

ORIGINAL ARTICLE**ANTIBIOGRAM OF PUS CULTURE IN PEDIATRIC PATIENTS OF SIALKOT**

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<p>Affiliations</p> <p>1. Assistant Professor Pathology, Govt. Khawaja M. Safdar Medical College, Sialkot dr.sidrahasan@hotmail.com</p> <p>2. Consultant Hematologist, Col. Sultan's Lab Hasan301@hotmail.com</p> <p>3. Professor, Dean Research and Academics, Sialkot Medical College, Sialkot Email: sahibzadadsyed786@gmail.com</p> <p>4-7 4th Year MBBS students sarazainab4thyear2023@smcs.com.pk rabiajavaid4thyear2023@smcs.com.pk javeriaansar4thyear2023@smcs.com.pk farwazainab4thyear2023@smcs.com.pk</p> <p>8. 4th Year MBBS Student Azerbaijan Medical College, Baku Azerbaijan. Email: ammarsadiqghumman@gmail.com</p> <p>9. 1st Year MBBS Student Azerbaijan Medical College, Baku Azerbaijan. Email: daniajahangir@gmail.com</p> <p>Corresponding Author: Dr. Sidra Ghazanfar, Assistant Professor Pathology, Govt. Khawaja M. Safdar Medical College, Sialkot Contact # 0322-6101100 Email: dr.sidrahasan@hotmail.com</p>	<p>Abstract:</p> <p>OBJECTIVES: To evaluate the pattern of bacteria an antibiogram of pus culture in pediatric patients of Sialkot in last one year.</p> <p>METHODS: This retrospective Observational Descriptive study was conducted in the department of microbiology at Khawaja Muhammad Safdar Medical College, Sialkot Medical College Sialkot and Abdul Sattar Lab Sialkot from January 22 to December 22 for a period of 1 year. All the patients presented with skin and soft tissue infection were selected as study population.</p> <p>RESULTS: Based on phenotypic profile of a total number of 611 patients presented with wound infection or pus were recruited for this study. Among total 611 culture majority were in the age group of 5-10 years which was 198 cases respectively. Interestingly females were predominant than males and ratio was 57% to 43% cases respectively. Out of 611 cases, aerobic culture was positive in majority cases i.e. 515 (85.02%) and the rest of 85 (14.98%) cases were grown negative. Therefore, culture positive was more than no growth which was shown in this result and reflected the laboratory authenticity. Staph aureus coagulase positive was the most common isolated bacteria (32.19%) from pus which was followed by pseudomonas (24.2%) and Acinetobacter Baumanii (11.82%).</p> <p>CONCLUSION: In conclusion the most common isolated bacteria after aerobic culture of pus were the Staphylococcus aureus. However, the gram positive cocci is less in number than gram negative bacilli. Among the Gram negative, pseudomonas were the most common bacteria causing wound infection.</p> <p>Keywords: Pyogenic infections, aerobic bacteria, antibiogram, culture.</p> <p>Cite this Article as: Ghazanfar S., Mahmood H.O., Syed S.M., Zainab S., Javaid R., Ansar J., Zainab F., Ghumman A.S., Jehangir D.,; <i>Antibiogram of Pus Culture in Pediatric Patients of Sialkot. SIAL J Med. Sci. 2023 V-2 (Issue-01):20-25</i></p>
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Introduction;

An Antibiogram is an overall profile of antimicrobial susceptibility testing (AST) results of a specific microorganism to disc of antimicrobial drugs. This profile is generated by the laboratory using aggregate data from a hospital or health care system where data are summarized

periodically and presented which shows percentages of organisms tested those are susceptible to a particular antimicrobial drug. Only results for antimicrobial drugs that are routinely tested and clinically useful should be presented to clinicians.

Pediatrics is the branch of medicine dealing with the health and medical care of infants, children and adolescents from birth up to the age of 18.

- Neonates: 0-28 days' old
- Infant: 1-12 months' old
- Child: >1-12 years' old
- Adolescent; 13-17 years' old

Pus is a thick yellowish or greenish opaque liquid produced in infected tissue, consisting of dead white blood cells and bacteria with tissue debris and serum. Pus culture and sensitivity is a technique predominantly used to test the sensitivity of the aerobic bacteria, which can infect the human body. This test is done on both males and females to confirm the infection. Pus cultures are carried out in upper and lower respiratory tract infections, otitis media, conjunctivitis, infectious diarrhea etc. Pus formation is one of several cardinal indicators of suppurate infections caused by pyogenic bacteria, resulting in aggregation of dead leukocytes, bacteria and tissue debris. Pyogenic infection is caused by several local inflammatory factors. It usually presents with formation of pus. Pyogenic bacteria are most common cause of pus. Pyogenic infections may be endogenous or exogenous¹. These results in the production of pus. Both aerobic and anaerobic bacteria have been implicated in wound infections which occur under hospital environment and they result in significant morbidity, prolonged hospitalization and huge economic burden. Antibiotic resistance emerges commonly due to irrational use of antibiotics so resistance among bacteria is becoming more and more serious problem throughout the world. Monitoring of resistance patterns has become essential in the hospital to overcome these difficulties and to improve the early treatment of serious infections in hospital. Though the bacterial profile from pus

samples remain similar in various studies, but there is a considerable variation in the antibiotic susceptibility pattern of these isolates highlighting the increasing threat of emergence of resistant bacteria and hence a need for a continuous surveillance of such changing trends.²

Sartelli in 2017 conducted a study aimed to highlight the effectiveness of certain antibiotics against certain bacteria and get rid of antibiotics that are resistance against the pyogenic organisms. Pyogenic wound infection is the most common cause of morbidity. Staphylococcus aureus (MRSA), Acinetobacter Baumannii, Escherichia Coli, Enterobacter Cloacae, are still most important bacteria isolated among pyogenic wound infections in our recent study. Even though gram negative bacteria outnumber it.¹⁹

Empirical and appropriate use of antibiotics is very crucial in preventing emergence of multidrug resistant bacteria. Our study will definitely guide clinician for right and appropriate antibiotic choice based on individual isolate. Hence majority of antibiotics which are still sensitive can be prevented from being listed among multidrug resistance³

Becker in 2014 emphasized to understand the common organisms isolated from wound infections which helps in empirical treatment of patients based on antibiotic susceptibility patterns.⁴

Antimicrobial susceptibility of microorganisms varies from time to time and from place to place. Hence regular monitoring of bacterial susceptibility to antibiotics is essential. Antibiogram should be prepared regularly and made readily available to the clinicians to guide them in therapy. Knowledge of the antibiotic resistance pattern serves as a significant platform in improving the empirical antibiotic therapy. There is a need for continuous surveillance of antimicrobial susceptibility pattern.⁴

Objectives:

To evaluate the pattern of bacteria an antibiogram of pus culture in pediatric patients of Sialkot in last one year and to see the sensitivity of antibiotics to different bacteria in Imran Idress Teaching Hospital, Sialkot, Punjab, Pakistan, Allama Iqbal Memorial Hospital, Sialkot, Punjab, Pakistan and Abdul Sattar Lab of Sialkot in last 01 year.

Methodology

A retrospective study was conducted in January-december2022 on 611 children's (0-18 years) of Allama Iqbal Memorial Hospital, Imran Idrees Teaching Hospital Sialkot and Abdul Sattar Lab Sialkot for a period of 1 year. All patients who presented with skin and soft tissues infections were selected as study population. The pus samples were collected from the patients who visited in outpatient department and were admitted at Allama Iqbal Memorial Teaching Hospital Sialkot and Imran Idrees Teaching Hospital Sialkot. Bacteria were detected after aerobic culture at 370 C for 24 hours. Identification of bacteria was performed by biochemical test and antibiotic susceptibility test was done by disc diffusion method. Pus samples were collected from skin (furuncles, pustules, and abrasions), nasal wounds, ears, legs, Pus samples were processed for Gram staining and culturing. The samples were aseptically inoculated on blood agar (with 5% sheep blood) and MacConkey's agar plates, incubated aerobically at 35°C–37°C for 24–48 h. Identification and characterization of isolates were performed on the basis of Gram staining, microscopic characteristics, colony characteristic, and biochemical tests using standard microbiological methods.

Antibiotics discs containing amikacin (30 µg), amoxicillin-clavulanic acid (30 µg), azithromycin (30 µg),, ceftriaxone (30 µg), cefotaxime (30 µg), cefuroxime (30 µg), cephalexin (30 µg), ciprofloxacin (1 µg), clindamycin (2 µg), cloxacillin (30 µg),

erythromycin (15 µg), gentamicin (10 µg), imipenem (10 µg), levofloxacin (5 µg), linezolid (30 µg), meropenem (10 µg), ofloxacin (5 µg), piperacillin-(100/10 µg),, tetracycline (30 µg), and vancomycin (30 µg) were obtained from AIMTH, Abdul Sattar Lab and IITH Laboratories (Sialkot, Pakistan) and used as per manufacturer's instructions. Briefly, inoculate were prepared for each bacterial isolate by adjusting the turbidity to 0.5 McFarland standard and spread on Muller-Hinton agar plates. The numerical data obtained from the study were analyzed and significance of difference was estimated by using the statistical methods. Data were expressed in percentage as applicable. Comparison between groups was done by Chi -square test. Probability less than 0.05 was considered as significant.

Results

A total sample of 611 pus culture reports were received from laboratories of Govt. Allama Iqbal Memorial Teaching Hospital, Imran Idrees Teaching Hospital and Abdul Sattar Lab. Out of 611 pus culture 286 were of males and 325 were of females.

New Born	Children:
Staphylococcus aureus	Hemophilus influenza
Chlamydia trachomatis	Streptococcus pneumonia (Pneumococcus)
Neisseria gonorrhoea	Moraxella catarrhalis

Table 1: Common childhood bacterial infection

Age group	Male	Female	Total
0-4 months	16	24	40
5month-1 year	25	20	45
>1year-5 year	23	42	65
>5 year-12 year	103	144	247
>12 year-18 year	119	95	214
TOTAL	286	325	611
Percentage	47%	53%	

Table 2: Age and gender distribution of study population

Bacteria isolated	Frequency	% age
Coagulase positive staph aureus	193	32.1
Pseudomonas aeruginosa	148	24
Acinetobacter Baumanii	90	15
E coli	40-51	8.5
Enterobacter specie	33	5.5
Ecinetobacter Cloacae	23	3.8
Corynebacterium specie	21	3.5
Coagulase negative Staph Aureus	20	3.3
Proteus mirabilis	16	2.6
Proteus vulgaris	16	2.6
TOTAL	611	100%

Table 3: Rate of Isolated bacteria after aerobic culture

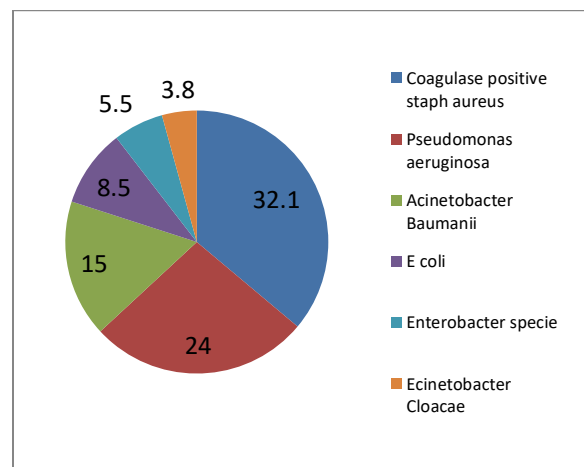


Figure 1: Pie chart of common bacteria isolated after aerobic culture.

Staph aureus:

According to this study staph aureus (coagulase positive) were the most frequently pathogen and these were isolated from respiratory tract, skin, pus and mucous membrane. Staph aureus are highly sensitive to Salbactum (60.97%) and highly resistant to tobramycin (84.64%) according to our study.

Drugs:	Sensitivity (%)	Resistance (%)
Salbactum	60.97	39.0
Amikacin	60.9	39.08
Colistin	59.9	40.06
Ceftazidime	54.08	45.9
Azteronomam	51.64	48.3
Gentamicin	28.04	71.9
Ciprofloxacin	24.45	75.54
piperacillin	21.52	78.4
Imipenem	19.5	80.48
Tobramycin	15.36	84.64

Table 4: Sensitivity and resistance pattern of coagulase positive staph aureus in pus culture (n=193)

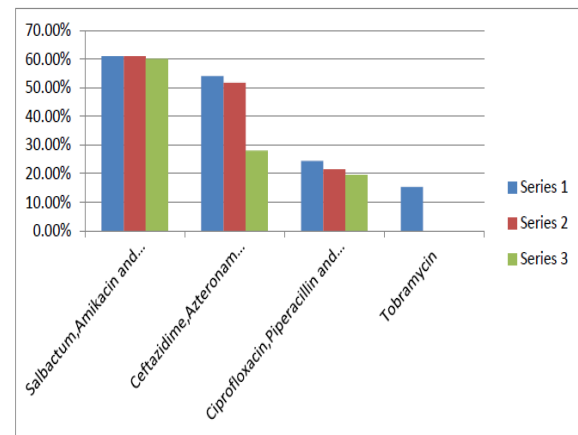


Figure 2: sensitivity pattern of coagulase positive staph aureus encountered in specimens collected from pediatric patients.

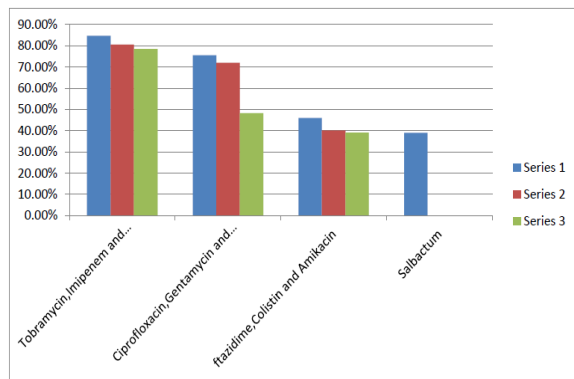


Figure 3: resistance pattern of coagulase positive staph aureus encountered in specimens collected from pediatric patient.

Pseudomonas Species;

Pseudomonas were isolated from respiratory tract, skin, pus and mucous membrane and they are highly sensitive to colistin (100%) and highly resistant to tobramycin (59.45%) and Azteronam (59.45%) according to our research.

Drugs:	S	S (%)	R	R (%)
colistin	148	100	0	0
Meropenem	128	86.6	20	13.51
Amikacin	128	86.4	20	13.51
Piperacillin+Tazobactam	125	84.6	23	15.54
Levofloxacin	119	80.4	29	19.59
Imipenem	119	80.4	29	19.59
Ceftazidime	89	60.1	59	39.8
Cefepime	79	53.3	69	46.62
Tobramycin	60	40	88	59.45
Azteronam	60	40	88	59.45

Table 5: Antibiotic Sensitivity and Resistance Pattern of Pseudomonas species (n = 148)

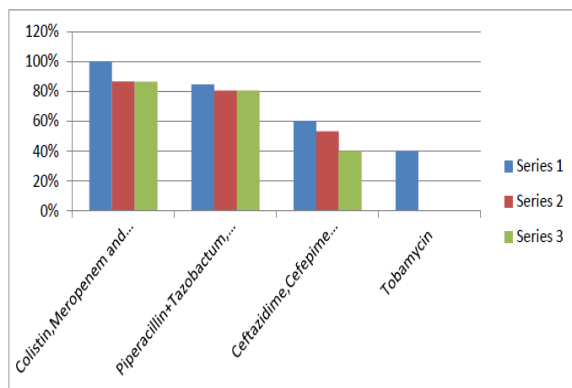


Figure 3: pseudomonas species Antimicrobial sensitivity encountered in the specimens collected from pediatric patients.

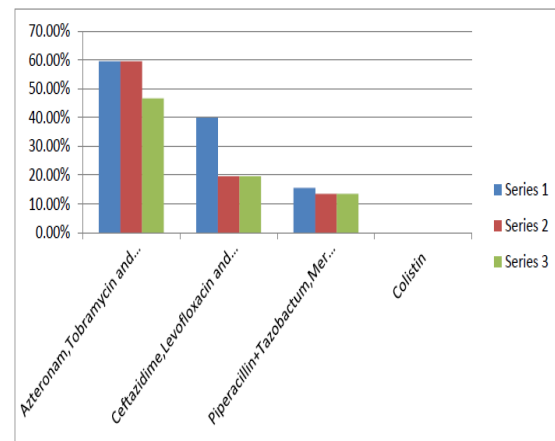


Figure 4: pseudomonas species Antimicrobial resistance encountered in the specimens collected from pediatric patients.

Discussion

Purulent wound infections are exemplified by severe local inflammation, habitually with pus formation caused by several pyogenic bacteria and few fungi. These infections can lengthen the hospital stay, hinder in wound healing, and raises the overall cost and morbidity. This study showed females preponderance (53%) in wound infections. Age is one of the significant factors influencing the occurrence of infection. In the present study majority of the cases were reported in the age group more than 5-12 years (36-44%). Several studies had reported that S. aureus was the common isolate of purulent wound infections worldwide with prevalence rate ranging from 4.6% to 54.4% S. aureus infection is usually associated with patient's own endogenous flora, a skin and nasal microbial flora.^{3,4} It is acquired also from contaminated hospital environment, surgical devices or from hands of health care workers. Among the Gram negative organisms P. aeruginosa isolation rate was more in the current study. More E.Choli in wound infections is also due to patient's own normal endogenous microbial fecal flora. It is the clear cause of poor hospital hygiene. More mono-microbial growth of the organisms was identified with

pus related infections than polymicrobial growth.^{3,4}

The antibiotics susceptibility pattern of *Staphylococcus aureus* showed 100% resistance to penicillin, cefoxitin, erythromycin, clindamycin, nalidixic acid, ciprofloxacin, chloramphenicol and doxycycline and co-trimoxazole (17%), gentamycin (17%), amikacin (17%), vancomycin (33%) and teicoplanin showed (50%) resistance. However one isolate of *S. aureus* was completely multidrug resistant to all tested antibiotics. The first most prevalent organism of the study coagulase-positive *Staphylococcus aureus* was resistant to several antibiotics. The second most prevalent organism of study was *P. aeruginosa* also showed multidrug resistance and sensitivity to antibiotics like ciprofloxacin (50%) and levofloxacin (75%). The repeated empirical prescription of these antibiotics for treatment and prophylaxis in our hospital might be responsible for observed high degree of resistance. This condition raises a serious alarm and calls for urgent revision of antibiotic policy and antibiotic prescribing guidelines. Higher resistance of the bacterial isolates towards the antibiotics may also be due to practicing self-medication, lack of diagnostic laboratory services or unavailability of guidelines regarding the selection of drugs thereby which lead to inappropriate use of antibiotics.⁵

Conclusion:

The most of the isolated aerobic bacteria are resistant to multiple classes of antibiotics.

Recommendation

Meticulous surgical techniques, proper sterilization, judicious use of antibiotics, improvement of operation theatre and ward environments, control of malnutrition and obesity, treatment of infective foci and diseases like diabetes, helps to control the morbidity of pus infections.

Limitations:

- Lack or decreased availability of resources.
- High cost and requirement of technical expertise.
- Lack of established guidelines for performing antibiotic susceptibility testing and treatment.
- Anaerobic bacterial profile and fungal cultures were not done on the samples obtained from various surgical departments.

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