



## A STUDY OF VARIOUS ISOLATES FROM PUS SAMPLES WITH THEIR ANTIBIOGRAM FROM SILCHAR MEDICAL COLLEGE, SILCHAR.

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### ABSTRACT

Pyogenic infections can lead to severe morbidity and mortality. Though different studies show isolation of same organisms from pus samples yet there is considerable difference in antibiotic susceptibility pattern followed by the organisms. The study is conducted to find out the common organisms in pus samples and their antibiotic sensitivity pattern. The study was conducted in department of Microbiology of Silchar Medical College & Hospital between November, 2015 to April, 2016. Pus samples collected from various clinical departments were processed according to standard microbiological techniques and Antibiotic sensitivity testing is done using Kirby Bauer, s Disc diffusion technique according to C.L.S.I guideline. Out of 248 pus samples received 201 cases (81.05%) showed culture positivity while 47(18.95%) were culture negative. Maximum contribution of pus samples were from Surgery department (59.68%). The most common organism isolated was *Staphylococcus aureus* (39.3%) followed by *Klebsiella species* (19.9%), *Escherichia coli* (16.41%), *Pseudomonas* (14.42%), *Acinetobacter* (4.47%), *CONS* (2.98%) & *Proteus* (2.48%). Gram positive cocci were 100% sensitive to Vancomycin & Linezolid. Gram negative bacilli showed highest susceptibility to Imipenem & least sensitive to Cefuroxime. *Pseudomonas* showed maximum resistance towards Ceftazidime. The change in antibiotic susceptibility pattern is a major concern since it may lead to ineffective treatment of pyogenic lesions. Thus appropriate and judicious use of antibiotics should be encouraged to prevent emerging drug resistant organism.

**Keywords:** Pyogenic infections, *Staphylococcus aureus*, Antibiotic sensitivity testing, Drug resistance.

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### INTRODUCTION

Pyogenic infection is characterized by several local inflammation, usually with pus formation, generally caused by one of the pyogenic bacteria, which can produce the accumulation of dead leukocytes and infectious agent commonly known as pus [1]. Skin infection can arise from the invasion of organisms from the external environment through breaks in skin or from organisms that reach the skin through the blood as a part of a systemic disease [2].

The inadvertent use of antibiotics leads to emergence of drug resistant pathogens, which in turn acts as a great challenge to the health services. Moreover, highly virulent strain and capacity to adapt quickly to changing environment worsen the situation and draw a matter of concern [3].

It has been observed that while managing the pyogenic lesion of the body surface, there is lot of problem with initiation of a presumptive treatment. Hence this study has been adapted to see the common pyogenic organisms involved and their antibiotic susceptibility pattern in our set up.

## MATERIALS AND METHODS

A total of 248 pus sample were collected from various departments of Silchar Medical College & Hospital, Silchar. Under strict aseptic condition pus samples were collected using sterile cotton swabs or syringe and it was properly labeled. Study period- 6 months study period (November 2015 to April 2016).

### Processing Of Sample

The samples collected were immediately transferred to Bacteriology section of Department of Microbiology for processing. The media and reagents were purchased from HIMEDIA laboratories. First samples were inoculated on to Blood agar and MacConkey agar. Then samples were subjected to gram stain of Direct smear to examine for the presence of pus cells and any bacteria. Culture plates were incubated at 37degree Celsius for 24hrs to 48hrs in aerobic condition. If there was no growth it was considered sterile. After incubation ,identification of bacterium from positive cultures was done with a standard microbiological technique which includes motility testing by hanging drop preparation ,gram staining and biochemical reactions such as catalase, coagulase, indole, methylred, Voges-Proskauer, citrate, urease,

Phenyl pyruvic acid test and oxidase test[4]. Further biochemical tests done were carbohydrate fermentation test using Lactose, sucrose, mannitol& Maltose, Triple sugar Iron test, Nitrate reduction test, Arginine dihydrolase production, lysine and ornithine decarboxylase test, Hugh and leifson test.

The antimicrobial susceptibility testing were done by Kirby Bauer, s Disk Diffusion method and interpreted as per Clinical Laboratory Standard Institution (CLSI) guidelines [5]. For antimicrobial sensitivity testing Muellar Hinton agar was used. The antimicrobial discs used were purchased from HiMedia Laboratory Ltd. Inhibition zones were measured and reported as sensitive or resistant according to manufacturer, s guidelines.

Escherichiacoli ATCC 25922, Pseudomonas aeruginosa ATCC 27853 and *Staphylococcus aureus* ATCC 25923 were used as quality control strains. Antimicrobial discs used for sensitivity testing by disc diffusion method were Imipenem 10mcg, piperacillin/tazobactam 100/10 mcg, Ceftazidime 30mcg, Cefotaxime 30mcg, Amikacin 30mcg, Gentamicin 10mcg, Levofloxacin 5mcg, Ceftriaxone 30mcg, Cefoxitin 30mcg, Amoxycillin/Clavulanic acid 20/10 mcg, Vancomycin 30 mcg, Azithromycin 15mcg ,Linezolid 30mcg, Ampicillin 10 mcg, Ciprofloxacin 5mcg,Cefuroxime 30 mcg, Penicillin 10 units, Ceftriaxone 30 mcg, Aztreonam 30mcg.

## RESULTS

Out of 248 pus samples received for aerobic culture and sensitivity from different departments of Silchar Medical College & Hospital 201 cases (81.05%) were found to be culture positive while 47(18.95%) cases were sterile. The Department wise distribution of pus samples received showed maximum contribution from Surgery department 148(59.68%) followed by Orthopaedics department 22(8.87%), ENT 20(8.06%), Obstetrics & gynaecology 17(6.85%), Medicine 16(6.45%), Paediatrics 14(5.65%) Derma 8(3.23%) & ICU 3(1.21%).

Among 201 culture positive cases, *Staphylococcus aureus* 79(39.3%), *Klebsiella* species 40(19.9%), *Escherichia coli* 33(16.41%), *Pseudomonas* 29 (14.42%), *Acinetobacter* 9(4.47%), CONS 6(2.98%) and *Proteus* 5(2.48%).

The antibiogram of gram positive cocci showed 100% sensitivity to Vancomycin and Linezolid followed by high sensitivity to Levofloxacin, Amikacin while moderate sensitivity was observed to Ampicillin, Ciprofloxacin, Azithromycin and Amoxycillin/Clavulanic acid. Gram positive cocci showed high resistance to Penicillin, Cefuroxime and Ceftriaxone. MRSA noted was 46.84%

The antibiogram of enterobacteriaceae showed high susceptibility to Imipenem, Aztreonam, Amikacin, Levofloxacin, Piperacillin/Tazobactam, Gentamicin and Ciprofloxacin. Highreistance is observed towards Cefuroxime, Cefotaxime, Ceftriaxone and Ceftazidime. *Pseudomonas* and *Acinetobacter* showed maximum susceptibility to Imipenem while showed least sensitivity to Ceftazidime and Cefuroxime respectively.

**Table 1. Department Wise Distribution Of Pus Samples**

Serial no	Department	Number(%)
1	Obs & Gynae	17(6.85%)
2	Medicine	16(6.45%)
3	Surgery	148(59.68%)

4	ENT	20(8.06%)
5	Paediatrics	14(5.65%)
6	Orthopaedics	22(8.87%)
7	Derma	8(3.23%)
8	ICU	3(1.21%)

**Table 2. Distribution of isolates based on gram staining**

Isolates	Number	Percentage
Gram Negative	122	60.69%
Gram positive	79	39.31%
Total	201	100%

**Table 3. Bacterial isolates from pus samples**

Serial no	Organism	Number(%)
1	Staphylococcus aureus	79(39.3%)
2	Klebsiella species	40(19.9%)
3	Escherichia coli	33(16.41%)
4	Pseudomonas	29(14.42%)
5	Acinetobacter	9(4.47%)
6	CONS	6(2.98%)
7	Proteus	5(2.48%)

**Table 4. Antibigram of gram positive cocci**

Antibiotics	<i>Staph. aureus</i>		Cons	
	Sensitive	Resistant	Sensitive	Resistant
Cefoxitin	42(53.16%)	37(46.84%)	4(66.67%)	2(33.33%)
Amoxycillin/Clavulanic	38(48.1%)	41(51.9%)	5(83.33%)	1(16.67%)
Vancomycin	79(100%)	0(0%)	6(100%)	0(0%)
Azithromycin	42(53.16%)	37(46.84%)	4(66.67%)	2(33.33%)
Levofloxacin	59(74.68%)	20(25.32%)	4(66.67%)	2(33.33%)
Linezolid	79(100%)	0(0%)	6(100%)	0(0%)
Amikacin	55(69.62%)	24(30.38%)	5(83.33%)	1(16.67%)
Ciprofloxacin	44(55.7%)	35(44.3%)	3(50%)	3(50%)
Ampicillin	45(56.97%)	34(43.03%)	3(50%)	3(50%)
Ceftriaxone	28(35.44%)	51(64.56%)	3(50%)	3(50%)
Penicillin	15(18.99%)	64(81.01%)	2(33.33%)	4(66.67%)
Cefuroxime	30(37.98%)	49(62.02%)	3(50%)	3(50%)

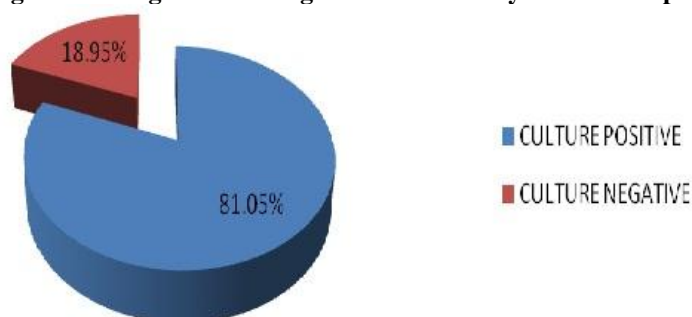
**Table 5. Antibigram of Enterobacteriaceae**

Antibiotics	<i>Klebsiella</i>		<i>E.coli</i>		<i>Proteus</i>	
	S	R	S	R	S	R
Amikacin	90%	10%	57.58%	42.42%	80%	20%
Levofloxacin	70%	30%	84.85%	15.15%	60%	40%
Ceftazidime	35%	65%	45.45%	54.55%	20%	80%
Ceftriaxone	30%	70%	21.21%	78.79%	40%	60%
PIT	70%	30%	60.6%	39.4%	80%	20%
Cefotaxime	30%	70%	30.3%	69.7%	40%	60%
Gentamicin	55%	45%	54.54%	45.46%	60%	40%
Imipenem	100%	0%	90.9%	9.1%	100%	0%
Cefuroxime	20%	80%	12.12%	87.88%	20%	80%
Ciprofloxacin	60%	40%	60.6%	39.4%	60%	40%
Aztreonam	80%	20%	84.85%	15.15%	80%	20%
Ampicillin	45%	55%	51.52%	48.48%	60%	40%

PIT- Piperacillin/Tazobactam

**Table 6. Antibigram of pseudomonas and acinetobacter**

Antibiotics	Pseudomonas		Acinetobacter	
	Sensitive	Resistant	Sensitive	Resistant
Amikacin	25(86.2%)	4(13.8%)	4(44.44%)	5(55.56%)
Levofloxacin	21(72.4%)	8(27.6%)	5(55.56%)	4(44.44%)
Ceftazidime	3(10.3%)	26(89.7%)	4(44.44%)	5(55.56%)
Ceftriaxone	5(17.24%)	24(82.76%)	3(33.33%)	6(66.67%)
PIT	20(68.96%)	9(31.04%)	4(44.44%)	5(55.56%)
Cefotaxime	13(44.82%)	16(55.18%)	3(33.33%)	6(66.67%)
Gentamicin	21(72.41%)	8(27.6%)	4(44.44%)	5(55.56%)
Imipenem	27(93.1%)	2(6.9%)	7(77.78%)	2(22.22%)
Cefuroxime	5(17.24%)	24(82.76%)	1(11.11%)	8(88.89%)
Ciprofloxacin	19(65.52%)	10(34.48%)	6(66.67%)	3(33.33%)
Aztreonam	15(51.72%)	14(48.28%)	6(66.67%)	3(33.33%)
Ampicillin	14(48.28%)	15(51.72%)	2(22.22%)	7(77.78%)

**Fig 1. PIE Diagram Showing Culture Positivity Of Pus Samples**

## DISCUSSION

The prevalence of culture positive pus samples in our study is 81.05% which is similar to RaoRaghav [6] and Duggal Swati [9] where the prevalence is 89.47% and 93.27% respectively. The maximum contribution of pus samples were from Surgery ward followed by Orthopaedics which is similar to RaoRaghav [6].

Our study shows domination of gram negative bacilli which is similar to Zubair M [11] and Ghosh A [13].

The present study showed *Staphylococcus aureus* to be the most common organism isolated from pus samples which agrees with RaoRaghav [6], Tiwari P [7], Lee C.Y [8] and Zafar A [14]. However Duggal Swati [9] and Basu [10] found *Pseudomonas* to be the most common isolate. Also, Rameshkannan S[15].found *Escherichia coli* to be the most common organism isolated from pus samples.

*Staphylococcus aureus* was found to be 100% sensitive to Vancomycin & Linezolid which agrees with Samra [11]. Antibiotic sensitivity profile of gram negative bacilli showed maximum sensitivity towards Imipenem which agrees with

Duggal Swati [9] and Chauhan M *et al.*, Gram negative bacilli showed high sensitivity towards Levofloxacin and Piperacillin/Tazobactam which agrees with RaoRaghav [6].

## CONCLUSION

Pyogenic infections are important cause of morbidity in patients. Though the most important organism isolated is *Staphylococcus aureus* there is significant increase in gram negative bacilli. As emerging antimicrobial resistance is a major concern, appropriate and judicious use of antibiotics should be encouraged to limit the emerging drug resistant strain in future for effective treatment of these clinical conditions.

Our study will help the clinician to prescribe appropriate antibiotics for different clinical conditions with pyogenic lesions.

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## CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

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