

ORIGINAL ARTICLE

Pattern of Organism and Drug Sensitivity on Culture and Sensitivity of Pus from Soft Tissue Abscesses in Pediatric PatientsSAQIB ISMAIL¹, TAHSEEN ISMAIL², SYED ZAKIR HUSSAIN SHAH³, AQDAS SAQIB⁴, MUHAMMAD UZAIR⁵, MASROOR HUSSAIN SHARFI⁶¹Associate Prof of Pediatric Surgery, Div. HQ Teaching Hospital, Mirpur Azad Kashmir²Assistant Professor, Mohi-Ud -Din Islamic Institute of Pharmaceutical Sciences³Assistant professor pediatric surgery AJKMC Muzaffarabad⁴Consultant pediatrician, Al Seha Hospital, Mirpur Azad Kashmir⁵Assistant professor pediatrics .Sahara medical college, Narowal⁶Consultant Pediatric Cardiologist, King Faisal Specialist Hospital and RC, Jeddah, KSA

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ABSTRACT**Background:** Soft tissue abscesses is one of the most commonly observed complication in children. This infection may impart the longer stay at hospital and also increase the cost of medical care.**Objective:** The study was carried out to find the pattern of organisms and the sensitivity of drugs from the pus produced in soft tissue abscesses among patients.**Study design:** It is cross-sectional study conducted from January 2020 to November 2022.**Material and Methods:** The study was conducted at the pediatric department of the Div. HQ teaching hospital Mirpur, Azad Jammu and Kashmir. The study was carried out on 160 patients having at least one abscess on their body. The study also collected information about the predisposing factor that could have led to abscess formation. The site of distribution of the abscess was also analyzed. The abundance of microorganisms that were isolated from the samples of abscesses was also studied.**Results:** it was found that in most of the patients (45.5%) the blunt trauma was the main cause of formation of abscess. The common cause of abscess at extremities was blunt trauma. The common cause of abscess at head and neck site was upper respiratory tract infection and lymphadenitis. The head and neck area along with lower limb was the site that had most of the abscess.**Conclusion:** In our study the blunt trauma at extremities was found to be main factor leading to pus formation from smooth tissue abscess among infants. The most common region where pus was formed was extremities, head and neck area and lower limb area.**Keywords:** klebsiella pneumonia and Soft tissue abscesses.**INTRODUCTION**

Soft tissue abscesses is one of the most commonly observed complication in children. This infection may impart the longer stay at hospital and also increase the cost of medical care. It also develop antibiotics resistance. In both community and hospital it is one of the frequent cause of morbidity¹⁻². Soft tissue infection is a usual cause of infirmity. In soft tissue infection there is lack of clear local bound arise and extremely virulent nature of responsible pathogens which produce the high death rate. Cellulitis, impetigo, folliculitis, furuncle, carbuncle, necrotizing fasciitis are the example of soft tissue infection. Ulcerations, exudates, fluid collection are frequently analogous with complex soft tissue abscesses. Antibiotics sensitivity determination of abscess aspirate culture is dominant in assisting clinicians in empiric antibiotics therapy³⁻⁴. Empirical antibacterial therapy is highly effected by pathogens nature, patient factors and diagnostic procedure reports. An extensive range of pathogens may be the reason of soft tissue abscesses. Staphylococcus aureus is an important one. Other organisms included are Pseudomonas aeruginosa, Escherichia coli, Enterococcus and Enterobacter species. Staphylococci multidrug resistance is a widen complication in clinical practice like methicillin resistance S.aureus strain (MRSA). These strains are resistant to the majority of antimicrobial agents, and isolates with decreased susceptibility and resistance to vancomycin, the last drug used to treat MRSA infections⁵⁻⁶. It cause the severe infection and the mortality rate expanded due to these multidrug resistance strains. According to latest scrutiny data, 160-90% Staphylococcus pathogens remain vulnerable to cefazolin or oxacillin. For soft tissue infection, a first generation cephalosporin remains the first line empirical therapy. The study was carried out to find the pattern of organisms and the sensitivity of drugs from the pus produced in soft tissue abscesses among patients. With the emergence of the antibiotic drug resistance the incidence of STA has also increased. The severity of the STA vary greatly. The markers of this necrotizing infection are erythema and skin vesicles. The necrotizing soft tissue infection are the most lethal type of

infections. The assessment of infection severity and organisms involve in causing the infection is the most crucial factor for the treatment⁷⁻⁹. Ignorance and economic constrains are the two main factors that leads to the prevalence of the infection in the developing countries. The STA without proper treatment and on-time diagnosis can be life-threatening. The STA requires urgent evaluation for the proper and on-time treatment. The scarce and limited data is available about the pattern organisms involves in the infection¹⁰. The study aimed to find the pattern of organisms and the sensitivity of drugs from the pus produced in soft tissue abscesses among patients.

MATERIAL AND METHODS

The study was conducted at the pediatric department of the Div. HQ teaching hospital Mirpur Azad Jammu and Kashmir. It is cross-sectional study conducted from January 2020 to November 2022. The study was conducted at the pediatric medicine department of our institute hospital. The 160 patients having at least one abscess on their body were included in the study. The children of age less than 15 years were included in the study. The ethical and review board committee of the hospital approved the study. The samples were collected and analyzed. The confirmatory test were performed. Gram negative organisms were cultured from neonates having sepsis problem.

The 160 patients were given antibiotics after incision and drainage of the abscess. The pus samples and cultures were analyzed under microscope to identify the organism and to check the antimicrobial patterns of sensitivity found in the samples. The information about the predisposing factor that could have led to abscess formation was also collected. The site of distribution of the abscess was also analyzed. The abundance of microorganisms that were isolated from the samples of abscesses was also studied. The drug sensitivity on the cultures was studied. The SPSS software was used to statistically analyze the data. The data was stratified and presented in the forms of tables.

RESULTS

The study was carried out on 160 patients having at least one abscess on their body. Twelve of them had abscess two times and 4 patients had it three times on their body. Most of the patients belonged to age group 1-5 years, then it was followed by 28 days to 1-year age group as shown in table 1. There were 16 patients that ranged from 0-28 days' age group. The haematogenous spread was cause of infection spread from head and neck to upper respiratory tract.

Table 1: Distribution of age of patients

| Feature | No. of patients | Percentage |
|-----------------|-----------------|------------|
| Age | Number | Percentage |
| 0-28 days | 16 | 10 |
| 28 days -1 year | 36 | 22.5 |
| 1-5 years | 76 | 47.5 |
| 5-10 years | 24 | 15 |
| 10-15 years | 8 | 5 |
| Total | 160 | 100 |

The study also collected information about the predisposing factor that could have led to abscess formation, it was found that in most of the patients (45.5%) the blunt trauma was the main cause of formation of abscess. It was followed by intramuscular injection. The HIV virus related abscess cases were not observed. (table no.2)

Table 2: Factors leading to abscess formation

| Factors | No. of patients | Percentage |
|-------------------------|-----------------|------------|
| Blunt trauma | 72 | 45.5 |
| Intramuscular injection | 30 | 18.5 |
| Nil | 58 | 36 |

The site of distribution of the abscess was also analyzed and the results in table no.3 shows that the head and neck area along with upper respiratory tract infection area was the site that had most of the abscess. Then it was followed by trunk and gluteal region.

Table 3: Distribution of abscesses

| Site of distribution | No. of patients | Percentage |
|----------------------|-----------------|------------|
| Head and neck area | 48 | 30 |
| Lower limb area | 48 | 30 |
| Breast | 16 | 10 |
| Trunk | 24 | 15 |
| Gluteal | 24 | 15 |
| Total | 160 | 100 |

The abundance of microorganisms that were isolated from the samples of abscesses was also studied and it was found that E. coli was the second most commonly found organism present in the culture where it was seen in almost 25% of the patients. (table no.4). The common cause of abscess at extremities was blunt trauma. The common cause of abscess at head and neck site was upper respiratory tract infection and lymphadenitis. The upper respiratory tract infection includes cold, tonsillitis, sinus infection or otitis media (ear infection).

Table 4: Abundance of microorganisms isolated from culture of abscesses

| Organism | No. of isolates | Percentage of isolates |
|------------------------|-----------------|------------------------|
| Enterobacter cloacae | 6 | 3 |
| Proteus mirabilis | 3 | 1 |
| Enterobacter aerogenes | 2 | 1 |
| Staphylococcus aureus | 97 | 60 |
| Klebsiella pneumoniae | 8 | 5 |
| Escherichia coli | 40 | 25 |
| Morganella morganii | 4 | 2 |

The drug sensitivity on the cultures was studied and it was found that in case of E. coli the percentage of resistant isolates was 57 and there were 37% sensitive isolates for ampicillin. In

case of piperacillin or amoxicillin the percentage of sensitive isolates is 78 and resistant isolates were 7%. Staphylococcus aureus and E. coli were the most commonly found organism. Ampicillin was showing resistance to klebsiella pneumoniae. Staphylococcus aureus was 100% sensitive to linzolid, Teicoplanin and mostly sensitive to vancomycin, clindamycin and amikacin. It was resistant to ampicillin, oxacillin, ciproflaxacin, and erythromycin.

Table 5: Drug sensitivity of pus from soft tissue abscesses

| Organism | Percentage of sensitive isolates | Percentage of resistant isolates |
|---|----------------------------------|----------------------------------|
| Escherichia coli (n=24) | | |
| Ampicillin/amoxicillin | 37 | 57 |
| Piperacillin Amoxicillin with clavulanic acid | 78 | 7.1 |
| Meropenem | 98 | 2.1 |
| Imepenem | 89 | 5.2 |
| Cefotaxime | 20 | 60 |
| ciproflaxacin | 24 | 50 |
| Klebsiella pneumoniae/oxytoca (n=13) | | |
| Ampicillin/amoxicillin | 0 | 100 |
| Piperacillin Amoxicillin with clavulanic acid | 88 | 6 |
| Cefuroxime | 96 | 3.5 |
| Cephazolin | 94 | 6.8 |
| Morganella morganii/ Enterobacter spp./Citrobacter freundii (n=4) | | |
| Ampicillin/amoxicillin | - | - |
| Piperacillin Amoxicillin with clavulanic acid | - | - |
| Amikacin | 100 | 0 |
| Cephazolin | - | - |
| Staphylococcus aureus (n=6) | | |
| Methicillin | 97 | 2 |
| Erythromycin | 75 | 24 |
| Clindamycin | 78 | 21 |
| Vancomycin | 94 | 6 |
| Linzolid | 100 | 0 |
| Teicoplanin | 95 | 7 |
| Ampicillin | 10 | 50 |
| Oxacillin | 19 | 70 |

DISCUSSION

The study was carried out to find the pattern of organisms and the sensitivity of drugs from the pus produced in soft tissue abscesses among patients. Bacterial infections are still one of the major health conditions reported by the patients. As per studies gram negative bacteria cause more harm than gram positive bacteria¹¹. Gram negative organisms were cultured from neonates having sepsis problem. As per previous studies commensal bacteria including many gram negative bacteria starts to grow and colonize in the skin of new born infants, the first microflora and the mucous membrane is formed by the mother's birth canal¹². As per literature a pattern of similar gram negative microorganism is found in the flora of neonates¹³. Another study showed that when the flora was cultured from infants it was found that the gram negative organisms are 64% and are found in abundance as compared to the 30% gram positive bacteria¹⁴. In case of conditions like sepsis, UTI infection and many other cases like meningitis are enriched in gram negative strains¹⁴. This study was done on 160 patients, most of them belonged to age group to 1-5 years. The blunt trauma was one of the main causes of formation of abscess among patients, and it was followed by intramuscular injection. In this study the predisposal cause of the abscess was studied and it was found that in majority of the case blunt trauma was the root cause of abscess. In a study carried out to find the distribution of organisms in the sepsis area, it was found that Staphylococcus aureus and E. coli were some of the organisms that were

frequently found in the culture¹⁵. The drug sensitivity of the samples was studied and it was found that in case of *E. coli* the percentage of resistant isolates was 57 and there were 37% sensitive isolates for ampicillin. In case of piperacillin or amoxicillin the percentage of sensitive isolates is 78 and resistant isolates were 7%. The samples were taken from urine, blood, eye extractions and other body fluids. The study comprised of 160 patients where they were given antibiotics after incision and drainage of the abscess. The pus samples and cultures were analyzed under microscope to identify the organism and to check the antimicrobial patterns of sensitivity found in the samples. Similar protocols were used by previous studies as well. *Staphylococcus aureus* was found in case of 56% of patients suffering from abscess. Other than that *Enterobacter cloacae* was also abundantly found in 6 patients. In this study *E. coli* was the main microorganism found in the culture as it was observed in 30% of the isolates. The samples were taken from nasopharyngeal swabs. It showed a very high resistance to antibiotics like amoxicillin and ampicillin and it has low drug resistance to aminoglycosides and cephalosporin. These findings are similar to the previous findings. In another study carried out to study the flora of sepsis site of the neonates the results showed that *E. coli* and gram negative bacteria are susceptible to antibiotics like amikacin but they are not sensitive to ampicillin¹⁶⁻¹⁷. Samples taken from the neonates from children ward showed that there is high resistance of *E. coli* towards cephalosporin as compared to other drugs. The drugs like ofloxacin and ciprofloxacin were also some of the commonly found antibiotics that were sensitive to the cultured organisms found in the flora¹⁸⁻¹⁹. In our study linezolid was 100% sensitive to the cultures that have *Staphylococcus aureus*. It was observed that the cultured organisms showed high sensitivity to fluoroquinolones and they showed high sensitivity to aminoglycosides and other quinolones. The use of commonly prescribed antibiotics and previous use of antibiotics make the cultured organism resistant to the drug²⁰. Therefore, the use of antimicrobial susceptibility test for the treatment of neonates can guide the doctors about the drugs that are becoming resistant to the organisms for that patient²¹. The study also has some limitations as the sensitivity testing was done by different technicians. There were no anaerobic cultures used in the study as the study was carried out in the clinical set-up. There were some patients whose follow-up was not done because of non-cooperation at their end.

CONCLUSION

In our study the blunt trauma was found to be main factor leading to pus formation from smooth tissue abscess among infants. The most common region where pus was formed was head and neck area in addition to lower limb area. *Staphylococcus aureus* and *E. coli* were the most commonly found organism. *Staphylococcus aureus* was 100% sensitive to linezolid, Teicoplanin and mostly sensitive to vancomycin, clindamycin and amikacin. It was highly resistant to ampicillin.

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