Original Article

Bacteriological Profile of Burned Patients with Septicaemia

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ABSTRACT

Objective: The objective of the current study was to evaluate the bacterial profile of burned patients causing septicaemia in Karachi.

Study Design: Descriptive / cross sectional study.

Place and Duration: Sample were received Department of Microbiology, Basic Medical Sciences Institute (BMSI), Jinnah Postgraduate Medical Centre (JPMC) Karachi from February 2011 to June 2011.

Materials and Methods: Altogether, 42 registered hospitalized burned patients who were admitted in different teaching hospitals of Karachi were included. After taking necessary aseptic measures, the samples were collected and necessary data was filled accordingly. Established microbiological methods, which include colonial morphology, Gram's staining and biochemical characteristics were used for identification.

Results: A total of 23.8% samples were culture positive. Specimens yielded 15 microorganisms. Of this number, 86.66% showed Gram-negative and 13.3% were Gram-positive microbial growth. Among the Gram-negative, pseudomonas aeruginosa were the most common accounting for 46.66% followed by proteus vulgaris accounting for 20% and less common was escherichia coli with 6.66%. Staphylococcus aureus (13.33%) was the only Gram positive organism isolated.

Conclusion: In burned patients with septicaemia, Gram-negative, pseudomonas aeruginosa was the most common organism seen in positive cultures.

Key Words: Burned patients, septicemia, Gram positive bacteria, Gram negative bacteria and Pseudomonas aeruginosa

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INTRODUCTION

Infection with microorganisms due to thermal injury in burns patients is always a main problem in their treatment process[1]. Injury caused by heat damages the skin barriers which tend to stop the entry of tiny microscopic creatures[2-5]. Complex alterations in hemostasis are due to severe burns which can hardly be compared to different types of injuries while there is a high death rate is usual in initial phase, thus allowing microbial colonization of burn wound[6,7]. In the human body, the widest area is covered by skin. There are various mechanisms such as conservation of body fluids, homeostasis, heat regulation as well as guarding of host from infection is important because of an organ called skin[8]. It was surprisingly seen that during initial 15 days after burn injury, majority of septic episodes happened in this time period. However, it is mostly caused by Bronchopneumonia pyelonephritis, thrombophlebitis or infection of burn wound itself. The major cause of death in burn patients is due to huge burns[6].

In group of non-fermentative gram negative bacilli, pseudomonas aeruginosa is coming up as a vital microorganism[9]. It sustains as a main nosocomial infection fear to burn patients. It has been observed that treatment of patients having pseudomonas aeruginosa infection becomes difficult when there is reduced susceptibility of many routine antibiotics[10]. There is an increasing evidence of pseudomonas aeruginosa infections occurring these days. In burns patients the various microorganisms may cause skin contamination followed by septicemia in about 11% to 30% of cases. The primary sources of these may be from the normal flora of the skin, GIT and respiratory tract flora [6]. The objective of present study was to evaluate the most common causative microorganisms present in septicemic hospitalized burned patients.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted between February 2011 to June 2011 in the Department of Microbiology, Basic Medical Sciences Institute (BMSI), Jinnah Postgraduate Medical Centre (JPMC) Karachi. Approval from the institutional review

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committee and written consent from each patient/guardian was obtained.

Irrespective of age or gender, degree, percentage or duration of burn, total 42 blood samples were taken from suspected patients of septicaemia from 42 patients. After taking necessary aseptic measures, the samples were collected and necessary data was filled accordingly. 5-10 ml of blood was collected in a disposable syringe aseptically. Blood was injected into a bottle containing 50 ml of brain heart infusion broth where blood was mixed in broth by tilting or rotating the bottle gently and was transported to the Microbiology Department of BMSI in minimum time[11]. The blood culture broth was incubated at 37°C for 7 days. Three sub cultures were made after 24 hours, 72 hours and on the 7th day over Blood and MacConkey agar respectively[12]. Various standard bacteriological methods were used in order to identify specific colonial morphology, Gram's staining and biochemical feature of microorganisms from these specimens.

RESULTS

A total of 42 blood specimens taken from 42 septicemic burned patients were studied. Percentages of positive and negative blood cultures in septicemic burned patients were identified as are shown in Figure 1. Out of 42 blood specimens microbial growth was found in 10 (23.8%) cases. Data shows low percentage of positive cultures in blood specimens. However, 32 (76.2%) blood specimens did not show any microbial growth.

Table 1 shows different pathogens (n=15) isolated from patients suffering from septicaemia. Most predominant pathogen isolated was Pseudomonas aeruginosa i.e. 7 (46.66%).

Table No.1: Microorganisms isolated from patients of septicaemia (n=15)

Organisms	Number	Percentage
Pseudomonas aeruginosa	7	46.66
Proteus vulgaris	3	20.00
Klebsiella pneumonieae	2	13.33
Escherichia coli	1	6.66
Staphylococcus aureus	2	13.33

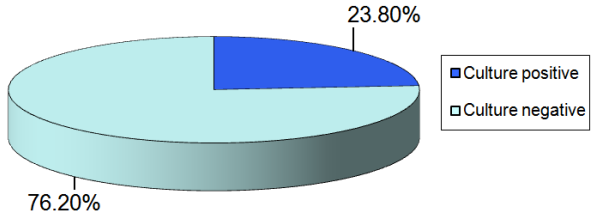

Figure No.1: Percentages of positive and negative blood cultures in septicemic burned patients

Figure 2 reveals that among 10 patients of septicemia, 50% were suffering from infection due to single pathogen while 50% were having infection due to more than one pathogen.

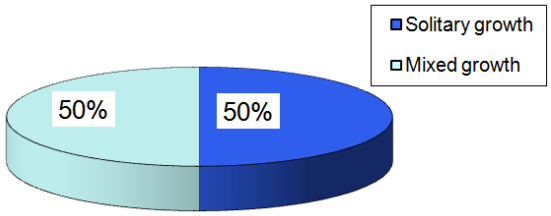

Figure No.2: Percentage of solitary and mixed growth from blood specimens in patients of septicaemia

DISCUSSION

Burn patients are more vulnerable to infection according to different studies.In the present study septicaemia occurred in 10/100 (10%) patients that is similar with the studies conducted by Ekrami and Kalantar (2007)[13] and Alp et al (2011) [14] in which septicaemia occurred in 18.6% and 17% patients respectively, which is in accordance to our study. Another study done in tertiary care unit in Bangladesh showed no growth in 5 blood samples[6] . Another study done by Ressner et al (2008)[15] reported 92/1258 (7.31%) bacteremic burned patients. The most common pathogens were staphylococcus aureus and pseudomonas aeruginosa while in our study pseudomonas was the most highly isolated organism. The findings of our study are partially similar to this study. The main source of sepsis in these groups of patient was the burn wound. It might be due to the fact that in hospitalized burned patients there normal flora gets replaced, as a matter of fact with higher number of resistant micro-organisms in some days.

The change in the bacterial profile of the burns patients is widely reported worldwide. In fact there is lack of reliable evidences that can suggest this change in epidemiology of microorganisms causing involved in the burns patients, however nosocomial transmission is reported for the pseudomonas aeruginosa patients in different parts of the world. Murray et al. (2007)[16] showed most recovered bacteria from blood culture were pseudomonas aeruginosa (26.09%) 19/73. Mahar et al. (2010) [17] observed 62.7% prevalence of NFGNB in bacteremia. The finding of our study is in accordance to this study (70%). Moreover, this variation in burn patients emphasizes the empirical use of antibiotics in their burn units. Overcrowding, massive contaminated environment, lack of isolation and improper hand washing are few common etiologies of higher rate of infections of burn wounds and sepsis[18]. In addition, we have found in sepsis the main culprit is non other than burn wound itself.

Although with the improvement in the use of locally applicable altogether with injectable antimicrobial medications and the prompt excision in these patients

sepsis is always on top in causing death due to burns. Major malfunctioning of defense mechanism, a huge skin colonization of infected stuff, the chances of gastrointestinal migration, a long hospitalization and invasive diagnostic and management procedure are combinely contributing in sepsis[19].

CONCLUSION

In burned patients with septicaemia, Gram-negative, pseudomonas aeruginosa was the most common organism seen in positive cultures.

Author's Contribution:

Concept & Design of Study:	Dr. Rakhshinda Younas
Drafting:	Prof. Dr. Mohammad Asif Durrani, Summaya Anas
Data Analysis:	Prof. Dr. Mohammad Asif Durrani, Summaya Anas
Revisiting Critically:	Dr. Ghulam Shah Nizamani
Final Approval of version:	Dr. Rakhshinda Younas

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Kumar CA, Mathur M, Salunke P, Baweja S. Time related changes of microbial flora in burns unit at tertiary care hospital. Bombay Hospital J 2010; 52(2):205-209.
2. Singh NP, Goyal R, Manchanda V, Das S, Kaur I, Talwar V. Changing trends in bacteriology of burns in the burns unit, Delhi, India. Burns 2003; 29(2): 129-132.
3. Barret JP, Gomex P, Solano I, Gonzalez-Derrego M, Crisol FJ. Epidemiology and mortality of adult burns in Catalonia. Burns 1999; 25(4): 325-329.
4. Murray P, Finegold S. Anaerobes in burn wound infection. Rev Infec Dis 1984;6(Suppl 1):S184-S186.
5. Lari AK, Bahrami HH, Alaghehbandan R. Pseudomonas infection in Tohid Burn Centre, Iran. Burns 1998;24(7): 637-641.
6. Begum H, Quamruzzaman M, Talukdar M. Microbial isolates from patients and their antibiogram at the tertiary care Burn Unit in Bangladesh. J Bangladesh Coll Phys Surg 2011; 29:62-66.
7. Nasser S, Mabrouk A, Maher A. Colonization of burn wounds in Ain Shams University Burn Unit. Burns 2003;29(3):229-233.
8. Chalise PR, Shrestha S, Sherpa K, Nepal U, Bhattachan CL, Bhattacharya SK. Epidemiological and bacteriological profile of burn patients at Nepal Medical College Teaching Hospital. Nepal Med Coll J 2008;10(4):233-237.
9. Vidal F, Mensa J, Almela M, Olona M, Martinez JA, Marco F, et al. Bacteraemia in adults due to glucose non-fermentative gram negative bacilli other than Pseudomonas aeruginosa. Q J Med 2003;96:227-34.
10. Naqvi ZA, Hashmi K, Rizwan QM, Kharal SA. Multidrug resistant Pseudomonas aeruginosa: A nosocomial infection threat in burn patients. Pak J Pharmacol 2005; 22(2):9-15.
11. Collee JG, Marr W. Specimen collection, culture containers and media In: Collee JG, Marmion BP, Fraser AG, Simmons A, editors. Mackie and McCartney. Practical Medical Microbiology, 14th ed. Churchill Livingstone; 1999.p.95-111.
12. Manoharan A, Chatterjee S, Mathai D. Detection and characterization of metallo beta lactamases producing Pseudomonas aeruginosa. Ind J Med Microbiol 2010;28(3):241-244.
13. Ekrami A and Kalantar E. Bacterial infections in burn patients at a burn hospital in Iran.Indian J Med Res 2007;126:541-544.
14. Alp E, Coruth A, Gunay GK, Yontar Y and Doganay M. Risk factors for nosocomial infection and mortality in burn patients: 10 years of experience at a University Hospital. J Burn Care Res 2011; XX:01-05.
15. Ressner RA, Murray CK and Griffith ME. Outcomes of bacteremia in burn patients involved in combat operations overseas. J Am Coll Surg 2008;206:439-444.
16. Murray CK, Hoffmaster RM, Schmit DR, Haspenthal DR, Ward JA, et al. Evaluation of white blood cell count, neutrophil percentage, an elevated temperature as predictors of blood stream infection in burn patients. Arch Surg 2007; 142(7):639-642.
17. Mahar P, Padiglione AA, Cleland H, Paul E, Hinrichs M, Wasiak J. Pseudomonas aeruginosa bacteraemia in burns patients: Risk factors and outcomes. Burns 2010;36:1228–1233.
18. Saha SK, Muazzam N, Begum SA, Chowdhury A, Islam MS, Parveen R. Study on time related changes in aerobic bacterial pattern of burn wound infection. Faridpur Med Coll J 2011; 6(1):41-45.
19. deMacedo JLS and Santos JB. Bacterial and fungal colonization of burn wounds. MemInst Oswaldo Cruz, Rio De Janeiro 2005; 100(5):535-539.