Int.J.Curr.Microbiol.App.Sci (2016) *5*(8): 832-836

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 5 Number 8 (2016) pp. 832-836**
Journal homepage: http://www.ijcmas.com

Original Research Article http://dx.doi.org/10.20546/ijcmas.2016.508.093

Bacteriological Profile of Burn Patients in a Tertiary Care Hospital, Jamnagar, Gujarat, India

Pooja A. Kamaria*, Binita J. Aring and Mala Sinha

Department of Microbiology, Shri M. P. Shah Government Medical College and GGG Hospital, Jamnagar, Gujarat, India
**Corresponding author*

Keywords

Burn, Swab samples, Nosocomial infection, Antibiotic Resistance.

Article Info

Accepted:
21 July 2016
Available Online:
10 August 2016

A B S T R A C T

Infection is a common cause of morbidity and mortality in burn patients. Clinical diagnosis of bacteremia and/or sepsis in burn patients is difficult for a number of reasons. It could be symptomatic and/or asymptomatic as a result of immune deficiency secondary to thermal injury. To determine the bacteriological profile from burn patients and their resistance pattern for the various antibiotics. This Retrospective study was carried out in the Department of Microbiology, Shri M. P. Shah Government Medical College, Jamnagar, Gujarat from June 2014 to June 2015 from burns ward, Guru Govind Singh Govt. Hospital Jamnagar. A total of 471 swab samples were cultured by conventional method. Antibiotic susceptibility test of the isolates was determined by Kirby bauer disc diffusion method. 471 swab samples of 246 patients were enrolled in the study group of whom 56.69% were found bacteremic and 43.31% were found sterile. 262 isolates of 10 different bacteria were obtained from swab samples, of which *Pseudomonas aeruginosa* (33.08%), *Klebsiella* spp.(28.57%), *Acinetobacter* spp. (14.66%), *Staphylococcus aureus* (14.28%) were predominant. The present study conclude that aggressive infection control measures should be applied to limit the emergence and spread of multi drug resistant pathogens.

Introduction

Burn wound infection is one of the most co mmon causes of mortality and morbidity in burn patients (Sedat *et al*., 2005). It has been estimated that 75% of all deaths following thermal injuries are related to infections (Vindenes *et al*., 1995). The rate of nosocomial infections are higher in burn patients due to various factors like nature of burn injury itself, immunocompromised status of the patient, invasive diagnostic and therapeutic procedures and prolonged ICU stay (Pruitt *et al*., 1998).

Initially, the burnt area is considered free of microbial contamination. But gram-positive bacteriain the depth of sweat glands and hair follicles heavily colonized the wound within 48 hours of the injury (Luterman; Mooney, 1989). Topical antimicrobials decrease microbial overgrowth but seldom prevent further colonization with other potentially invasive bacteria. These are derived from patient's gastrointestinal and upper respiratory tract and the hospital environment (Monafo *et al*., 1987; Hansbrough, 1987). Following colonization, these organisms start penetrating the viable tissue depending on their invasive capacity, local wound factors and degree of the

patient's immunosuppression (Hansbrough *et al*., 1987).

The causative infective microorganisms in any burn facility change with time. Individual organisms are brought into burns ward on the wounds of new patients. These organisms persist in the resident flora of the burn treatment facility for a variable period of time, only to be replaced by newly arriving microorganisms. Introduction of new topical agents and systemic antibiotics influence the flora of the wound (Pruitt *et al*., 1984; Manson *et al*., 1992).

The importance of preventing infection has been recognized in organized burn care centers starting from its inspection. These include strict aseptic techniques, use of sterile gloves and dressing materials, wearing mask for dressing changes and special separation of patients, using private rooms (Sharma, 2005).

Materials and Methods

This retrospective study was carried out in the Department of Microbiology, Shree M.P. Shah Govt. Medical College and G.G.G. Hospital, Jamnagar, Gujarat from June 2014 to June 2015. We have included pus swab samples and excluded other samples like blood, urine, stool and other body fluids. A total of 471 pus swab samples were received from burns ward of Guru Gobind Singh Govt. Hospital, Jamnagar.

All the samples were inoculated on MacConkey agar, Blood agar and Nutrient agar plates. The culture plates were incubated aerobically for 24 hrs at 37°C. Growth and cultural characteristics were observed next day. Bacterial pathogens were identified by conventional biochemical methods according to standard microbiological techniques. Anti-microbial sensitivity testing was done according to the CLSI (Clinical and Laboratory Standards Institute) guidelines (CLSI, 2014) by Kirby bauer disc diffusion method for Amikacin (30mcg), Netilmycin(30mcg), Gentamycin (10mcg), Ceftazidime(30mcg), Piperacillin+ Tazobactum (100mcg/10mcg), Aztreonem (30mcg), Imipenem (10mcg), Ciprofloxacin (5mcg), Azythromycin(30 mcg), Linezolid (30 mcg) and Vancomycin(30 mcg).

Ethical clearance

It is a retrospective analysis of samples tested for routine laboratory diagnosis; hence ethical clearance is not necessary.

Statistics

Data was entered and analyzed in MS excel 2007.

Results and Discussion

In the present study, bacterial isolates were found in 267 (56.69%) swab samples & 171 (43.31%) were found sterile. Table -1 shows that 43 (16.41%) isolates were gram positive organisms and 219(83.59%) were gram negative organisms. Table-2 shows that *Pseudomonas aeruginosa* was the commonest pathogen isolated (33.59%). Other isolates include *Klebsiella* spp. (29.01%), *Acinetobacter* spp. (14.89%), *Staphylococcus aureus* (14.50%), *E.coli* (3.44%), *Proteus* spp. (2.66%) and *Enterococcus* spp. (1.91%).

The Susceptibility of the organisms to different antibiotics varied depending on the isolates. Table-3 shows Antibiotic Resistant pattern of Gram negative bacilli. *Pseudomonas aeruginosa* was highly resistant to Gentamicin (89.77%) and least resistant to Imipenem (15.90%). *Acinetobacter* spp. was highly resistant to

Ceftazidime (93.54%) and least resistant to Imipenem (48.71%). Resistant to Gentamicin (86.84%) and Ceftazidime (86.84%) were high for the *Klebsiella* spp. Other gram negative bacilli were least resistant to imipenem (50.00%). *P. aeruginosa* and *Acinetobacter* spp. were found to be Multidrug resistant. 33 (37.5%) isolates of *P. aeruginosa* and 25 (64.10%) isolates of *Acinetobacter* spp. were multidrug resistant.

Table-4 Resistant pattern of Gram positive cocci. *S aureus* and *Enterococci* spp. show 0% resistant to both for Vancomycin and Linezolid.

Table.1 No. of gram positive and gram negative organisms isolated

Type of Organisms	No. of strains	Percentage
Gram Positive Organisms	43	16.41%
Gram Negative Organisms	219	83.59%

Table.2 Various isolate recovered from burns patients

Organism	No. (out of 262 isolates)	Percentage (%)
Pseudomonas aeruginosa	88	33.59
Klebsiella spp.	76	29.01
Acinetobacter spp.	39	14.89
Staphylococcus aureus	38	14.50
Escherichia coli	9	3.44
Proteus spp.	7	2.66
Enterococcus spp.	5	1.91

Table.3 Antibiotic resistant pattern of gram negative organisms

Name of antibiotics	*P.aeruginosa* N=88 Resistance (%)	*Acinetobacter* spp. N= 39 Resistance (%)	*Klebsiella* spp. N= 76 Resistance (%)	Other Gram Negative Microorganisms N= 16 Resistance (%)
Ceftazidime (CAZ)	68 (77.27%)	29 (93.54%)	66 (86.84%)	10 (62.5%)
Piperacillin+ Tazobactum(PT)	48 (54.54%)	30 (76.92%)	49 (64.47%)	9 (56.25%)
Imipenem (IMP)	14 (15.90%)	19 (48.71%)	51 (67.10%)	8 ((50.00%)
Gentamicin (GEN)	79 (89.77%)	31 (79.48%)	66 (86.84%)	14 (87.5%)
Ciprofloxacin (CIP)	76 (86.36%)	33 (84.61%)	65 (85.52%)	15 (93.75%)
Netilmicin (NET)	66 (75.00%)	20 (51.28%)	55 (72.36%)	11 (68.75%)
Colistin (CL)	0 (0%)	0 (0%)	NT	NT

(*NT = Not Tested)

Table.4 Antibiotic resistant pattern of gram positive organisms

Name of antibiotics	*S. aureus* (N= 38) Resistance (%)	*Enterococcus* spp. (N= 5) Resistance (%)
Erythromycin	47.37	80
Clindamicin	26.31	NT
Linezolid	0	0
Vancomycin	0	0
Ciprofloxacin	42.10	80
Ampicillin	94.28	100

(*NT = Not Tested)

In the present study, the most commonly isolated organism from burn patients was *Pseudomonas aeruginosa*, followed by *Klebsiella* spp., *Acinetobacter* spp. and *S. aureus* were predominant. A study done by Manjula *et al*., (2007) shows that most commonly isolated organism was *Pseudomonas aeruginosa* (51.5%) followed by *Acinetobacter* spp. (14.28%), *S. aureus* (11.15%), *Klebsiella* spp. (9.23%) were predominant. Other study done by Ganesamoni S. *et al*., (2010) also shows that commonest organism was *P.aeruginosa* (81.1%), followed by *Acinetobacter* spp. and *S. aureus*.

The bacterial resistance pattern is important for clinical and epidemiological purpose. A comparative study done by Indu *et al*., (2014) shows that *P.aeruginosa* was 81.03% and 18.9% resistant to Gentamicin and Imipenem respectively. A study done by Yasemin *et al*., (2013) shows that for *Acinetobacter* spp., resistance to Ceftazidime, Gentamicin, Ciprofloxacin and Imipenem were 93%, 86%, 86% and 86% respectively. For vancomycin and linezolid resistance, comparative done by Yasemi *et al*., (2013) shows 0% resistance for both the drugs, which are comparable to present study.

The main limitations of present study are retrospective study design and collection of data from a single burn centre. There is also unavailability of culture isolates for molecular analysis or additional testing to determine if isolates were acquired through nosocomial transmission. It is also known that widespread use of broad spectrum antimicrobials in burn units may lead to acquisition of resistance and transformation to form new strains (Chim *et al*., 2007).

The present study conclude that isolation of multidrug resistant should be considered as a serious risk in burn units. Routine microbiological surveillance and careful in-vitro testing prior to antibiotic use and strict adherence to hospital policy.

References

Chim, H., Tan, B.H., Song, C. 2007. Five-year review of infections in a burn intensive care unit: High incidence of *Acinetobacter* baumannii in a tropical climate. *Burns.* 2007;33(8):1008-14.

CLSI. 2014. *Performance Standards for Antimicrobial Susceptibility Testing; Twenty-Fourth Informational Supplement.* CLSI document M100-S24. Wayne, PA: Clinical and Laboratory Standards Institute.

Ganesamoni, S., Kate, V., Sadasivan, J.Epid emiology of hospitalized burn patients in a tertiary care hospital in South Indi a.NCBI. 36(3): 422-9. (PubMed)

Hansbrough, J.F. 1987.Burn wound sepsis. *J. Intensive Care Med.*, 2: 313–27.

Indu, B. 2014. Incidence of multidrug resistant *Pseudomonas aeruginosa* isolated from burn patients and environment of teaching institute. PMCID: PMC4080000.

Luterman, A., Dasco, C.C., Curreri, P.W. 19 86.Infection in burn patients. *Am. J. M ed.*, 81: 45–52. (PubMed)

Manjula, M., Priya, D., Varsha, G. 2007. Bacterial isolates from burn wound infections and their antibiograms: A eight-year study. *Indian J. Plastic Surgery,* 40(1): 25-28.

Manson, W.L., Pernot, P.C., Fidler, V., Saue r, E.W. 1992. Colonisation of burns and duration of hospital stay of severel y burned patients. *J. Hosp. Infect.*,22: 55–63.

Monafo, W.W., Freedman, B. 1987.Tropical therapy for burns. *Surg. Clin. North A m.*, 67: 133–45.

Mooney, D.P., Gamelli, R. L. 1989. Sepsis following thermal injury. *CompTher.*, 15: 22–9. (PubMed)

Pruitt, Jr. B.A., McManus, A.T., Kim, S.H., Goodwin, C.W. 1998. Burn Wound infections: current status. *World J. Surg.*, 22: 135-45.

Pruitt, B.A., Jr, McManus, A.T. 1984.Oppu rtounistic infections in severely burnt patients. *Am. J. Med.*, 76: 146–54. (PubMed)

Sedat, Y., Tarik, Z., Nurkan, T., Targut, N., Yusuf, Z., Gokhan, M., Mehmet, H. 2 005.Bacteriological profile and antibio tic resistance. *J. Burnwound and Reha bilitation,* 6(6): 488. (PubMed)

Sharma, B.R., Virendar, P., Sumedha, B., N eha,G. 2005.Septicemia the principal k iller of burn patients. *Amer. J. Infect. Dis.*, 1(3): 132–138.

Vindenes, H., Bjerknes, R. 1995. Microbial colonization of large wounds. *Burns,* 21: 575-9.

Yasemin, Bayram, Mehmet Parlak, Cenk Aypak, İrfan Bayram. 2013. Three-year Review of Bacteriological Profile and Antibiogram of Burn Wound Isolates in Van, Turkey. *IJMS*, 10(1): 19-23.

How to cite this article:

Pooja A. Kamaria, Binita J. Aring and Mala Sinha. 2016. Bacteriological Profile of Burn Patients in a Tertiary Care Hospital, Jamnagar, Gujarat, India. *Int.J.Curr.Microbiol.App.Sci.* 5(8): 832-836. doi: http://dx.doi.org/10.20546/ijcmas.2016.508.093