A Prospective Study On Prevalence Of Aerobic Bacteria In Intensive Care Units And Their Antibiotic Susceptibility Pattern In A Tertiary Care Hospital In Jaipur , Rajasthan

Neha Sharma*, Dr. Ved Prakash Mamoria**, Dr. Manisha Jain***
*M. S. C. Post Graduate Student, **Professor, ***Assistant Professor, Department Of Microbiology, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, India.

Abstract: Introducation: Multi-drug resistant nosocomial infections are one of the leading causes of mortality and morbidity amongst hospitalized patients throughout the world, accounting a major burden on the patients and public health system of any country Method :To determine the prevalence of aerobic bacterial in different clinical specimens received from various Intensive Care Units (MICU, SICU, CCU, PICU, and NICU) and their antibiotic susceptibility pattern in the isolated organisms in a tertiary care hospital in Jaipur, Rajasthan. Result : Out of 500 samples, 213 (43%) samples showed growth while 287 (57%) did not show any growth. In the 213 positive samples 183 (85.92%) were Gram Negative bacilli while 25(1.74%) were Gram Positive Cocci and 5 (2.34%) were candida spp.Out of Gram Negative Isolates Acinetobacter Spp. was found to be maximum 35.2% followed by E.coli 19.7% , Klebsiella spp.19.2%, Pseudomonas 12.2%, Citrobacter 0.93% and Proteus Spp. 0.93%. Among Gram Positive Isolates Staphylococcus aureus was maximum 6.5% followed by Enterococcus 3.75%, CONS 0.93% and streptococcus spp.0. 46%. Candida spp. contributes 2.34% of all positive culture. Conclusion: Isolates are sensitive to combination drugs while more resistant to single drug. Among gram negative bacteria most common isolate was Acinetobacter spp. 75 (35.2%) which were resistant to most of the antibiotics like amoxycillin- clavulanic acid (83%) , cefotaxime (76%), imipenem (71%), piperacillin- tazobactam (53%),cefepime (57%) while sensitive to aztreonam (64%) and cotrimoxazole (64%). [Jain M NJIRM 2016; 7(2):52-55]

Key Words: infection in icu, antibiogram, antibiotic pattern.

Author for correspondence: Dr. Manisha Jain, 91/59, Sector 9, Kumbha Marg, Pratap Nagar, Jaipur, India. Pin 302033 Email: drjain.manisha@gmail.com

Introduction: Multi-drug resistant nosocomial infections are one of the leading causes of mortality and morbidity amongst hospitalized patients throughout the world, accounting a major burden on the patients and public health system of any country [1]. Intensive care units represent the heaviest antibiotic burden within hospitals. The patient in the ICU has a 5-7 fold higher risk of nosocomial infection compared with other patients [2]. The frequent use of broad spectrum antibiotics results in colonisation with resistant bacteria and consequently in serious infections [3]. Antimicrobial resistance has emerged as an important determinant of outcome for patients in ICU [4]. Antibiotic overuse and misuse partly due to incorrect diagnosis, irrational and counterfeit (fake replicas) antibiotic market combinations and irregular consumption due to either wrong prescription or poor compliance contribute to the widespread drug resistance among the hospital acquired organisms [5].

The hospital antibiogram is a periodic summary of antimicrobial susceptibilities of local bacterial isolates submitted by the microbiology laboratory [6]. Antibiogram are often used by clinicians to access local susceptibility rates, as an aid in selecting empiric antibiotic therapy and in monitoring resistance trends over time within an institution. Antibiogram can also used to compare susceptibility rates across institutions and track resistance trends [6].

Material and Methods: The present study "A prospective study on prevalence of aerobic bacteria in intensive care units and their antibiotic susceptibility pattern in a tertiary care hospital in Jaipur , Rajasthan ." was carried out in the department of Microbiology, Mahatma Gandhi Medical College & Hospital, Jaipur (Rajasthan) from October 2014 to March 2015.

The samples like blood, urine, sputum, endotracheal tip secretions, suction tip secretions, pus, swabs, stents/valves, body fluids etc. are collected from all the patients admitted in various ICUs (MICU, SICU, CCU, PICU, NICU) in the hospital regardless of their age, sex, occupation, religion. After transportation of samples to the microbiology department microscopy, Gram Stain, culture & antibiotic sensitivity were done.

All culture Medias & Antibiotic discs were obtained from Hi Media Laboratories Mumbai, India[11]. Primary inoculation was done on the Blood Agar, MacConkey Agar and other suitable enriched media according to the type of sample and were incubated for 18-24 hrs at 37*c aerobically[12].

The isolates obtained were further identified by standard techniques based on Colony morphology, Gram staining, hanging drop for motility , catalase, oxidase and other Biochemical tests required for confirmation of isolate[13]. Antimicrobial susceptibility test using modified Kirby-Bauer disk diffusion method [on] Mueller Hinton Agar was done for all antibiotics as per CLSI guidelines[14].

Results: The present study was conducted in Department of Microbiology, Mahatma Gandhi Medical College, Jaipur from October 2014 to March 2015 on 500 samples received from various Intensive Care Units (MICU, SICU, CCU, PICU, and NICU).

Out of 500 samples, 213 (43%) samples showed growth while 287 (57%) did not show any growth. In the 213 positive samples 183 (85.92%) were Gram Negative bacilli while 25(11.74%) were Gram Positive Cocci, & 2.34% were Candida spp. Out of Gram Negative Isolates Acinetobacter Spp. was found to be maximum 35.2% followed by E.coli 19.7% , Klebsiella spp.19.2%, Pseudomonas 12.2%, Citrobacter 0.93% and Proteus Spp. 0.93%. Among Gram Positive Isolates Staphylococcus aureus was maximum 6.5% followed by Enterococcus 3.75%, CONS 0.93% and streptococcus spp.0. 46%. Candida spp. contributes 2.34% of all positivity.

Table 1: Distribution of Isolates.

Isolates	No. of isolates	Percentage	MICU	SICU	CCU	NICU	PICU
Acinetobacter spp.	75/213	35.2%	23	30	20	00	02
E.coli	42/213	19.7%	09	17	10	05	01
Klebsiella	41/213	19.2%	07	08	11	10	05
Pseudomonas spp.	26/213	12.2%	02	09	08	02	05
Staphylococcus aureus	14/213	6.5%	02	08	04	00	00
Enterococcus spp.	8/213	3.75%	00	02	03	01	02
Candida spp.	5/213	2.34%	00	03	02	00	00
Citrobacter	2/213	0.93%	00	00	02	00	00
Proteus spp.	2/213	0.93%	00	02	00	00	00
CONS	2/213	0.93%	00	02	00	00	00
Streptococcus spp.	1/213	0.46%	00	01	00	00	00

Among gram negative bacteria most common isolate was Acinetobacter spp. 75 (35.2%) which were resistant to most of the antibiotics like amoxicillin- clavulanic acid (83%) , cefotaxime (76%), imipenem (71%), piperacillin- tazobactam (53%),cefepime (57%) while sensitive to aztreonam (64%) & cotrimoxazole (64%).

Second most common isolate was E. coli 42 (19.7%) were resistant to cefotaxime (57%), cefixime (54%), doxycyclin (69%) , imipenem (62%), while sensitive to combination drugs like amoxicillin- clavulanic acid, piperacillin- tazobactam, aztreonam, levofloxacin.

Pseudomonas spp is resistant to Ceftazidime (77%), cefepime (54%), piperacillin (58%), meropeme (50%), levofloxacin (69%)& sensitive to combination like piperacillin- tazobactam(69%),& toberamycin, polymyxin B, colistin, imipenem.

In the case of gram positive Cocci , 69% Staphylococci aureus were Methicillin resistant which were sensitive to Linezolid ,Vancomycin , Teicoplanin, levofloxacin, doxycycline while resistant to cefoxitine , Cotrimoxazole (75%), Clindamycin (69%) , Erythromycin (62%).

Table 2: Distribution of Isolates based on Samples obtained from various ICUs

Sample	Total positive samples	GNB	GPC	Candida
Blood	20	11	09	00
Urine	40	33	03	04
Pus	07	04	03	00
Sputum	30	29	01	00
Swabs	16	14	02	00
Fluids	13	09	03	01
E.T.Secretions	78	74	04	00
Others	09	09	00	00

Discussion: The results of positivity in present study are lower to the study of Rubina Sabir et al, Pratiwi Wikaningtyas et al, & Mohammad Mehr M et al because of effective infection control policies. Among positive cultures, gram negative bacilli are predominant over gram positive Cocci which is similar in all studies but percentage of gram negative organisms are higher than Zaveri Jitendra R et al ,Maksum Radji et al studies.

Table3: Percentage of positive cultures in different studies.

Study Group	Total no. of positive cultures/ Total no of samples	Percentage
Mohammad Mehr M et al[15]	460/904	51%
Kaushal V. Sheth et al[16]	126/676	19%
Rubina Sabir et al [17]	272/312	87.17%
Pratiwi Wikaningtyas et al[18]	132/250	52%
Present Study	213/500	43%

Table 4: Percentage of different isolates in different studies.

Study group	GNB	GPC	Candida spp.
Zaveri Jitendra R et al[19]	74.21%	21.09%	4.68%
Maksum Radji et al[20]	63%	35%	-
Present study	89%	8%	3%

Conclusion: Reduction of nosocomial infections and antimicrobial resistance is a big challenge to all ICU's around the world. Strict infection control measures like universal precautions and stringent adherence to hand washing practices, formulation of antibiotic policy, surveillance activities must require. Involvement of an Infectious Disease Specialist seems to increase the rates of antibiotic de-escalation. Evolving ICU specific antibiotic pathways and de-escalation policy may improve the overall quality of antibiotic prescription and compliance rates. Determination of antibiotic susceptibility pattern in periodic intervals with the help of antibiogram should be mandatory for the clinicians to aware the trends of emerging pathogens and their antibiotic resistant pattern.

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