, special attention was paid to the morphology in the form of gram-positive "grape clusters" cocci on the surface of the slide when stained by the Gram method, the enzymes catalase, plasmocoagulase, DNAase, the fermentation of a number of carbohydrates and the production of a golden carotenoid pigment, growth at high (6.5%, 10%) concentrations of NaCl, and 5% blood agar was used to determine the hemolytic properties of the derivatives. The study of the enzyme plasmocoagulase and the formation of a "precipitate" on the surface of the slide was carried out by the traditional method, using rabbit citrate plasma with an isolate of 18-24 hours. All tests were conducted using special *S. aureus* NCTC 12973 control strains, the obtained results were recorded twice with a 6-hour interval. Antibiotic sensitivity



test. Colonies identified as *Staphylococcus aureus* were transferred on discs of antibiotics belonging to the β -lactam group: antibiotics of the cephalosporin and penicillin series, fluoroquinolone, macrolides, and other groups according to EUKACT (2025 edition 15) rules on a Muller-Hilton nutrient medium.

Results. In this study, 465 *Staphylococcus aureus* strains were isolated from clinical samples. The level of sensitivity of bacteria to 10 types of antibiotics was assessed by the disc diffusion method based on standard methods. According to the analysis results, the highest sensitivity was observed in the antibiotics Linezolid (77.6%) and Amikacin (75.6%). These drugs are especially effective against strains resistant to many antibiotics. Rifampicin, an inhibitor of RNA synthesis, also showed a high level of sensitivity (67.9%). This drug is important in MRSA infections. DNA synthesis inhibitors Ciprofloxacin (52.9%), Moxifloxacin (43.9%), Doxycycline (41.9%) have moderate sensitivity and can be used depending on the type of disease. Among the inhibitors of bacterial cell wall synthesis, Cefoxitin (16.1%) and inhibitors of protein synthesis Gentamicin (16.8%) and Erythromycin (16.1%) showed low sensitivity to antibiotics, which indicates the presence of methicillin-resistant strains.

Discussion. The obtained results indicate a high level of resistance to many antibiotics among the *staphylococcus aureus* strains. In particular, the low effectiveness of drugs such as Cefoxitin and Erythromycin indicates the widespread use of MRSA. At the same time, the high effectiveness of modern antibiotics such as Linezolid and Amikacin indicates the need for their widespread use in clinical practice. Nevertheless, in each case, it is necessary to conduct microbiological testing before selecting an antibiotic.

Conclusion. Based on the research results, it is recommended to consider the bacterial sensitivity profile when choosing antibiotics. The spread of MRSA indicates the need to revise antibiotic policy and strengthen infection control measures.

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