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BACTERIOLOGICAL PROFILE OF PUS SAMPLES AND THEIR ANTIBIOTIC SUSCEPTIBILITY PATTERN

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Abstract-

Introduction-Pyogenic infections refer to infection causes pus formation. They are characterized by several local inflammations, usually multiplication of microorganism. Pus is a collection of thick, white or yellow fluid, formed at the site of inflammation during infection. It is made up of dead tissue, white blood cells, and damaged cells. Antibiotic resistance among bacteria is becoming more and more serious problem throughout the world. That evolution of bacteria towards resistance to antimicrobial drugs, including multidrug resistance, is unavoidable because it represents a particular aspect of the general evolution of bacteria that is un-stoppable. Antibiotic resistance emerges commonly when patients are treated with empiric antimicrobial drugs. Monitoring of resistance patterns in the hospital is needed to overcome these difficulties and to improve the outcome of serious infections in hospital settings. Materials and Methods- A retrospective study was conducted at Dhiraj hospital, SBKS MI & RC from January to May 2024. All pus samples collected during the study period were included. Pus samples were aseptically collected using sterile swab in a test tube and inoculated on to blood agar and MacConkey agar. Plates were incubated at 37◦C for 24 hours. Organisms were identified by series of biochemical reactions standard following standard procedures. Antimicrobial susceptibility testing was performed using Muller-Hinton agar plates by disc diffusion method following Clinical and Laboratory Standards Institute (CLSI) guidelines. Results- Of 125 pus samples collected, 37(29.6%) were positive cultures, which included 16 (43.2%) Gram negative and 21(56.7%) Gram positive bacteria. and no growth in 88(70.4%) samples. Middle age group of 20-40 years 48 (38.4%) was most commonly affected age group. Males 68(54.4%) were commonly affected than females 57(45.6%). Conclusion- The spread of the beta-lactamase producing organisms has been increasing. The Present study showed increased resistance to beta-lactam antibiotics which is serious problem.

Key words-S.aureus (staphylococcus aureus) , MRSA (methicillin-resistant Staphylococcus aureus), CLSI (Clinical and Laboratory Standards Institute)

INTRODUCTION-

Pyogenic infections refer to infection causes pus formation. They are characterized by several local inflammations, usually multiplication of microorganism. Pus is a collection of thick, white or yellow fluid, formed at the site of inflammation during infection. It is made up of dead tissue, white blood cells, and damaged cells[1]. The occurrence of wound infections depends on various factors like condition of wound, microbial load and the host defence mechanisms. The overall incidence of wound sepsis in India is from 10% to 33%[2]. The infecting pathogens not only differ from country to country, but also vary from one hospital to another within the same country. It is caused by bacteria, virus, fungi and protozoa and in many cases, there is mixed infection with more than one bacterial species.The most common causative agent includes Staphylococcus aureus which account for 20-40%. Infection with Pseudomonas aeruginosa occurs mainly following surgery and burns which account for 5-15%. Escherichia coli, Klebsiella sp., Proteus sp. and Enterococci sp. are commonly associated with pyogenic infections[3-4]. Selection of an effective antimicrobial agent for a microbial infection depends on the causative agent, pathophysiology of the infectious process and on pharmacodynamics and pharmacokinetics of the antimicrobial agents. Also, antibiotic resistance to the commonly used antibiotics is now emerging as a result of misuse and abuse of particular antibiotics. The routine use of antibiotics has resulted in wide spread antibiotic resistance especially within the gram-negative organisms.Bacteria have the ability to acquire resistance and can transfer the resistance from one bacteria to another. Earlier, such multidrug resistant organisms were common in immunosuppressed patients but now, reports are showing such infections in normal healthy individuals. Also, such drug-resistant infections may complicate the newly emerging infectious diseases.The emergence of high anti-microbial resistance among bacterial pathogens has made the management and treatment difficult[5]. It is ideal to give proper antibiotic after culture and sensitivity of the wound swab or pus.The present study aimed to detect common bacteriological profile and their antibiotic susceptibility profile from wound infection.

Antibiotic resistance among bacteria is becoming more and more serious problem throughout the world.That evolution of bacteria towards resistance to antimicrobial drugs, including multidrug resistance, is unavoidable because it represents a particular aspect of the general evolution of bacteria that is un-stoppable. Antibiotic resistance emerges commonly when patients are treated with empiric antimicrobial drugs. Monitoring of resistance patterns in the hospital is needed to overcome these difficulties and to improve the outcome of serious infections in hospital settings.The emergence of antibiotic resistance pathogenic bacteria are considered as grave threats to the public health worldwide[6].

During the last few decades, multidrug-resistant Gram-negative bacterial strains such as Acinetobacter baumannii, E. coli, Klebsiella pneumoniae, Pseudomonas aeruginosa and Gram-positive methicillin-resistant Staphylococcus aureus (MRSA) were increasingly associated with pus infections under hospital settings due to extensive overuse and inadequate dose regimen of antibiotics[7]. Rapid emergence of multidrug-resistant bacteria poses a serious threat to public health globally due to the limited treatment options and discovery of new classes of antibiotics. Therefore, this present study was undertaken to see bacteria in pus with their resistant pattern.

Materials and Methods-

A retrospective study was conducted at Dhiraj hospital, SBKS MI & RC from January to May 2024. All pus samples collected during the study period were included. Socio-demographic

and laboratory results were collected from Hospital Microbiology Laboratory registration books by using a standard data collection format. Pus samples were aseptically collected using sterile swab in a test tube and inoculated on to blood agar and MacConkey agar. Plates were incubated at 37◦C for 24 hours. Organisms were identified by series of biochemical reactions standard following standard procedures. Antimicrobial susceptibility testing was performed using Muller-Hinton agar plates by disc diffusion method following Clinical and Laboratory Standards Institute (CLSI) guidelines[8]. The isolates were tested against ampicillin (10 µg), amoxyclav (20/10µg), gentamicin (10 µg), amikacin (30 µg), ciprofloxacin (5 µg), ceftazidime (30 µg), Cefotaxime (30 µg), Meropenem (10 µg) and Piperacillin – Tazobactum (100/10µg). For gram-positive isolates, Cotrimoxazole (1.25µg /23.75µg), Erythromycin (5µg), Clindamycin (2µg), Chloramphenicol (30µg), Tetracycline (30µg), Linezolid (30µg), Vancomycin(30µg).

For Enterococci high level gentamicin (HLG) was used. ESBL was detected by combined disk test. This was performed by phenotypic confirmatory test as per the recommendations of CLSI. The ceftazidime (30 µg) discs alone and in combination with clavulanic acid (ceftazidime + clavulanic acid, 30/10 µg discs) were used. An increase of ≥ 5mm in zone of inhibition of the combination discs in comparison to the ceftazidime disc alone was considered to be ESBL producer. Methicillin resistant Staphylococcus aureus (MRSA) was detected by Cefoxitin disc diffusion test. Lawn culture was done onto Mueller– Hinton agar plate. A 30 µg cefoxitin disc was placed and incubated at 37◦C for 24 hrs. The zone of inhibition of S. aureus ≤ 21 mm was considered as methicillin resistant.

Results-

Of 125 pus samples collected, 37(29.6%) were positive cultures, which included 16 (43.2%) Gram negative and 21(56.7%) Gram positive bacteria. and no growth in 88(70.4%) samples. Middle age group of 20-40 years 48 (38.4%) was most commonly affected age group. Males 68(54.4%) were commonly affected than females 57(45.6%).

Age distribution	
age	No. patients
1-20	12
21-40	68
41-60	35
>60	10

Table 1- Age distribution

S. aureus 11(29.7%) was most common isolate followed by Pseudomonas spp. 8(21.6%), E. coli 5(13.5%), CONS 4(10.8%), Citrobacter spp. 2(5.4%), Klebsiella pneumoniae 3(8.1%)and Enterobacter spp. 2(5.4%) each, Proteus spp. 2(5.4%).

ESBL positivity was seen in 22(59.4%) Gram negative isolates and most were susceptible to piperacillin / tazobactum and meropenem. MRSA was detected in 8 (21.6%) S. aureus isolates and were susceptible vancomycin and linezolid.

Discussion-

Pyogenic infections are characterized by local and systemic inflammation usually with pus formation. It may be either monomicrobial or polymicrobial. Gram negative bacteria such as Pseudomonas, Escherichia coli, Klebsiella spp., Proteus spp., and Gram positive cocci such as Staphylococcus aureus and Enterococci are the common causative agents. 16 In this study, both gram positive and gram-negative pathogens were isolated from samples. The predominant pathogens were gram negative bacteria (43.2%). It was agreed with studies done

by Swati Duggal et al. [9] and Shama et al. [10] which showed dominance pathogens as Gram negative bacteria.

Conclusion-

The spread of the beta-lactamase producing organisms has been increasing. The Present study showed increased resistance to beta-lactam antibiotics which is serious problem. Resistance irrational use of antibiotics should be avoidedand regular surveillance helps in implementing better therapeutic strategies to reduce morbidity and mortality.

References-

1- Bindu D, Chitralekhasaikumar, Kiran M, Praveena R, Illamani V. Bacterial Profile and Antibiotic Resistance Pattern of Aerobic Gram Positive Bacteria Isolated From Pus Sample. Res J Pharm, Biol Chem Sci. 2014;5(5):643–6.

2- Mantravadi H, Chinthaparthi M, Shravani V. Aerobic isolates in pus and their antibiotic sensitivity pattern: a study conducted in a teaching hospital in Andhra Pradesh. Int J Med Sci Public Health. 2015;4(8):1076–9.

3- Sida H, Pethani P, Dalal H, Shah N, Shaikh. Current Microbial Isolates From Wound Samples And Their Susceptibility Pattern In A Tertiary Care Hospital. Natl J Integr Res Med. 2018;9(2):17–21.

4- Namita A R, Choudhari MR, Das S. Antibiotic profiling of Pseudomonas aeruginosa isolates from pus sample of rural tertiary care hospital of Western Maharashtra, Loni, India. Int J Res Med Sci. 2017;5(7):3076–81.

5- Ananthi, Ramakumar M, Kalpanadevi V, Abigail RS, Karthiga L, Victor HK. Aerobic Bacteriological Profile and Antimicrobial Susceptibility Pattern in Postoperative Wound Infections at a Tertiary Care Hospital. Int J Med Sci Clin Inventions. 2017;4(2):2702–6.

6- Rice LB. Antimicrobial resistance in gram-positive bacteria. American Journal Medicine. 2006;119(6, supplement 1):S11-S19

7- Courvalin P. Antimicrobial Drug Resistance: Prediction Is Very Difficult, especially about the Future. Emerg Infect Dis. 2005;11:1503-06

8- Performance Standards for antimicrobial susceptibility testing, XXI International Supplement (M100-S27). In: Clinical Laboratory Standards Institutes (CLSI); 2017

9- Duggal S, Khatri PK, Parihar RS, Arora R. Antibiogram of Various Bacterial Isolates from Pus Samples in a Tertiary Care Centre in Rajasthan. Int J Sci Res. 2015;4(5):1580–84. 18.

10- Shama M, Murugesan K, Vijayan H. Isolation Identification and Antibiotic Sensitivity Pattern of Pyogens from Pyogenic Pathogens. Biomed Pharmacol. 2018;11(1):463–8.