IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 10 Ver. XI (Oct. 2015), PP 01-04
www.iosrjournals.org

Bacteriological profile and Antibiogram of Burn wound infections in a tertiary care hospital

N. Lakshmi[1], Ramalakshmi Koripella[2], Jayalaxmi Manem[3], Perala Balamurali Krishna[4]
[1,2,3,4]*Department of Microbiology, Andhra Medical College , Visakhapatnam , AP, India*

Abstract:
Introduction: *The major cause of morbidity and mortality in burn patients is due to infections . Inspite of recent advances in the health care practices related to burn wound management and infection control practices, still infection remain the main cause of mortality. Emergence of drug resistant pathogens like MRSA and ESBL producers is leading to inappropriate treatment and hence increased morbidity and mortality.*
Aims: *To isolate various bacteria from samples of burn wound infections and the antibiotic pattern of the isolated organisms .*
Materials and Methods: *Swabs from 435 burn wounds received at microbiology laboratory , Andhra Medical College from King Gorge Hospital during the period of June 2014 to June 2015 were included in the study. The samples were processed as per the standard protocol. Pathogenic organisms were isolated, identified by biochemical tests and antibiotic susceptibility testing was performed by Kirby- Bauer disc diffusion method.*
Results: *Out of 435 samples , 405 (93%) samples were culture positive and 30 (6.9%) were sterile . The predominant isolate was Pseudomonas (33.6%) followed by Escherichia coli (20.9%), Klebsiella species (18.5%) ,Proteus species (17.3%), Staphylococcus aureus (5.7%) and Acinetobcter species (3.9%). Among Staphylococcus aureus, 39.1% were MRSA and all were susceptible to vancomycin and linezolid (100%). Gram negative isolates were more sensitive to Meropenem (92.6%), Amikacin (92.6%), PIT (86.7%) and Ceftriaxone (86.1%). Extended spectrum Beta lactamase (ESBL) producers were 28% among Enterobacteriaceae isolates.*
Conclusion: *Continuous microbiological surveillance and careful in vitro testing prior to antibiotic use and strict adherence to hospital antibiotic policy helps in the prevention of emergence of multidrug resistant pathogens like MRSA and ESBL producers .*
Keywords: *Antibiotic susceptibility , Burns , ESBL , MRSA , Psdeudomonas aeruginosa.*

I. Introduction

The major cause of morbidity and mortality in burn patients is due to infections . Burn patients are ideal hosts for opportunistic infections.[1] Inspite of recent advances in the health care practices related to burn wound management and infection control practices, still infection remain the main cause of mortality. Several reports states that nearly 75% of all deaths in burn patients are due to infections.[2,3,4] Further , infections cause delay in maturation and deep scar formation of burn wounds.[5]

Aerobic bacteria routinely isolated from burn wounds include Pseudomonas aeruginosa , Escherichia coli , Klebsiella spp, Proteus spp, Staphylococcus aureus etc . Pseudomonas aeruginosa has emerged as a predominant member of burn wound flora.[6] The pathogens which cause infections vary from place to place and time to time . [7] Emergence of drug resistant pathogens like MRSA(Methicillin Resistant Staphylococcus aureus) and ESBL(Extended Spectrum Beta Lactamase) producers is leading to inappropriate treatment and hence increased morbidity and mortality.[8]

The present study was conducted to know the current aerobic bacterial profile and their antibiogram of burn wound infections in a tertiay care hospital .

II. Aims and objectives

1. To isolate various bacteria from samples of burn wound infections .
2. To study the antibiotic pattern of the isolated organisms .

III. Materials and methods

A total of 435 burn wound swabs received at microbiology laboratary, AMC from KGH during the period of June 2014 to June 2015 were included in the study. The samples were collected prior to antibiotic therapy by commercially available sterile swabs and transported to the lab. The samples were processed in the

laboratory as per the standard protocol by inoculating on Blood agar , MacConkey agar and incubated overnight at 37^0 C aerobically. Pathogenic organisms were isolated and identified by conventional biochemical tests.[9] The antibiotic susceptibility testing was performed by Kirby- Bauer disc diffusion method as per CLSI guidelines[10] and commercially available antibiotic discs (Hi-media) were used.

For GPC the following drugs were used…

1. Cefoxitin 30 mcg
2. Amoxyclav 20/10 mcg
3. Azithromycin 30 mcg
4. Ofloxacin 5 mcg
5. Vancomycin 30 mcg
6. Linezolid 30 mcg
7. Meropenem 10 mcg
8. Ceftazidime 30 mcg

For GNB the following drug were used

1. Amoxyclav 20/10 mcg
2. Ciprofloxacin 5mcg
3. Amikacin 30mcg
4. Ceftazidime 30 mcg
5. Ceftriaxone 30mcg
6. Piperacillin+ Tazobactum 100/10 mcg
7. Ceftazidime + Clavulonate 30/10 mcg
8. Meropenem 10 mcg

E .coli ATCC 25922 , Pseudomonas aeruginosa ATCC 27853 , Staphylococcus aureus 25923 were used as control strains.

Cefoxitin disc was used to detect methicillin resistance in Staphylococcus species and ESBL producing organisms were identified by using ceftazidime and ceftazidime + Clavulinic acid discs as per CLSI guidelines

IV. Results

Out of 435 samples , 258(59.3%) were from females and 117 (40.6%) were from males. Majority of the cases were from 20 to 40 years age group (66%) . Out of 435 samples , 405 (93%) samples were culture positive and 30 (6.9%) were sterile .

TABLE 1 : Isolation rate of organisms from burn wound swabs (n=405)

S.no	Organism	No	Percentage
1	Pseudomonas species	136	33.6%
2	Escherichia coli	85	20.9%
3	Klebsiella species	75	18.5%
4	Proteus Species	70	17.4%
5	Staphylococcus aureus	23	5.7%
6	Acinetobacter species	16	3.9%
Total		405	100%

The predominant isolate was Pseudomonas species (33.6%) followed by Escherichia coli (20.9%), Klebsiella species (18.5%) , Proteus species (17.3%), Staphylococcus aureus (5.7%) and Acinetobcter species (3.9%) (TABLE 1).

Out of 405 culture positive samples, 24 (5.9%) showed mixed bacterial growth . Among 24 mixed isolates, Staphylococcus aureus +Pseudomonas spp isolated in 4 samples , Coagulase Negative Staphylococci + klebsiella spp in 14 samples and Klebsiella spp + Pseudomonas spp in 6 samples.

TABLE 2 : Sensitivity pattern of Gram positive isolates

Isolate	CX	AMC	AZM	OF	CAZ	VA	LZ	MEM
Staphylococcus aureus(n=23)	9 (39.1%)	14 (60.8%)	18 (78.2%)	17 (73.9%)	17 (73.9%)	23 (100%)	23 (100%)	21 (91.3%)
CoNS (n=14)	14 (100%)	11 (78.5%)	11 (78.5%)	12 (85.7%)	12 (85.7%)	14 (100%)	14 (100%)	14 (100%)

Note :CoNS= Coagulase Negative Staphylococci, CX= cefoxitin, AMC = Amoxyclav, AZM = Azithromycin, OF = Ofloxacin, CAZ = Ceftazidime , VA = Vancomycin, LZ = Linezolid, MEM = Meropenem

Among Staphylococcus aureus, 39.1% were MRSA and all were susceptible to vancomycin and linezolid (100%) (TABLE 2) .

TABLE 3: Sensitivity pattern of Gram negative isolates

	AMC	CIP	AK	CAZ	CTR	PIT	CAC	MEM
Pseudomonas spp (n=136)	94 (69.1%)	102 (75%)	126 (92.6%)	102 (75%)	118 (86.7%)	118 (86.7%)	106 (77.9%)	126 (92.6%)
E .coli (n=85)	65 (76.4%)	69 (81%)	82 (96.4%)	68 (80%)	74 (87%)	76 (89.4%)	76 (89.4%)	82 (96.4%)
Klebsiella spp (n=75)	56 (74.6%)	62 (82.%)	72 (96%)	64 (85.3%)	64. (85.3%)	72 (96%)	66 (88%)	72 (96%)
Proteus spp (n=70)	52 (70%)	56 (80%)	66 (94.2%)	56 (81%)	56 (80%)	64 (91.4%)	56 (80%)	64 (91.4%)
Acinetobacter spp (n=16)	10 (62.5%)	10 (62.5%)	12 (75%)	12 (75%)	10 (62.5%)	12 (75%)	12 (75%)	14 (87.5%)

Note: AMC = (Amoxycillin + Clavulanic acid) , CIP = Ciprofloxacin, AK =Amikacin , CAZ =Ceftazidime , CTR = Ceftriaxone ,PIT= Piperacillin + Tazobactum , CAC = Ceftazidime + Clavulanic acid , MEM = Meropemem

Gram negative isolates were sensitive to Meropenem (92.6%), Amikacin (92.6%). PIT (86.7%), Ceftriaxone (86.1%) followed by Ceftazidime , Ciprofloxacine and Amoxyclav(Table -3). Extended spectrum Beta lactamase (ESBL) producers were 28% among Enterobacteriaceae isolates , which was detected by Ceftazidime + Clavulanic acid combination discs as per CLSI guidelines .

V. Discussion

The rate of nosocomial infections are higher in burn patients due to various factors like nature of burn injury , immunocompromised status of patient , invasive , diagnostic and therapeutic procedures and prolonged ICU stay .[11]

The burn site remains relatively sterile during the first 24 hrs , there after colonization of the wound by Gram negative bacteria common.[11]

In addition, problem of multidrug resistance in Gram negative bacilli due to ESBL production and MRSA in Staphylococcus is becoming threat[12].

In the present study, the incidence of burn wound infection was higher in females (59.3%) which correlates with S. Rajeshwara Rao et al (56.2%)[13] , Umachowdary et al (53%)[14] , Jithendra Kandati et al (53.2%)[15] and Kour et al reported 68%[16]

The common age group effected in the present study was 20- 40 yrs (66%) which correlates with Kaur et al [16] and S. Rajeshwara rao et al [13].

In the present study, Pseudomonas aeruginosa was the commonest isolate(33.6%) which correlates with Alirej Ekrami et al (37.5%)[17] and Herjinder kaur et al[16], Manjula mehatha et al reported 51.5%.[18]

The antibiotic sensitivity pattern of Gram negative bacilli and Gram positive cocci in the present study correlates with S.Rajeshwar et al.[13]

Methicilline resistance was seen in 39.1% of Staphylococcus aureus isolates in the present study which coincides with S . Rajeshwar et al (32.7%)[13]and Alireja Ekrami et al (58%) [19] and dissimilar in various studies [20, 21]

In the Present study , ESBL producers among Enterobacteriaceae were 28% which Correlates with S.Rajeshwar et al (30.9%).[13] Alireza Ekrami et al (32.1%)[19]

Among Staphylococcus aureus, 39.1% were MRSA and all were susceptible to vancomycin and linezolid (100%) correlates with S.Rajeshwar et al.[13]

VI. Conclusion

As infections are serious problem among burn patients , there is a need for every hospital to have a data on prevalent organisms and their antibiotic susceptibility pattern which also helps to formulate an effective antibiotic policy .

Inadequate antimicrobial therapy for infected patients may lead to higher morbidity and mortality but inappropriate use of higher antibiotics leads to MDR strains. Hence continuous microbiological surveillance and careful in vitro testing prior to antibiotic use and strict adherence to hospital antibiotic policy helps in the prevention of emergence of multidrug resistant pathogens like MRSA and ESBL producers .

References

[1]. Cochran A, Morris SE, Edelman LS, Saffle JR. 2002. Systemic Candida infection in burn patients. Surg infection Larch mt. Vol.3(4).pp367-374.
[2]. Macedo JLS, Santos JB,Bacterial and fungal colonization of burn wounds, Mem lnst Oswaido Cruz 2005;100:535-539.
[3]. Taneja N, Emmuanuel R, Chari PS, Sharma M.A prospective study of hospital-acquired infectins in burn patients at a tertiary care referral centre in North India.Burns 2004;30:241-243.
[4]. Vindenal H, Bjerknes R. Microbial colonization of large wounds,Burns 1995; 21: 575-579.
[5]. Mayhall, C.G. 2002. The epidemiology of burn wound infections: then and now. Burns, 29: 738 44.
[6]. Revathi G, Puri J, Jain B K. 1998. Bacteriology of burns. Burns. Vol.24.pp347-349
[7]. Kumar, V., Bhatnagar, S.K., Singh, A.K.,Kumar, S., Mishra, R.K. 2001. Burn wound infection: A study of 50 cases with special reference to antibiotic resistance.Indian J. Biol. Res., 46:66 9.
[8]. Dr SC Parija, DR S Sujatha,Dr Rahul Dhodapkar Dr SidharthaGiri,Dr Shamanth D. Standard operating procedure manual,2011; Dept.of Microbiology,JIPMER,Pondicherry.79-81.
[9]. Colle JG, Miles RS, Watt B.Tests for Identification of bacteria.Mackie and Cartney Practical Medical Microbiology, Churchill Livingstone 2008:14 th edition.131-149.
[10]. Clinical Laboratory Standards Institute. Performance standards for antimicrobial Disk susceptibility tests: approved standard. 9 th ed. CLSI document M2-A9, 2006; 26(1): Wayne,PA.
[11]. Pruitt Jr BA,McManus AT,kim SH, Goodwin CW. Burn Wound infections: current status. World J Surg 1998;22:135-45.
[12]. Singh NP, Goyal R, Manchanda V, Das S, Kaur Z, Talwar V. Changing Trends in bacteriology of burns units, Delhi, India. Burns 2003;29:129-32.
[13]. S. Rajeshwar Rao et al. World journal of pharmacy and pharmaceutial sciences; Bacteriological profile, Antibiogram of burn would isolates and detection of MRSA and ESBL production at tertiary care hospital, Hyderabad. VOL 3,Issue 10,2014.
[14]. Uma Chaudhary, NidhiGoel, Madhu Sharma, Mahavir Singh Griwan, Vikas Kumar. Methicillin resistant Staphylococcus aures infection/colonization at the burn care unit of a medical school in India. J Infect Dis Antimicrob agents.2007; 24:29-32.
[15]. Jithendra Kandati et al, International Journal of Current Microbiology and Applied sciences; ISSN: 2319-7706 Volume 4 Number 1 (2015) pp.348-358.
[16]. Herjinder Kaur et al,Bacteriological profile of blood and burn wound infections in Burn patients.
[17]. AlirezaEkrami & EnayatKalantar. Bacterial infections in burn patients at a burn hospital in Iran. Indian J Med Res December, 2007; 126: 541- 544.
[18]. Manjula Mehta,Depatment of Microbiology, Government Medical College Hospital, Chandigarh, India.;Bacterial isolates from burn wound infections and their antibiograms:
[19]. AlirezaEkrami, AlirezaSamarbafzadeh, Mohammad alavi, EnayatKalantar, FarhadHamzeloi. Prevalence of methicillin resistant Staphylococcus species isolated from burn patients in a burn center, Ahvaz, Iran. Jundishapur J of Microb, 2010; 3(2): 84 - 91..
[20]. Zulfiqar A Naqvi, Khursheed Hashmi and Saleem A Kkharal. Methicillin resistant Staphylococcus aureus (MRSA) in burn patients. Pakistan J of Pharmacology, 2007; 24(2): 7 - 11.
[21]. VG Bhat and SD Vasalkar. Bacteriological profile and antibiogram of aerobic burn wound isolates in Mthatha, Eastern Cape, South Africa. South Afr J Epidemiol Infect, 2010; 25(4): 16-19