STUDY OF RARE BACTERIAL ISOLATES IN A TERTIARY CARE HOSPITAL

by Jana Publication & Research

Submission date: 28-May-2025 01:06PM (UTC+0700)
Submission ID: 2664983897
File name: IJAR-51919.docx (20.71K)
Word count: 2090
Character count: 13846

STUDY OF RARE BACTERIAL ISOLATES IN A TERTIARY CARE HOSPITAL

Introduction

The rise of emerging bacterial pathogens is a matter of global concern [1,8]. These novel pathogens raise innumerable concerns like the source of transmission, virulence capacity, and susceptibility profiles of these organisms [2,11]. In addition, the emergence of novel multidrug-resistant (MDR) nosocomial pathogens and lack of awareness regarding their transmission potential further prolong morbidity, posing a high-cost burden on society [3,5]. Distinguishing culture contaminants from true pathogens for timely diagnosis and management requires technical expertise and good clinical acumen [6,7]. This makes it imperative to understand infections caused by these emerging bacterial pathogens and their antibiotic susceptibility patterns to combat the increasing morbidity in hospitalized patients suffering from these infections [4,9,10].

Material and Methods

Prospective observational study was conducted on 9 rare bacterial isolates. Blood, tracheal secretions, pus samples were collected from various departments over a time period of 7 months from November 2023 to May 2024 at Apollo Institute of Medical Sciences and Research General Hospital, Hyderabad. Gram staining and culture of isolates was done, antimicrobial susceptibility testing was done for all isolates as per CLSI guidelines. Identification of organisms by VITEK 2 system. INCLUSION CRITERIA- All IP and OP patients of Apollo Institute of Medical Sciences & Research. EXCLUSION CRITERIA - Patients on antibiotics before culture is sent.

Results

Demographic and Clinical Characteristics

In our study, the majority of cases were observed in the 41–60 years age group (7 cases), accounting for the highest proportion among all age categories. This was followed by patients over 60 years of age, with 2 reported cases. Notably, there were no cases identified in the younger age groups of 1–20 years and 21–40 years. Regarding gender distribution, a significant male predominance was evident, with

males constituting 81% of cases, while females represented only 18%. Comorbid conditions were prevalent among the study population, with Type 2 Diabetes Mellitus, Hypertension, Hypothyroidism, Acute Kidney Injury (AKI), and Chronic Kidney Disease (CKD) being the most frequently reported [6–10].

Microbiological Findings and Antimicrobial Susceptibility Patterns

Pantoea agglomerans was isolated from blood samples of a patient with a diabetic foot ulcer leading to below-knee amputation. The isolate displayed a broad antibiotic sensitivity profile, showing susceptibility to Cefepime, Cefoperazone, Ciprofloxacin, Levofloxacin, Imipenem, Meropenem, Colistin, Piperacillin, Aztreonam, Trimethoprim, Ceftazidime, Amikacin, and Gentamicin. Resistance was limited to Fosfomycin.

Streptococcus dysgalactiae isolates, recovered from blood cultures in a patient presenting with sepsis complicated by thrombocytopenia, exhibited sensitivity to a wide range of antibiotics including Levofloxacin, Chloramphenicol, Clindamycin, Cotrimoxazole, Penicillin, Ampicillin, Vancomycin, Teicoplanin, Erythromycin, and Minocycline. Resistance was noted to Ciprofloxacin and Optochin.

Streptococcus sanguinis was isolated from patients diagnosed with infective endocarditis. The organism was susceptible to Ceftriaxone, Cefotaxime, Clindamycin, Vancomycin, Levofloxacin, Chloramphenicol, Linezolid, and Fosfomycin, but resistant to Azithromycin, Tetracycline, Ampicillin, and Benzyl penicillin.

Achromobacter xylosoxidans was recovered from blood cultures in a patient who experienced shock secondary to anaphylaxis. The isolate demonstrated susceptibility to Piperacillin, Ceftazidime, Cefoperazone/sulbactam, Cefepime, Imipenem, Meropenem, Trimethoprim, and Sulfamethoxazole. Resistance was documented against Aztreonam, Gentamicin, and Levofloxacin.

Serratia fonticola was isolated from a patient with a nosocomial febrile illness. The isolate was sensitive to several cephalosporins (Cefuroxime, Cefuroxime axetil, Ceftriaxone, Cefoperazone, Cefepime), Fosfomycin, Ciprofloxacin, Imipenem, Meropenem, Colistin, Piperacillin, and Trimethoprim. Resistance was observed against Amikacin, Gentamicin, and Tigecycline.

Elizabethkingia meningoseptica was recovered from tracheal secretions of a patient with Acute Respiratory Distress Syndrome (ARDS). The isolate was sensitive to Cefoperazone and Minocycline but exhibited resistance to a broad range of antibiotics including Cefepime, Ciprofloxacin, Levofloxacin, Imipenem, Meropenem, Piperacillin, Aztreonam, Trimethoprim, Ceftazidime, and Gentamicin.

Staphylococcus warneri was isolated from the central line tip of a patient with a right diabetic foot infection. The isolate showed sensitivity to Vancomycin, Ciprofloxacin, Levofloxacin, Ofloxacin, Trimethoprim-sulfamethoxazole, Linezolid, Teicoplanin, Nitrofurantoin, Gentamicin, Tigecycline, Rifampicin, and Daptomycin. Resistance was detected against Clindamycin, Azithromycin, and Benzyl penicillin.

Aeromonas hydrophila was isolated from pus from a foot abscess. It was susceptible to Amikacin, Gentamicin, Ciprofloxacin, and Trimethoprim/sulfamethoxazole but resistant to Piperacillin/tazobactam, Cefuroxime, Ceftriaxone, Cefoperazone/sulbactam, Meropenem, Cefepime, and Imipenem.

Kocuria kristinae was isolated from blood of a patient with acute kidney disease. The isolate showed susceptibility to Erythromycin, Clindamycin, Vancomycin, Azithromycin, Levofloxacin, Ampicillin, Ofloxacin, Chloramphenicol, Linezolid, Teicoplanin, Bacitracin, and Optochin, but resistance to Ceftriaxone, Penicillin, and Co-trimoxazole.

Discussion

Demographic Trends and Comorbidities

The preponderance of cases in the 41–60 years age group observed in this study aligns with findings by Nidhi Tejan et al., suggesting this age group may be particularly vulnerable to the infections studied. However, the absence of cases in younger adults (21–40 years) and children (1–20 years) contrasts with other studies such as Eric Farfour et al., who reported significant incidence in younger adults, indicating potential regional or demographic differences. The marked male predominance (81%) in our study differs notably from prior reports by Balew Aregan et al. and Eric Farfour et al., who reported near gender parity. This gender skew may reflect occupational, behavioral, or healthcare access disparities in our study population [9,10].

Comorbid conditions such as Diabetes Mellitus and Hypertension were consistently observed across multiple studies, including ours, emphasizing their role as critical risk factors for infection susceptibility and severity. The variability in associated conditions, such as hypothyroidism in our cohort and Obstructive Sleep Apnea or ARDS in other studies, may indicate differing clinical spectrums and underlying population health characteristics [6,8].

Pathogen-Specific Findings and Antimicrobial Susceptibility

Pantoea agglomerans was isolated in all referenced studies, including our own, indicating its emerging clinical significance in bloodstream infections. While susceptibility to broad-spectrum beta-lactams, fluoroquinolones, and carbapenems was common, resistance profiles varied, highlighting the importance of individualized susceptibility testing. Our isolate's resistance to Fosfomycin contrasts with other reports of resistance to Amoxicillin/clavulanate and Cotrimoxazole, suggesting evolving resistance patterns and potential geographic variation [16,18].

The susceptibility of Streptococcus dysgalactiae isolates to beta-lactams and glycopeptides, including Vancomycin, supports the continued use of these agents as first-line therapy. Resistance to Ciprofloxacin seen in both our study and others underscores the need to avoid fluoroquinolones empirically when treating these infections [2].

The detection of penicillin resistance in Streptococcus sanguinis isolates from infective endocarditis cases both in our study and Ali Rahman et al. raises concerns regarding the efficacy of traditional penicillin therapy for this pathogen. These findings suggest that alternative regimens, such as cephalosporins or glycopeptides, should be considered pending susceptibility data [15].

Achromobacter xylosoxidans showed resistance to gentamicin and levofloxacin across multiple studies, indicating that aminoglycosides and fluoroquinolones are suboptimal for treatment. Carbapenems and beta-lactam/beta-lactamase inhibitor combinations demonstrated better efficacy, making them preferred therapeutic options [11–13].

Serratia fonticola isolates displayed a concerning resistance pattern, particularly to gentamicin and tigecycline. The broad resistance spectrum observed in our study and in Radha Kunjwa et al. complicates management and warrants vigilant antimicrobial stewardship and susceptibility-guided therapy [5].

Our observation of increased resistance to quinolones in Elizabethkingia meningoseptica isolates aligns with reports from Sri Goel et al. and Ratnamani et al., indicating a trend toward quinolone resistance. This resistance limits the therapeutic options available and underscores the need for ongoing surveillance and development of alternative treatment strategies [1,8,9].

The antimicrobial susceptibility profile of Staphylococcus warneri in our study largely corresponds with previous reports, though resistance to clindamycin and azithromycin noted here but not elsewhere suggests local antimicrobial pressure influencing resistance patterns [3,4,17].

Resistance to meropenem in Aeromonas hydrophila isolates in our study and Hassan Valley et al. highlights the emerging challenge of carbapenem resistance in non-fermenting gram-negative bacilli. This finding argues against the empirical use of carbapenems for suspected Aeromonas infections and calls for alternative treatment protocols [14].

The sensitivity of Kocuria kristinae to vancomycin and piperacillin/tazobactam in our study, consistent with Quin Jian et al., suggests these agents remain effective options for infections caused by this organism, which is increasingly recognized as an opportunistic pathogen [6,7].

Conclusion

Rare bacterial infections were commonly seen in patients of 41 to 60 years age group. Sex predisposition varies from place to place. Diabetes mellitus , hypertension and chronic kidney disease were the associated comorbidities. Pantoea agglomerans is mostly associated with sepsis and is sensitive to 3rd generation cephalosporins, quinolones & aminoglycosides, Streptococcus dysgalactiae is also associated with sepsis. Beta lactam drugs and vancomycin remain the preferred drugs for treatment of this infection. Streptococcus sanguinis remains an established pathogen in endocarditis. Clindamycin , Ceftriaxone & Vancomycin are the preferred drugs &Penicillin should not be used in the treatment of this infection. Achromobacter xyloxsidans could be associated with hypertension and shock. 3rd generation cephalosporins and carbapenems are the preferred drugs against this infection and Aminoglycosides and fluoroquinolones are not preferred drugs for acromobacter xyloxsidans infections. Serratia fonticola associated with sepsis and endocarditis. Second, third and fourth generation cephalosporins, quinolones, carbapenems are the

most effective drugs for Serratia fonticola. Gentamicin,tigecycline are not preferred drugs for Serratia fonticola infections. Elizabethkingia meningoseptica mostly a pathogen associated with ARDS patients with sensitivity to third generation cephalosporins &variable sensitivity to Quinolones. S. warneri infection is mostly associated with diabetic foot infections and UTIs. This organism is sensitive to fluroquinolones, daptomycin, gentamicin& Trimethoprim/sulphamethoxazole and resistant to penicillin. Aeromonas hydrophilia is commonly associated with lower Limb infection. Amikacin , Gentamicin, Ciprofloxacin are the preferred drugs for these infections & carbapenem should not be used as an empirical treatment. Kocuria kristinae is also associated with sepsis. Vancomycin can be given as empirical treatment. Rare bacterial isolates are usually associated with sepsis. Infections caused by rare bacterial isolates can be empirically treated with 3rd generation cephalosporins, quinolones and vancomycin. However more studies are required to confirm these findings.

References

1. Ratnamani MS, Rao R. Elizabethkingia meningoseptica: Emerging nosocomial pathogen in bedside hemodialysis patients. Indian J Crit Care Med 2013;17:304-7.
2. Chen-Hong He, Shu-Fan Feng et al. Streptococcus dysgalactiae subsp. dysgalactiae presents with progressive weakness in limbs: a case report and literature review, BMC Infectious Diseases, March 2023.
3. Kanuparthy A, Challa T, Meegada S, et al. (May 28, 2020) Staphylococcus warneri: Skin Commensal and a Rare Cause of Urinary Tract Infection. Cureus 12(5): e8337. DOI 10.7759/cureus.8337
4. Gelman R, Potruch A, Oster Y, Ishay Y, Gur C, Beeri R, Strahilevitz J. Native aortic valve Staphylococcus war neri endocarditis after COVID-19 infection: a case report and a review of literature. APMIS. 2022; 130: 270–275.
5. Kunjalwar R, Shaw D, Mudey G (March 24, 2024) Unveiling the Menace of Serratia fonticola: Rising Pathogenic Threat or Bystander?. Cureus 16(3): e56840. DOI 10.7759/cureus.56840
6. P. Arun Kumar, R. A. Chougale, Kocuria kristinae (Unusual Pathogen) Isolated from Cerebrospinal Fluid: A Case of Acute Meningitis, Highlights on Medicine and Medical Research Vol. 15.

7. Arif Maqsood Ali, Gule Raana Waseem, Shazia Arif, Rare case report of infective endocarditis due to Kocuria kristinae in a patient with ventricular septal defect, Access Microbiology 2020;2
8. Balakrishnan NK, Ghani AR, Hassan MH, Mukmin LA, Hassan WM. Nosocomial Elizabethkingia meningoseptica meningitis and bacteremia in a post transsphenoidal hypophysectomy complicated with sagittal sinus thrombosis: A case report. Surg Neurol Int 2022;13:370.
9. Goel S, Jhajra SD, Nangia S, Kumar A, Nanda D. Neonatal meningitis secondary to Elizabethkingia meningoseptica infection. J Global Infect Dis 2023;15:23-7.
10. Kannuri S, Gandham NR, Das NK, Vyawahare CR, Mirza S. Elizabethkingia meningoseptica: A case report of an emerging and rare pathogen of neonatal meningitis isolated from a tertiary care centre. J Patient Saf Infect Control 2024;11:18-20.
11. Farfán-Cano GG and Silva-Rojas GA. Achromobacter xylosoxidans as an emerging pathogen in healthcare settings: A mini review. Narra X 2023; 1(1): e74 - http://doi.org/10.52225/ narrax.v1i1.74.
12. Rajni E, Kataria S, Sarna MK, Garg VK. A case of bacteremia by Achromobacter xylosoxidans in an immunocompromised host and review of literature. Arch Med Health Sci 2023;11:141-4.
13. Mudey G, Kunjalwar R, Sahu G, et al. (July 17, 2023) Sepsis Due to Achromobacter xylosoxidans in a Tertiary Care Centre: Case Series. Cureus 15(7): e42052. DOI 10.7759/cureus.42052.
14. Pessoa RBG, Oliveira WF, Correia MTS, Fontes A and Coelho LCBB (2022) Aeromonas and Human Health Disorders: Clinical Approaches. Front. Microbiol. 13:868890. doi: 10.3389/fmicb.2022.868890.
15. Singu S, Chory R, Singu V K, et al. (January 18, 2024) Bicuspid Aortic Valve Endocarditis Caused by Streptococcus sanguinis: A Case Report. Cureus 16(1): e52488. DOI 10.7759/cureus.52488
16. Mirtella, D.; Fedeli, P.; Scendoni, R.; Cannovo, N.; Cingolani, M. A Case of Nosocomial Outbreak of Pantoea agglomerans Related to Parenteral Nutrition Procedures. Healthcare 2021, 9, 684. https://doi.org/10.3390/ healthcare9060684.
17. Sued Karam, Staphylococcus warneri: brief literature review,Brazilian Journal of Health Review, Curitiba, v. 5, n. 2 p. 4525-4531, mar./apr., 2022.

18. D. Parikh, K. Shah, Pantoea species-A Rare Cause of Central Venous Catheter Related Sepsis in Hemodialysis Patient, Journal of Microbiology and Infectious Diseases 2020; 10 (2):103-105.

STUDY OF RARE BACTERIAL ISOLATES IN A TERTIARY CARE HOSPITAL

ORIGINALITY REPORT

8%	1%	7%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Nidhi Tejan, Mitra Kar, Romya Singh, Ashima Jamwal et al. "Clinical and Microbiological Characteristics of Rare Pathogens Causing Bacteremia in Patients Admitted to a Tertiary Care Centre in Northern India", Microbiology Society, 2023 Publication	6%
2	www.cihi.ca Internet Source	1%
3	pmc.ncbi.nlm.nih.gov Internet Source	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		