ORIGINAL ARTICLE

Prevalence and Antibiotic Susceptibility of Gram-Negative Bacteria: A Study in ICU of Lahore General Hospital, Lahore with Mac Conkey Growth Medium

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ABSTRACT

Aim: Antibiotic sensitivity of gram-negative bacteria responsible for infections on Mac Conkey medium
Methodology: Blood samples were cultured on MacConkey medium and antibiotic sensitivity was done by the technique called disk diffusion.
Sample size: 200 subjects
Duration of research: Four months i.e. 01-09-2022 to 31-12-2022
Results: 148 were gram-negative bacteria, 25 having growth of mixed types and there was no growth in 27 cases. In 148 subjects, resistance for ceftriaxone, ceftazidime, imipenem, meropenem, and doxycycline was 79%, 75.6%, 58.7%, 65.5% and 51.3% respectively. Gram-negative bacteria had high resistance %age of cefotaxime and the low for doxycycline.
Conclusion: By gram staining technique, cases were all gram-ve bacteria. A species of Klebsiella was originated frequently in blood sample i.e. 18.5%.
Keywords: Incidence, antibiotic sensitivity, infection in blood, gram-ve species

INTRODUCTION

Mostly, species linked to hospital-induced infections have shown a rise in resistant strains among critical care patients, and rates are nearly uniformly greater among intensive care unit cases. Similarly, ICU patients who have been in the hospital for a longer period are 2-3 times more prone to infection with a microorganism with an antibiotic-resistant phenotype of concerns. However, by improving the use of infectious control methods (patient quarantine, washing hands, glove usage, and proper gown usage) and implementing a systematic evaluation of antibacterial use, there are several chances to avoid the establishment and spread of these resistant infections[1].Gram-negative bacteria are a usual source of infection in hospitals and communities. The occurrence of multidrug resistance among gram-negative bacteria in the US is reviewed in this summary[2].

Saeed et al[3] conducted a study with cerebrospinal fluid, nasal swabs, urine, wound or tissue, blood, and respiratory samples. There was a significant rate of nosocomial multidrug-resistant microorganisms identified from patients admitted to the General ICU in Riyadh, irrespective of the specimen. Acinetobacterbaumannii made up 40.9% of the isolates, followed by Klebsiella pneumoniae at 19.4% and Pseudomonas aeruginosa at 16.3%. The most prevalent isolates obtained from clinical specimens include Escherichia coli, A. baumannii, K. pneumoniae, P. aeruginosa, Staphylococcus coagulase-negative, and Staphylococcus aureus (methicillin-sensitive and methicillin-resistant). Roughly 39% of all the samples taken in the ICU were from the respiratory system. The most prevalent MDR bacteria were K. pneumoniae and A. baumannii.

Mechanical ventilation, surgical procedures, and invasive medical devices are the most common reasons for hospital-acquired infections. Gram-negative bacteria cause over 30% of hospital-acquired illnesses and are the most common cause of hospital-acquired pneumonia. They are extremely effective at getting antibacterial drug resistance pathways, particularly when antibiotic selection pressure is present. This review brings practitioners up to date on the latest information on these potentially life-threatening infections[4].

METHODOLOGY

Inclusion Criteria: Patients admitted in ICU suspected to have bloodstream infection.
Exclusion Criteria: Patients of other species infection.
Sample collection: Sample of cases admitted in ICU were composed.5 ml of blood was collected in culture bottle. Sample was taken under uncontaminated atmosphere. Data was composed and then analyzed by SPSS version 21.

RESULTS

Table 1: Mac Conkey medium with gram –vegrowth

Bacteria	N=	%age	Growth
Acinetobacter	30	14.9%	Raised, creamy, opaque
Citrobacter	17	8.5%	Colorless and after 24 hours pinkish
Enterobacter	02	1%	Large, mucoid, and pink
E coli	07	3.5%	Pink, flat, dry, and non-mucoid
Salmonella	04	6.5%	Convex, colorless with serrated margins
Pseudomonas	25	12.5%	Colorless, smooth, and flat
Klebsiella	37	18.5%	Heavily mucoid pink

Table 2: Biochemical Tests for Different Bacteria

Bacteria	N=	Indole	Citrate	Urease
Acinetobacter	30	-	+	-
Citrobacter	17	+	+	-
Pseudomonas	37	-	+	-
Klebsiella	25	-	+	+
Salmonella	07	-	+	-
Escherichia coli	07	+	-	-
Enterobacter	02	-		+

Table 3: Antibiotic sensitive gram-negative bacteria

Bacteria	N=	Antibiotics												
		COL	DOX	AK	FEP	CEF	LEV	MEM	CTX	CAZ	CIP	COR	GN	IMP
Enterobacter	02	1	1	0	0	0	0	0	02	0	1	0	0	0
Salmonella	17	3	11	9	4	4	10	4	3	3	7	8	9	3
E coli	07	1	2	4	4	3	1	2	1	1	1	3	3	5
Pseudomonas	37	9	10	14	17	11	16	18	9	11	14	11	11	20
Klebsiella	25	9	4	7	7	8	6	7	2	1	6	6	6	10
Acinetobacter	30	5	19	7	4	4	8	8	4	9	7	14	20	10
Citrobacter	17	1	11	4	1	2	6	1	1	1	6	6	6	1

DISCUSSION

This study shows that infection is in 148 (74%) cases i.e. gram negative cases were identified in blood stream. Research done in China showed that E. Coli was frequentspecies liable for infections, i.e. 32%[5]. Other research show that species of Klebsiella is frequent for infection in blood i.e. 18.5%[6].

On MacConkey agar, Acinetobacter showed raised, creamy, opaque, , Citrobacter showed opaque shiny grey, Enterobacter showed large dull-grey, E coli showed medium greyish smooth colonies, Salmonella showed some beta-hemolytic grey colonies, Pseudomonas showed greyish green colonies, Klebsiella showed heavily mucoid colonies. It is concluded that an infection rate of 74% i.e. 148 cases

In 148 cases, males were 70 i.e. 35% while females 78 i.e. 39%. Frequently cases were of ages 16-25 years. With gram staining, gram-negative rods are observed i.e.100%. In this research, significant association is seen in gram-ve species and antibiotics like amikacin, cefepime, ceftriaxone, ceftazidime, ciprofloxacin. In this study, doxy antibiotics had 79%and cefotaxime had 51.4%resistance for numerousgram-ve species.

In previous study, 517 gram-negative species were analyzed. Bronchial secretions were frequently positive. Pseudomonaswas seen in PICU and NICU whileE coliwascommon in the AICU. [7]

Regarding colonies on MacConkey agar, Chaudhariet al[8] observed 322 gram–ve cases and species were Klebsiella i.e. 37.3%; followed by E. Coli (16.5%), Pseudomonas (12.4%). Colistin (96.3%) was successfulbeside gram-ve species, followed by carbapenems (71.8%), aminoglycosides (71.4%), and fluoroquinolones (67.2%).

CONCUSION

By gram staining technique, cases were all gram-ve bacteria. A species of Klebsiella was originated frequently in blood sample i.e. 18.5%. To minimize the emergence and transmission of nosocomial infections in ICU patients, there is a need for continuous control and surveillance of antibiotic usage.

Conflict of interest: Nil

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