

Original article:

Pattern of pathogens and their sensitivity isolated from pus culture reports in a tertiary care hospital, puducherry

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Abstract:

Aim: To analyze the pattern of pathogens involved and their antibiotic sensitivity isolated from pus culture reports in a tertiary care hospital.

Methods: This observational study was conducted using pus culture and sensitivity reports collected retrospectively from the records maintained in the Department of Microbiology over a period of one year from May 2013 to April 2014 in our hospital. Data were analyzed using SPSS 21.0 and expressed as descriptive statistics.

Results: During the study period, 124 pus culture and sensitivity reports were analyzed. *E. coli* (60.7%) was the most common organism isolated followed by *Klebsiella* (20.5%), *Staph.aureus* (9.8%). All isolates were sensitive to Meropenem (100%) and Piperacillin & Tazobactam (89%), Levofloxacin (65%) and Amikacin (62%). However, high resistance rates were observed with Ceftriaxone (70%), Ceftazidime (64%) and Cefuroxime (62%) in our study.

Conclusion: *E. coli* and *Klebsiella* were commonly isolated from pus culture with maximum sensitivity to carbapenem and penicillin derivatives.

Key words: Pus culture, Sensitivity, Resistance

Introduction:

Infectious diseases remain the most common cause of morbidity and mortality worldwide.¹ Bacteria and viruses cause most diseases, but diseases are also caused by other microorganism, protozoans and other parasites.² Pyogenic infections are characterized by local and systemic inflammation usually with pus formation. These may be endogenous or exogenous. A break in the skin can provide entry to the surface bacteria which thereby starts multiplying locally. The body's defence mechanism includes bringing

immune cells into the area to fight against bacteria. Eventually, accumulation of these cells produces pus which is a thick whitish liquid.^{3,4} These infections result in delayed healing and may cause several complications like wound dehiscence or wound breakdown.^{5,6} The use of antimicrobial agents locally or systemically for prevention or treatment of infections in any dose and over any time period cause a "selective pressure" on microbial population.⁷ The routine use of antibiotics has resulted in widespread antibiotic resistance by

development of antibiotic resistant genes in many organisms.⁸ The current spread of multi drug resistant bacteria from clinical isolates has increased the need for regular updates in the knowledge of the bacteriological review of pus culture reports so as to avoid the unguided empirical treatment which appears to differ in various environment.⁹ The present study was undertaken to analyze the pattern of pathogens involved and their antibiotic sensitivity isolated from pus culture reports in a tertiary care hospital.

Materials and methods:

This was a retrospective study conducted in Department of Pharmacology, Sri Manakula Vinayagar Medical College and Hospital, Pondicherry. The data including the pus culture positive reports were analyzed for a period of one year from May 2013 to April 2014. Records were retrieved from the Microbiology department of our college. Biomedical data, including reports of pus microscopy and culture sensitivity were analyzed.

All the significant isolates were identified and studied by standard procedures and their

antibiotic susceptibility pattern was tested and interpreted according to Clinical and Laboratory Standards Institute (CLSI) recommendations, with the automatic identification system against Piperacillin & Tazobactam, Meropenem, Levofloxacin, Ciprofloxacin, Ceftriaxone, Ceftazidime, Cefuroxime, Amikacin, Gentamicin, Erythromycin, Linezolid and Vancomycin.¹⁰

The data were entered and analyzed using SPSS software version 21.0 and the results were expressed in percentages.

Observation and results:

In the present study, a total of 124 pus culture reports were analyzed between May 2013 and April 2014.

Organisms isolated from pus culture reports:

Escherichia coli was the most frequent organism isolated from pus culture reports (n= 75, 61%) followed by Klebsiella (n=25, 21%) and Staph aureus (n=12, 10%). Other organisms like Pseudomonas (4%), Enterobacter (2%), Proteus (2%), Staphylococcus epidermidis (1%) were also isolated as depicted in figure 1. The frequency distribution of antibiotics screened is shown in table 1.

Figure 1: Distribution of organisms isolated from pus culture reports.

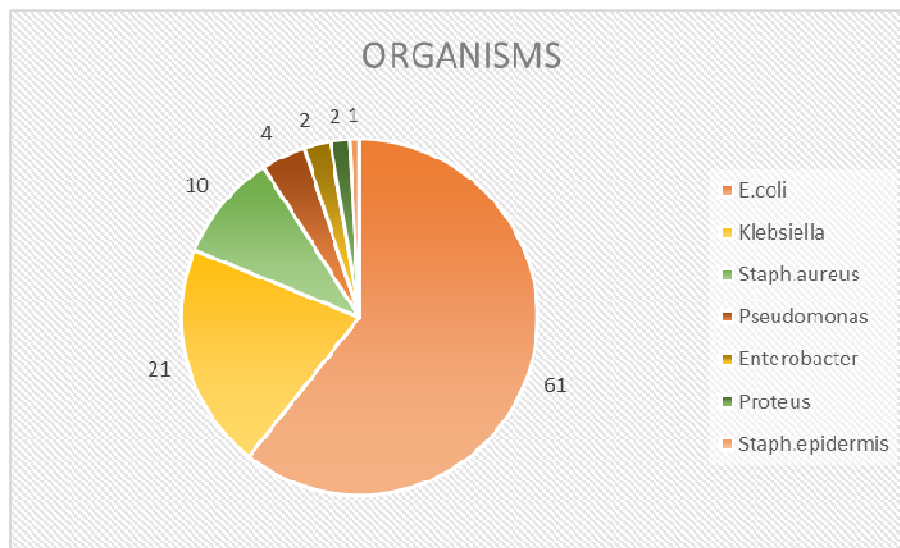


Table 1: Frequency distribution of antibiotics screened in pus culture reports.

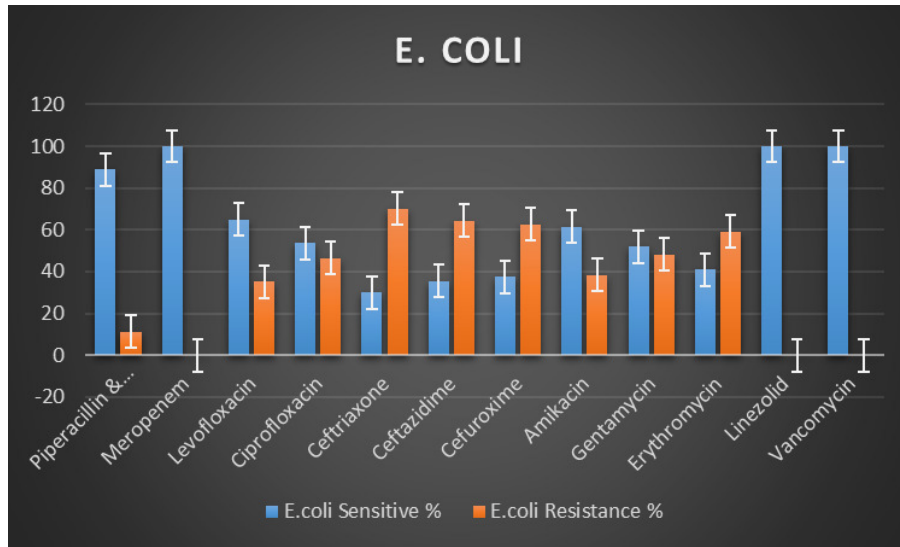
Antibiotics	E.coli	Klebsiella	Staph. aureus	Pseudomonas	Enterobacter	Proteus	Staph. epidermidis
Piperacillin & Tazobactam	72	22	9	5	2	2	1
Meropenem	58	13	7	5	2	2	1
Levofloxacin	54	22	8	5	2	0	1
Ciprofloxacin	56	17	11	2	0	1	0
Ceftriaxone	67	25	8	3	3	2	1
Ceftazidime	59	24	9	3	0	0	0
Cefuroxime	40	22	11	3	0	0	0
Amikacin	52	20	10	3	3	1	1
Gentamycin	52	15	12	3	1	0	0
Erythromycin	49	16	10	0	0	0	1
Linezolid	2	2	2	2	1	1	1
Vancomycin	18	5	8	3	2	2	1

Pattern of antibiotic sensitivity and resistance for E.coli:

Most common organism E. coli showed high sensitive (100%) to drugs like Meropenem, Linezolid and Vancomycin which are administered parentally. Among the oral drugs, quinolones

showed a better control over E.coli namely levofloxacin (65%) and Ciprofloxacin (54%). This organism was highly resistance to cephalosporin drugs, including Ceftriaxone (70 %), Ceftazidime (64%) and Cefuroxime (63%) as depicted in figure 2.

Fig : Pattern of antibiotic sensitivity



Pattern of antibiotic sensitivity and resistance for Klebsiella:

Meropenem, Linezolid and Vancomycin showed 100% sensitivity for Klebsiella apart from Piperacillin/Tazobactam (86%) and Levofloxacin

(64%). Klebsiella isolated from pus culture were resistant to cephalosporins similar to E.coli (Ceftriaxone-68%, Cefuroxime-64%, Ceftazidime- 63%). The pattern is shown in figure 3.

Figure 3: Pattern of antibiotic sensitivity and resistance for Klebsiella.

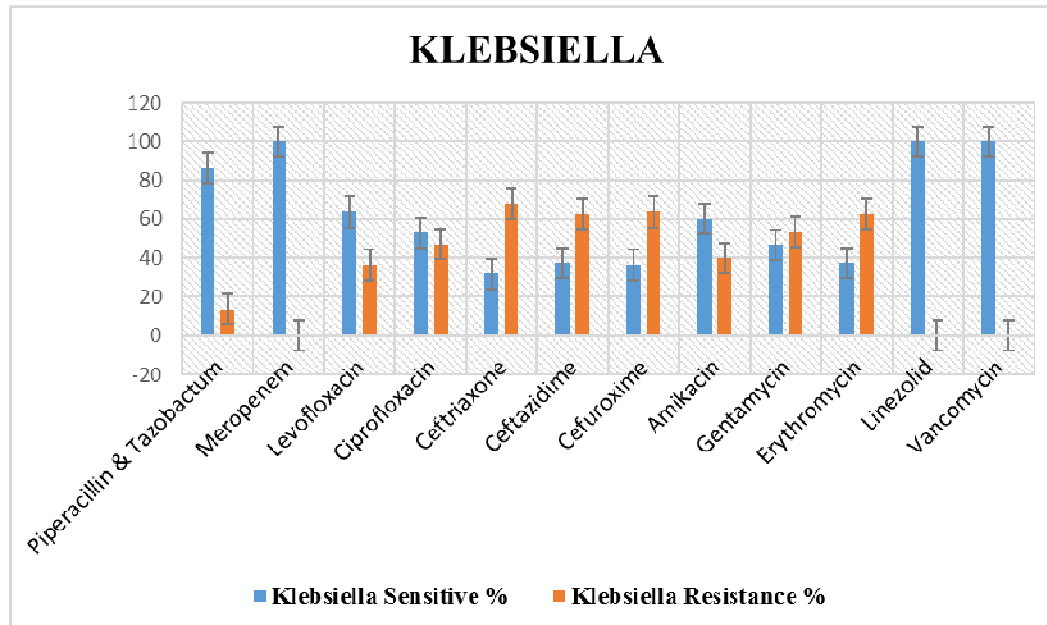


Table 2: Pattern of antibiotic sensitivity and resistance for Staph.aureus:

Antibiotics	Staph.aureus	
	Sensitivity %	Resistance %
Meropenem	100	0
Linezolid	100	0
Vancomycin	100	0
Piperacillin & Tazobactum	89	11
Levofloxacin	63	38
Amikacin	60	40
Ciprofloxacin	55	45
Gentamycin	50	50
Erythromycin	40	60
Cefuroxime	36	64
Ceftazidime	33	67
Ceftriaxone	25	75

Discussion:

Among the culture reports obtained, the most common organism was found to be E.coli (61%). The previous studies done in various parts of India by Karia JB et al has shown a higher frequency of staphylococcus aureus (39%) followed by Pseudomonas (26%) and E.coli (20%) isolates from pus culture reports and the study.¹¹ The reports obtained from Sri Manakula Vinayagar Medical College and Hospital, E.coli was the predominant organism isolated from pus culture and showed high sensitivity to Meropenem, Linezolid, Vancomycin, Piperacillin/Tazobactum, Levofloxacin and Ciprofloxacin which was similar to the previous results of Rao R et al.¹²

It is also notifiable that many cephalosporins have developed resistance against common organism as indicated in our study. Klebsiella also showed a higher sensitivity towards Meropenem, Linezolid, Vancomycin, Piperacillin/Tazobactum and Levofloxacin which in par with the results of Rao R et al.¹² Staphylococcus aureus showed a sensitivity and resistance pattern similar to the other results with a higher sensitivity to Meropenem, Linezolid, Vancomycin, Amikacin and levofloxacin.^{13,14}

Conclusion:

The results of the above study exemplify that there is an increasing need for gaining knowledge about the pattern of microbes and their antibiotic

sensitivity and resistance, which varies in a geographical manner. The isolates from this study showed that E.coli was the most isolated organism from the pus culture reports followed by Klebsiella

and Staph.aureus. All these organisms showed a very high sensitivity to Meropenem, Linezolid, Vancomycin and Piperacillin/Tazobactam and Quinolones (Levofloxacin and ciprofloxacin).

References:

- 1) Hossein AH, Ali AR, Akram H, Farhad M. Infectious Diseases in hospitalized Children of Central Iran. *Pak J Med Sci.* 2010;26(4):901-4.
- 2) Ananthanarayan and Paniker. Infection. In test book of microbiology 7th edition, CKJ paniker. Orient Longman 2006. p:64-6.
- 3) Koneman WK, Allen SD, Janda WM, Schreckenberger PC, Propcop GW, Woods GL et al. Philadelphia Color Atlas and Textbook of Diagnostic Microbiology, 6th ed. Lippincott-Raven 2005. p:624-62.
- 4) Chopra A, Puri R, Mittal RR, Kanta S. A clinical and bacteriological study of pyodermas. *Indian J Dermatol Venereol Leprol.* 1994;60:200-2.
- 5) Garner JS, Jarvis WR, Emori TG, Horan TC, Hughes JM. CDC definitions for nosocomial infections. *Am J Infect Control.* 1988;16(3):128.
- 6) Terry BA. Cost-effective application of the Centres for Disease Control: guideline for prevention of surgical wound infections. *AM J infect Control.* 1985;13(3):232.
- 7) Sharafati-chaleshtori R, Sharafati-chaleshtori F, Karimi A. Antibiotic resistance pattern of staphylococcus strains isolated from orange and apple juices in Shahre-kord, Iran. *Pak J Med Sci.* 2010;26:615-8.
- 8) Sengupta S, Human P, Girag AM, Shivananda PG. Acinetobacterbac: An emergency nosocomial pathogen in the burns unit, Manipal. *India Burns.* 2001;27:140-4.
- 9) Mohammed A, AdeshinaGO, Ibrahim YKE. Retrospective Incidence of wound infections and antibiotic sensitivity 162 pattern: A study conducted at the Aminu Kano Teaching hospital, Kano, Nigeria. *Int J Med Med Sci.* 2013;5:60-6.
- 10) CLSI. Performance Standard for Antimicrobial Susceptibility Testing; Twentieth Informational Supplement. CLSI document M100-S20. Wayne, PA: Clinical and Laboratory Standard Institute; 2010
- 11) Karia JB, Gadekar HB, Lakhani SJ. Study of bacterial profile of pus culture in dhiraj General hospital. *Indian J Surg Oncol.* 2013;4(2):172-218.
- 12) Rao R, Basu R, Biswas DR. Aerobic Bacterial Profile and Antimicrobial Susceptibility Pattern of Pus Isolates in a South Indian Tertiary Care Hospital. *IOSR-JDMS.* 2014;13(3):59-62.
- 13) Verma P. Antibiotic Sensitivity Treatment for Gram Positive Bacteria Isolated from Pus Sample. *Bull Environ Pharmacol Life Sci.* 2012;1(10):3-6.
- 14) Shittu AO, Kolawole DO, Oyedepo EAR. A study of wound infections in two health institutions in ile-ife, Nigeria. *Afr J Biomed Res.* 2002;5:97-102.