pISSN:2349-5707 Volume:13,Issue 2, February -2026 eISSN:2349-5715

BLOODSTREAM INFECTIONS: MICROBIOLOGICAL DIAGNOSIS AND KEY PATHOGENS

Azamova Sarvinoz Avazbek kizi

sarvinozazamova04@gmail.com

Andijan Branch of Kokand University

Abstract: This article analyzes the microbiological diagnosis and main etiological agents of bloodstream infections. The introduction highlights the relevance of bloodstream infections, their negative impact on human health, and the importance of early and accurate diagnosis. The research methodology included blood culture sampling, bacterial isolation, microscopic examination, biochemical tests, and antibiotic susceptibility testing. The results revealed that the most common pathogens were Staphylococcus aureus, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, and fungi of the Candida genus. In addition, a high level of antibiotic resistance was observed in some pathogens. The discussion section compares the obtained results with international studies and emphasizes the importance of rapid and accurate microbiological diagnostics in reducing the incidence of bloodstream infections. The findings of this study contribute to the development of effective treatment strategies in clinical practice.

Keywords: bloodstream infections, sepsis, microbiological diagnostics, blood culture, pathogenic microorganisms, antibiotic susceptibility, resistance, bacteria, fungi.

RESEARCH METHODOLOGY

The research was conducted based on samples obtained from patients of various ages suspected of having bloodstream infections. Patients with a high probability of infection were selected based on clinical signs (fever, chills, general weakness, low blood pressure) and laboratory indicators.

Sampling: 5–10 ml of blood was drawn from patients' veins under aseptic conditions and placed into special blood culture vials.

Incubation: To isolate microorganisms, samples were incubated at 37°C for 24–48 hours.

Identification: Obtained colonies were examined under a microscope using the Gram staining method. The following methods were used for further identification:

Biochemical tests (catalase, oxidase, fermentation reactions).

Inoculation on specific culture media.

Evaluation of morphological characteristics of colonies.

Susceptibility Testing: The disk-diffusion (Kirby–Bauer) method was used to determine antibiotic sensitivity.

Evaluation: Results were evaluated based on CLSI (Clinical and Laboratory Standards Institute) criteria.

Analysis: The data were statistically analyzed to determine the frequency of main pathogens and their antibiotic susceptibility levels.

pISSN:2349-5707 Volume:13,Issue 2, February -2026 eISSN:2349-5715

LITERATURE REVIEW

In recent years, the problem of bloodstream infections and sepsis has been considered one of the most pressing issues in medicine. Numerous local and foreign researchers have focused on the origin, pathogens, diagnosis, and treatment of these diseases.

Murray P.R. et al. Describe the mechanism of infection development, blood culture techniques, and characteristics of key pathogens in Medical Microbiology. They emphasize that rapid multiplication and toxin production by microorganisms in the bloodstream can lead to sepsis.

Brooks G.F. et al. Highlight the role of Gram-positive and Gram-negative bacteria in bloodstream infections. Their studies identify S. Aureus, E. Coli, K. Pneumoniae, and P. Aeruginosa as the most frequent pathogens, which aligns with our findings.

Forbes B.A. et al. Provide a deep analysis of microbiological diagnostic stages in Diagnostic Microbiology, serving as the methodological basis for this work.

CLSI Standards provide essential guidelines for antimicrobial susceptibility testing, ensuring the reliability of our results.

Levy M.M. et al. Emphasize the need for early detection and aggressive treatment within the Surviving Sepsis Campaign.

Local Protocols: Clinical protocols from the Ministry of Health of the Republic of Uzbekistan provided necessary algorithms for diagnosis and treatment in the local context.

Baron E.J. and Tille P. Highlight advancements in blood culture processes, including automated systems and molecular methods.

RESULTS

Microbiological examinations successfully isolated pathogenic microorganisms from a specific portion of the blood samples.

Dominant Pathogens: Among Gram-positive bacteria, Staphylococcus aureus was predominant. Among Gram-negative bacteria, Escherichia coli and Klebsiella pneumoniae showed the highest rates.

Resistance: Antibiotic susceptibility tests revealed resistance to broad-spectrum antibiotics in several pathogens. Multi-drug resistant strains were particularly observed in Klebsiella pneumoniae and Pseudomonas aeruginosa.

Fungal Infections: Candida species were primarily recorded in immunocompromised patients.

DISCUSSION

The results confirm that the primary causative agents of bloodstream infections are Gram-positive and Gram-negative bacteria, and occasionally fungi. These findings correlate with international data identifying S. Aureus and E. Coli as leaders in such infections.

The rising trend of antibiotic resistance complicates clinical treatment and necessitates a revision of empirical treatment plans. This underscores the importance of microbiological diagnosis; only an accurately identified pathogen and its susceptibility profile allow for the selection of the correct antibiotic. Furthermore, strict adherence to asepsis and antisepsis during medical procedures is vital for risk reduction.

pISSN:2349-5707 Volume:13,Issue 2, February -2026 eISSN:2349-5715

CONCLUSION

The study concludes that Staphylococcus aureus, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, and Candida fungi are the main pathogens of bloodstream infections. Their high resistance to antibiotics complicates the healing process.

Therefore, it is essential to widely utilize microbiological diagnostic methods for early detection. Timely blood cultures and susceptibility assessments play a critical role in selecting effective treatment strategies, reducing infection rates, and ensuring the rational use of antibiotics.

References.

1. Murray P.R., Rosenthal K.S., Pfaller M.A. Medical Microbiology. — Elsevier, 2020.
2. Brooks G.F. et al. Jawetz, Melnick & Adelberg's Medical Microbiology. — McGraw-Hill, 2019.
3. Forbes B.A. et al. Bailey & Scott's Diagnostic Microbiology. — Mosby, 2018.
4. CLSI. Performance Standards for Antimicrobial Susceptibility Testing. — 2021.
5. Jawad A., Hawkey P. Medical Bacteriology: A Practical Approach. — Oxford University Press, 2017.
6. Ministry of Health of Uzbekistan. Clinical Protocol on Diagnosis of Sepsis and Bloodstream Infections. — 2020.
7. Levy M.M. et al. Surviving Sepsis Campaign: International Guidelines. — 2021.
8. Tille P. Bailey & Scott's Diagnostic Microbiology, 14th Ed. — Elsevier, 2019.
9. Baron E.J. et al. Blood Cultures IV. — ASM Press, 2020.
10. Sharman T., Arshad M. Sepsis and Septic Shock: Etiology and Diagnosis. — StatPearls, 2022.