FREQUENCY DETERMINATION OF STAPHYLOCOCCUS AUREUS IN SEPTIC WOUND INFECTIONS FROM NISHTAR MEDICAL UNIVERSITY HOSPITAL, MULTAN, PAKISTAN

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ABSTRACT

Background: Septic Wound Infections is common entity in hospitals.
Objective: To determine the frequency and percentage of Staphylococcus aureus in septic wound infections.
Methodology: A descriptive cross sectional study was carried out at surgical wards, ICU, burn units, Gynecology & Obstetrics, orthopedics wards of Nishtar Medical University Hospital Multan from June to November 2018. Bacteriological investigations of wound infections were carried out using pus samples. The microorganisms were isolated from clinical specimens and identified using cultures and biochemical tests. Data was collected by interviewing the patients and attendants of patients through questionnaire, and analysis was done by using SPSS 20.
Results: Out of 50 samples, 18 (36%) were found to have septic infectious diseases associated with Staphylococcus aureus and 9 (18%) patients showed No growth. 12 (24%) were found to have diseases caused by other Staphylococcus species, 2 (4%) had fungal infection, and 9 (18%) showed only gram negative rods and all were catalase negative. Socioeconomic status was found to be important as 30 (60%) patients belonged to lower class, 18 (36%) belonged to middle class and 2 (4%) belonged to upper class family.
Conclusion: Our study showed that one third of the septic wounds were caused by Staphylococcus aureus it may be due to hospital acquired infections and nosocomial due to improper unhygienic condition. There is special need of strategy implementation to control hospital acquired and nosocomial infections for a healthy community.

Key Words: Septic wound, Staphylococcus aureus, Catalase test

INTRODUCTION

Human skin is the largest organ which not only performs sensory function but also protects underlying tissue from different kinds of microbes, which invade the skin, by providing innate immunity and thus controlling bacterial colonization.[1,2] Subcutaneous tissues are exposed to environment by losing skin integrity by any kind of mechanical injury, which ultimately leads towards bacterial colonization and proliferation.[3] This mechanical disruption causes wounds by facilitating different microorganism including parasites, bacteria, fungi and viruses by establishing infection by breaking protective barrier.[4,5,6]

There is antagonistic impact of septic wound infections on human life that not only affect the quality of life style but also causes delay in prognosis. There is a big contribution of septic wound infections in hospital acquired infections among surgical cases and causes mortality of 70-80% patients, so these are basic factors for mortality and morbidity in developing nations.[7,8]

Certain types of wound infections such as soft issue wound, bite wound, burn wound, surgical infections and pyogenic infections exist in patients having different diseases like diabetes and cardiac diseases.[9,10] It is difficult to control bacterial infection in wound patients especially in hospital environment. Research studies have proven the isolation of S. aureus, P. aeruginosa, E. coli, Klebsiella spp. and Acinetobacter spp. in wound infections.[9,10,11] It is becoming very challenging to control wound infections due to antimicrobial resistance and incidence of polymicrobial flora infections.[10]

Staphylococcus aureus is facultative anaerobe that falls in gram positive category of bacteria having grape like structures in appearance. It has golden yellow colonies on blood agar and haemolysis pattern. It is very important microbe causing skin infections that may lead towards serious systematic infections in human and animals.[11-13] S. aureus infection may cause skin diseases such as mycosis, eczema and mycosis.[14] This microbe is transferred from these sites through different means i.e. hands,

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hand kerchief, clothing and dust.[14] S. aureus resides in tissues of immune compromised individuals, diabetic, malnourished and chronic ill patients.[15] Methicillin-resistant Staphylococcus aureus (MRSA) and Vancomycin resistant Staphylococcus aureus (VRSA) strains of S. aureus have become more challenging for the scientists and physicians. MRSA is the most common cause of hospital acquired infections.[16]
Hospital staff, infants, surgical patients and long staying patients in hospital are commonly affected by S. aureus.[16,17] Studies have proven sepsis in patients after surgery in operation theatre and/or in ward.[17,18] Food poisoning is caused by ingestion of the toxin produced by Staphylococci. S. aureus has shown resistant to β-lactam antibiotics, aminoglycosides and macrolides.[18,19] Staphylococcus aureus strains carry a wide variety of MDR genes on plasmids, which can be exchanged and spread among different species of Staphylococci and can be transferred to new bacterial hosts.[20]
Hospital strains of Staphylococcus aureus are usually resistant to many useful antibiotics dics except vancomycin, although some microbiologist had reported the resistance of vancomycin.[21] The objective of this study was to determine the frequency of Staphylococcus aureus in septic wound infections.

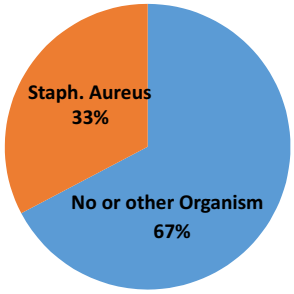
METHODOLOGY

This was a cross sectional study conducted at surgical wards, ICU, burn units, Gynecology & Obstetrics, orthopedics wards of Nishtar Medical University Hospital Multan from June 2018 to November 2018.
A total of 50 consecutive pus samples were collected from patients presenting clinical symptoms of wound infections in ICU (03 samples), Orthopedics ward (06 samples), Surgical ward (21 samples), Gynae & Obs ward (05 samples) and burn unit (15 samples) at Nishtar Medical University Hospital, Multan, Pakistan. The collected samples were transported aseptically to the microbiology laboratory within 30 minutes and segregation was done on the basis of infection site such as knee joints, burn sites, caesarean operated sites, arm and leg injuries. Data analysis was done by using SPSS version 20. Ethical approval was sought from ethical committee of hospital.
Culture and Isolation: Collected samples were inoculated on blood agar and MaConkey agar. Mannitol Salt agar was used as a selective medium for isolation of Staphylococcus aureus after incubation at 37°C for 24 hours. The culture were analyzed for morphological, physiological and biochemical characteristics. Growth on nutrient agar and blood agar medium: The isolated colonies were slightly large, circular and yellow in color after 24 hrs of incubation at 37°C. In the blood agar hemolytic zones appeared. Growth on Mannitol Salt Agar: After incubation at 37 C the isolated colonies appeared as golden yellow. The colonies were shining, opaque and circular in appearance. Gram Staining: Gram staining was done. Biochemical Screening Tests: For the identification of bacterial isolates samples were subjected to biochemical tests; catalase test, coagulase test and DNAse test.

RESULTS

Bacteriological investigation of septic wounds was carried out among 50 patients, in which there were 28 (56%) males and 22 (44%) females. Mean age of our patients was 27.91 ± 4.56 years, ranging from 21 – 38 years, 30 (60%) were aged 20 – 30 years and 20 (40%) were aged more than 30 years. Of these 50 study cases, 39 (78%) were illiterate and 11 (22%) were literate. Out of 50 samples, 18 (36%) had septic infectious diseases associated with Staphylococcus aureus (Figure I) while 9 (18%) showed no growth. Twelve (24%) patients were found to be suffering from diseases caused by other Staphylococcus species. Two patients (4%) had fungal infections while 9 patients (18%) showed only gram negative rods and all were Catalase test negative.

Figure I: Frequency of Staphylococcus aureus among septic wound patients



Socioeconomic status was found to be important as 30 patients (60%) belonged to lower class, 18 patients (36%) belonged to middle class and 2 patients (4%) belonged to upper class family. Source of infection was also found to be significant factor as 22 patients (44%) had poor unhygienic conditions like bed sore patients in burn unit, 26 patients (52%)

showed poor or improper dressing and 2 patients (4%) have other sources.

DISCUSSION

In this research work, patients with post operative surgery and flame burn were more infected with diseases caused by S.aureus.[17,18] Septic infections was the most common illness recorded in hospitals. Although the presence of S.aureus will not necessarily lead to development of a clinical infection but when this occurs it can be fatal.[15,19] S.aureus can be isolated from wounds that are apparently healing normally. As it is a part of human normal flora so it is difficult to eliminate it but measures can be taken to avoid its colonization, which progressively leads to hard-to-treat clinical infection.[20]

In this study, of S. aureus were isolated from septic wounds. It is also reported to be one of the major microorganisms that cause post-operative wound infections.[14, 15] Post war wound infection arising from injuries reported the organism as a major factor positive.[10,11] It is now known that coagulase is an extracellular substance, which has important role in the pathogenesis of this microorganism. The strains also produced haemolytic factor which had been attributed to the presence of eight different haemolytic factors (majority in humans). Other studies also reported that S.aureus is a killing human pathogen cause a variety of diseases in human i.e. skin infection, life threatening septicemia, meningitis and toxic shock syndrome. These pathogens are difficult to eradicate because it possess abilities to colonize and exploit the host functions.[21] In contrast to current study , a study in burns patients showed that about two third patients had burns wound\d infected with staph. aureus.[22]

Similar findings were reported in another study when 65% words were infected with staph. aureus which in contrast to our study.[23] Assessing the risk of recurrence, past history of infections was found to be the strongest risk factor. Patients with positive history of aseptic infections had at least two episodes of infection in past.

In this work, it was observed that, there were higher risks of septic diseases among those who are post operative wound infections then those who have other wounds infections due to poor hygiene and overcrowding.

CONCLUSION

Our study showed that one third of the septic wounds were infected with staphylococcus aureus, which may be due to hospital acquired infections and nosocomial due to improper unhygienic condition. There is special need of strategy implementation to control hospital acquired and nosocomial infections for a healthy community.

Authors Contribution: SMAN & SHA: Idea Generation, article writeup and supervision of study. **MSH & UKC:** Literature Review and Data analysis. **RY & UHS**: Data Collection. All authors critically revised and approved its final version.

Conflict of Interest: None

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CORRIGENDUM

"Imaging patterns of doppler sonography for evaluation of bud chiary syndrome in children"

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In the content list of this issue, the name of Abid Ali Querishi was added by mistake.
1.The correct author's List is
Ayesha Anjum, Eisha Tahir, Mamoona Chiragh

The errors have been corrected in online versions of this article.