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NOSOCOMIAL CANDIDEMIA IN BURN CARE UNIT AT A TERTIARY CARE HOSPITAL IN NORTH INDIA.

Microbiology

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ABSTRACT

Background : Nosocomial infection affect 1 in 10 patients admitted to hospital, they are associated with prolonged hospital stay, mortality and health care costs.Infections are a leading cause of mortality (75% of cases) in these patients. Candidemia is the 4th cause of bloodstream infection, occurring more frequently in ICU than in hospital wards.

Material and Method : This prospective study was conducted in Department of Microbiology GMC Srinagar, for period of 1 year.Patients admitted to burn unit and manifesting the signs and symptoms of nosocomial infections (as defined by CDC criteria) were included. Blood samples were collected using standard techniques for culture and identification. Positive isolates were confirmed using conventional biochemical tests.

Result : Blood stream infection was seen in 20 % of patients[20/100]. 30.98 % sustained third degree burns. Majority of patients had major burns (60.56%). Out of total (106) blood samples processed 81.13% showed no growth (sterile) and only 18.16% showed growth of organism. Candida spp was isolated from 10% (2/20) of positive cultures.90% of positive blood cultures showed bacterial isolates while as 10%(2/20) were candida albicans. 2% patients developed nosocomial Candidemia.

Conclusion: This study demonstrates that nosocomial candidemia in burn patients is a substantial problem in our setting. Delay in its diagnosis could be minimized by more active screening for candidemia especially in Intensive care units. Efforts should be directed to limit risk factors and microbiological laboratories should provide in time diagnosis which will go a long way in appropriating antifungal therapy and improving patient care.

KEYWORDS

Nosocomial Infections, Candidemia, Burn, Blood Stream Infection, Candida Albicans

INTRODUCTION.

Nosocomial infection are defined as infections that are not present or incubating at the time of hospital admission and develop after 48 hours or more of admission, 3 days of discharge or 30 days of an operation.(Chin-Hong & Guglielmo, 2017; Mayhall, 2003) They affect 1 in 10 patients admitted to hospital. These infections are a cause of concern in both developing and developed nations. They are associated with prolonged hospital stay, mortality and health care costs. These infections are caused by bacteria, fungi and viruses. The most common types infection in the hospital setting are blood stream infection, urinary tract infections, pneumonias, and skin and soft tissue infections.(Mayhall, 2003)

Burns are one of the most common and devastating forms of trauma. Patients with serious thermal injury require immediate specialized care in order to minimize morbidity and mortality. Burn patients are also at a high risk for infection as a result of the nature of the burn injury itself, the immunocompromising effects of burns, prolonged hospital stays, and intensive diagnostic and therapeutic procedures. If patients survive the initial burn and resuscitative phase, infections are a leading cause of mortality (75% of cases) in these patients.(Lari & Alaghehbandan, 2000) Burn patients are at an increased risk of blood stream infections (BSIs) especially those with central venous catheter compared with patients in other intensive can units (ICUs).(Leseva, Arguirova, Nashev, Zamfirova, & Hadzhyiski, 2013; "Microbiology and antibiotic resistance in severe burns patients: A 5 year review in an adult burns unit. - PubMed - NCBI," n.d.)

Although the initial burn wound is sterile, immediately following thermal injury, these wounds become colonized with microorganisms. (Cen, Wu, Wang, & Han, 2015) Gram positive bacteria that survive the thermal insult such as staphylococci located deep within sweat glands and hair follicles heavily colonize the wound surface within the first 48 hours.(Soares de Macedo & Santos, 2006; Wang et al., 2010) The presence of devitalized, avascularized tissue provides a favorable niche for microbial growth, and later bacteria and fungi from the host's normal gastrointestinal and upper respiratory flora colonize the burn wound. Microorganisms transferred to a patient's skin surface via contact with contaminated external environmental surfaces, water, fomites, air, and the soiled hands of health care workers can further contaminate the wound.(Cen et al., 2015).Wound colonization by yeasts and fungi usually occurs later due to the use of broad-spectrum antibiotic therapy which suppresses the normal bacterial flora .(Soares de Macedo & Santos, 2006; Wang et al., 2010)

Candidemia is ranked 4th as the cause of bloodstream infection, occurring more frequently in ICU than in hospital wards. Candidemia accounts for around 10% of ICU blood stream infections. Approximately 200 Candida species are known, of which about 10 % are recognized to cause infections in human. As the early signs and symptoms suggestive of invasive fungal infections are easily missed due to the associated co-morbid conditions, this makes it even more important to rapidly isolate and identify the causative organism. ("Secular trend in candidemia and the use of fluconazole in Finland, 2004-2007," n.d.)

Nosocomial transmission of microorganisms are associated with the emergence of antimicrobial resistance among a variety of bacterial and fungal pathogens which limits the therapeutic options for the treatment of infections associated with burns. Over the last several decades, antibiotic resistant organisms have resulted in increased mortality in burns patients.

The management of burned patients requires a multidisciplinary approach, including infectious disease physicians. Understanding the distribution of pathogens may help to develop procedures that will reduce nosocomial infection and to design proper and sensitive treatment guidelines as well. The present study is aimed to assess the occurrence of hospital acquired candidial blood stream infection in burn patients.

MATERIAL METHODS.

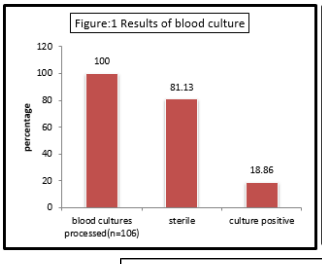
This prospective study was conducted in the Department of Microbiology, Government Medical College, over a period of 1 year.

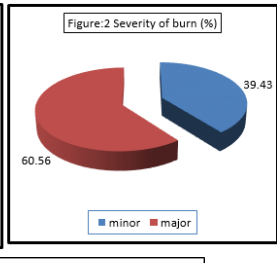
Inclusion criteria: The patients admitted to burn care unit with the following criteria were included in the study: 1) No infection at the time of admission and up to 48 hrs. (cultures negative).2) Length of stay in the hospital more than 48 hrs. 3) Signs and symptoms suggestive of infection.

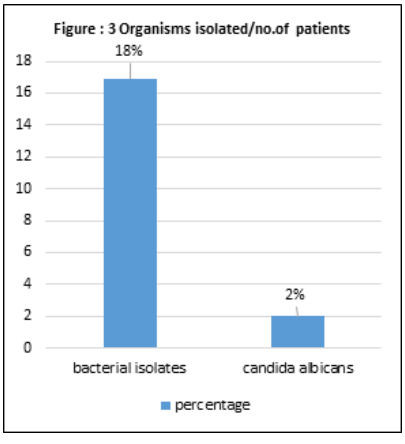
Exclusion criteria: 1) Patients referred from other hospitals. 2) Those not meeting the inclusion criteria.3) Stay at hospital <48 hours. 3) Infection acquired before 48 hours of admission.

Samples from patients falling under the inclusion criteria of the study and manifesting any symptoms and signs of nosocomial infection (as defined by centers for disease control and prevention(CDC) , Atlanta criteria) (Latham, 1996) during the management of burns were included in the study. Structured standard proforma was used to collect socio-demographic data, Clinical information including type and degree of burn, history of antibiotic use, time and date of admission, total body surface area (TBSA) burned, length of hospital stay, were also collected from patient file and hospital records. **Specimen collection and Laboratory procedures:** Blood collection was done using standard aseptic technique in patients with burn wounds showing signs of infection as defined by CDC. (Latham, 1996) Incubation of blood cultures (in liquoid broth) for a predetermined period at 35°C usually 5 days- 7 days was done. Cultures were Examined the daily, whether detection of positives was by visual inspection or by an automated system. For manual broth systems, subcultures were done after 24 hours, if negative subcultures was repeated after 48 hours and then after 7 days (if negative after 48 hours) on sheep blood agar and Macconkey agar (for suspected gram negative bacilli). In between, the bottles were examined daily and subculture on solid media was done whenever there was a visible sign of growth in the bottle. In special circumstances when cultures appeared to be negative, a Gram stain, wet mount was performed, from the culture or its sediment to determine the presence of organisms. A gram smear was also made from positive blood culture and on its basis subcultures were done on solid media like blood agar, macconkey agar and when yeasts were identified subculture was done on Sabourad's Dextrose agar and Hi-chrome Candida differential agar [Hi media lab, Mumbai] and plates were incubated at 37 ®C aerobically for 24-48 hrs. The Growth on SDA was observed within 24- 48hrs and yeast was confirmed by gram staining. Candida albicans was confirmed by performing germ tube test (being positive) and non –albicans group (negative germ tube test) were inoculated on Candida differential agar [Hi media lab, Mumbai] and incubated for 24-48 hrs. Color of the colonies was noted and species identified based upon manufacturer's instructions. Antifungal susceptibility testing of the fungus was not performed due to financial constraints.

Results: 100 patients suspected of having nosocomial infections 20 developed nosocomial blood stream infection. Most common age group was between 31-40 years (33.80%). 35.21% had burn surface area of 31-40 %, 30.98 % sustained third degree burns. Majority of patients had major burns (60.56%).60.56 % of patients were given ceftriaxone on admission and 22.53% were not given any antibiotics. Out of the total (106) blood samples processed 81.13% showed no growth (sterile) and only 18.8% showed growth of organism. [Figure: 1] 90% of the positive blood cultures showed bacterial isolates while as 10 % (2/20) were candida albicans. 2% (2/100) patients developed nosocomial Candidemia. [Figure: 3]







DISCUSSION AND CONCLUSION:

A total of 106 blood samples were collected from patients suspected of sepsis. Among all patients screened for candidemia, 2 patients had candidemia, occurrence of candidemia being 2%. All the isolates were candida albicans. Candida has emerged as an important cause of nosocomial blood stream infection. But, the actual prevalence of candidemia in India is lacking; due to unavailability of data from various parts of the country. However, a study from Lucknow reported an incidence rate of 1.61 per 1000 hospital admissions for candidemia.(Verma, Prasad, Singh, Dixit, & Ayyagari, 2003) .A study in South India reported an incidence rate of 5.7% for candidemia among children. Xess et al. from AIIMS, New Delhi, found a prevalence rate of 6% for Candida species in a 5-year study (2001-2005)(Xess, Jain, Hasan, Mandal, & Banerjee, 2007). A study by Sahni et al. from Maulana Azad Medical College, New Delhi, found an incidence rate of 6.9% for Candida species in BSI (Sahni et al., 2005). Another study from Rohtak, North India, reported an isolation rate of 8.1% for Candida species from neonatal septicemia cases(Goel, Ranjan, Aggarwal, Chaudhary, & Sanjeev, 2009).

In a 6 year study in major burn patients at burn ICU in china reported candidemia in 9.5% of patients.(Zhou, Tan, Gong, Li, & Luo, 2019) A study on burn patients in burn ICU of Aligarh Muslim university found that candidemia developed in 9.52 % of patients (Ahmad, Khurram, Maurya, Maurya, & Sheikh, 2018). Our study emphasized on the nosocomial mode of acquiring candidial blood stream infection where in 2% of the patients developed candidemia nosocomially. Another dimension to candidemia is it significant financial strain on the patient and the hospital as well due to its increased costs of care including antifungal agents and prolonged hospitalization(Olaechea et al., 2004). This study demonstrates that nosocomial candidemia in burn patients is a substantial problem in our setting. Delay in its diagnosis could be minimized by more active screening for candidemia especially in the Intensive care units. Efforts should be directed to limit risk factors like irrational use of antibiotics, central venous lines, total parenteral nutrition, mechanical ventilation, and long stay in the hospital intensive care units and microbiological laboratories should provide in time diagnosis which will go a long way in appropriating antifungal therapy and improving patient care.

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