International Journal of Recent Biotechnology
Available online at www.ijrbp.net

ISSN: 2322 – 0392
Int. J. Rec. Biotech. **2013,** 1 (1): 25-31

Research Article

IJRB

Bacteriological status and Antimicrobial sensitivity pattern of Burn patients

Deepika Trikotiya*
Mahatma Gandhi Institute of Applied Sciences, Jaipur (Rajasthan)
*Corresponding Author Email: trikotiyadeepika1990@gmail.com

ABSTRACT

In a study conducted between June 2013 and August 2013, 70 patients were studied. Amongst these, 20 (28.57 %) patients had positive cultures. Gram-negative bacilli accounted for 30 (42.85 %); Pseudomonas species 14 (20 %) Klebsiella pneumoniae 09 (12.85%) were the commonest. Staphylococcus aureus 10(14.28 %) and Enterococcus species 3 (4.28 %) were the most common gram-positive isolates followed by Streptococcus species. Beside this 20 isolates were found sterile. Antibiotic susceptibility of all the isolates was performed by the Kirby-Bauer disk-diffusion techniques. Both Klebsiella pneumoniae and Pseudomonas species showed alarmingly high resistance to all groups of antibiotics with 70-80% resistant to amoxicillin and cephalexin, but were all sensitive to cefaperazone–sulbactum and tazobactum with piperacillin. 4.28 % of the staphylococcus was methicillin-resistant. 4.28% of Enterococcus species were multidrug-resistant. Both the gram positive isolates were also 100% sensitive to vancomycin. Thus, the study clearly highlights the rising level of drug resistance amongst the bacterial isolates from blood and, hence, the need to continuously monitor the locally emerging antibiotic resistance patterns, and updates the existing drug policies.

Key Words: *Burn wound infection, culture, antibiotic resistance, disc test.*

INTRODUCTION

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. The survival rates for burn patients have improved substantially in the past few decades due to advances in modern medical care in specialized burn centers. Improved outcomes for severely burned patients have been attributed to medical advances in fluid resuscitation, nutritional support, pulmonary care, burn wound care, and infection control practices.[1] In local response three zones of a burn were Zone of coagulation, Zone of stasis, Zone of hyperaemia, While in systemic response Cardiovascular changes, Respiratory changes, Metabolic changes, Immunological changes were observed.

In patients with severe burns over more than 40% of the total body surface area (TBSA), 75% of all deaths are currently related to sepsis from burn wound infection or other infection complications and/or inhalation injury.[2]

This study focuses on modern aspects of the epidemiology, bacteriological diagnosis, management according to antibiotic sensitivity pattern to prevent septic complications.

MATERIALS AND METHODS

This prospective study was done on 70 patients admitted in burn unit . Surface swabs were taken using standard methods, Gram stained and cultured for the growth of the bacteria which were then subjected to various antibiotic sensitivity testing .

For identification of various bacterial species and to differenciate them from one another various biochemical tests were performed such as catalase test **(**Micrococcaceae were differentiated from the Streptococcaceae),Coagulase test (identify *Staphylococcus aureus* and differenciate it from the other species of *Staphylococci*), Oxidase test

(used to identify genera such as *Aeromonas, Pseudomonas, Neisseria, Campylobacter,* and *Pastuerella* (positive).Indole test, methyl red, voges proskauer , citrate utilization test, Triple sugar iron agar (used to differenciate the various species of enterobacteriaceae). Antibiotic sensitivity testing was done by Kirby bauer Disc diffusion method by using muller hinton agar.

RESULTS AND DISCUSSION

Burn wound infection is a serious and important complication that occur during acute phase following Burn injury. This influence morbidity and mortality of the patients and also affects the treatment guideline of burn patients. Despite several control measures in burn units, these infections play a very important role in patient management. Many factors are responsible for this management which includes types and severity of burn, age group of patients, immunological status of patient and nosocomial infections. Microbes rapidly colonize either from endogenous route or exogenous route from hospital environment.

In present study 70 samples were collected during 3 months of time from the burn unit of this institution by non repeatative sampling method.

Out of 70 samples, 30 isolates were Gram negative organisms and 20 isolates were Gram positive organisms. While Bariar LM et al (1997) studied 227 strains isolated from burn patients. 195 strains (86%) were gram-negative bacteria. Disk susceptibility showed various bacteria had high antibiotic resistance and multi-resistant rate

In present investigation Common Gram positive isolates were *Staphylococcus aureus,* Coagulase negative *Staphylococci, Enterococcus* and MR*SA* , Gram negative organism common isolates were *Pseudomonas aeruginosa , Klebsiella , E.coli* and *Proteus* which meets with other national studies and international data. While Kaushik et al (2001) analysed 336 samples, out of which 293 positive samples yielding 324 isolates. The isolates obtained from the culture of wound swabs were single in the majority of cases (78.0%). *Pseudomonas* was the most commonly cultured organism (54.2%) followed by *Staphylococcus aureus* (20.8%). Isolation of other organisms was uncommon by comparison. No isolates of beta-hemolytic streptococci or diptheroids were encountered.

Similarly Shankar Shrinivasan et al (2009) cultured 9333 swabs and antibiotic sensitivities to the isolated organisms determined. The age group of patients admitted to our facility ranged from one month to 15 years.*Klebsiella* was the predominant organism in our set-up (33.91%), closely followed by *Pseudomonas* (31.84%).

In present study Antibiotics sensitivity pattern indicated that commonest Gram negative isolate *Pseudomonas aeruginosa* found to be responsive to common antibiotics like Cefoperazone , Amikacin .The commonest Gram positive isolate *Staphylococcus aureus* also responded well to other common antibiotics used for Gram positive cocci. While Bariar LM et al (1997) studied 227 strains isolated from burn patients. 195 strains (86%) were gram-negative bacteria. Disk susceptibility showed various bacteria had high antibiotic resistance and multi-resistant rate. *S. aureus* was only susceptible to vancomycin, its resistant rate to imipenem was 19%. *P. aeruginosa* was only susceptible to polymyxin-B, its resistant rate to ceftazidime was 20%. However, after stop using ceftazidime two years, the susceptibility to gram-negative bacteria recovered. The resistant rate of ceftazidime to *P. aeruginosa*, *E.coli, K. pneumoniae* were decreased respectively. The resistance to quinolones was increased. The resistant rate of ciprofloxacin to *P. aeruginosa*, *K. pneumoniae* was increased respectively. After 20 microgram sulbactam added to cephalosporins drug disks, the primary susceptibility of ceftazidime to P. aeruginosa and K. pneumoniae recovered, and the antibiotic was better than the other cephalosporins[10].Similarly Japoni et al (2005) studied *Pseudomonas aeruginosa* plays a prominent role in serious infections in burn patients.[11]

CONCLUSION

Results of this study found to be very useful in management of burn patients admitted in IPD of burn unit. This study will be useful for data analysis of burn patients and their antibiotic sensitivity pattern.

TABLE:1 Sample analysis of burn patients collected from M.B.S Hospital, Kota.

S.NO.	Lab Reg. No.	Date	Age	Sex	*Organism isolated*	Sensitivity
1	1066	26/05/2012	55	M	*Proteus spp.*	S- Nil P-Nil R-Ag,AK,GM,RC,IM,QB,CE
2	1068	27/05/2012	22	M	*E.coli*	S-CL P-Nil S-CL
3	1069	27/05/2012	9	M	*Sterile*	
4	1070	2705/2012	35	M	*Staphylococcus aureus*	S-CI,LM,AK R-CE,AG,LI
5	1098	29/05/2012	45	M	*Enterococcus*	S-A/S,QB,VA,LI R-AM,TE, OF
6	1130	1/6/2012	35	F	*Sterile*	
7	1148	1/6/2012	19	M	Coagulase Negative *Staphylococci*	S-CP,RP,TE,GM,QB,LZ,Pef,Va,CH P-Er R-Nil
8	1166	4/6/2012	35	M	*Pseudomonas aeruginosa*	S-AK R-SF,DC,RC,QB,CB
9	1200	7/6/2012	40	M	*Klebsiella*	S-QB R-AK,RC,Na,SF,CB,CC
10	1258	9/6/2012	33	F	*Staphylococcus aureus*	S-CD,LZ,TE,PT,RP,Va,AK P-OF,CG R-Fg,CB,Er
11	1285	12/6/2012	38	F	*Pseudomonas aeruginosa*	S-CC,AK R-DC,CB,Na,SF
12	1298	13/06/2012	55	M	*MRSA*	S-VA, LI,CM,AZM R-Er,FX,AM
13	1304	14/6/2012	25	M	*Staphylococcus aureus*	S-CC,TE,Cd,DC P-Va R-Lz,Ak,CB,SF,IM
14	1305	14/6/2012	28	M	*Pseudomonas aeruginosa*	S-RF,CC P-Nil R-TE,CB,AK,SF,NF,DC,IM
15	1332	16/6/2012	25	M	*Sterile*	
16	1334	17/6/2012	35	M	*Staphylococcus aureus*	S-CC,TE,Cd,DC P-Va R-Lz,Ak,CB,SF,IM
17	1336	17/6/2012	25	M	*Klebsiella*	S-RF,AX P-CC,IM R-DC,RC,SF,TE
18	1347	18/6/2012	30	M	*Sterile*	
19	1413	22/6/2012	32	M	*Pseudomonas aeruginosa*	S-CS,RF,Fg+ P-Ak R-SF,RC,PR,TE

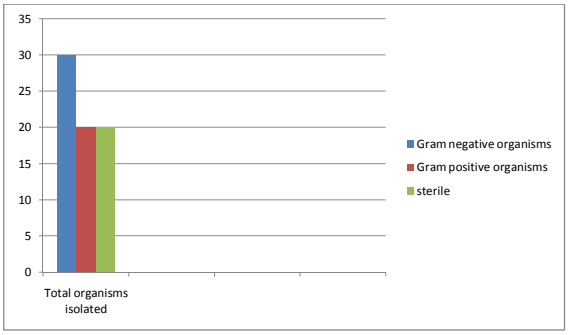
20	1414	22/6/2012	30	F	*Staphylococcus aureus*	S-TE,CS,RF P-RC R-AK,SF,PR,Fg+
21	1426	22-06-2012	48	M	*Enterococcus*	S-LI,AK,QB,VA,A/S R-AM,TE,OF
22	1431	23-6-2012	23	F	*Pseudomonas aeruginosa*	S-AK,RC,TE,PR R-SF,CS,Fg+
23	1436	23-6-2012	3	M	*Staphylococcus aureus*	S-TE,CS,RF P-RC R-AK,SF,PR,Fg+
24	1438	23-6-2012	23	F	*Sterile*	
25	1502	28-6-2012	38	F	*Pseudomonas aeruginosa*	S-CS,RC,RF P-Fg+ R-PR,TE,AK,KF
26	1503	28-6-2012	32	F	*Klebsiella*	S-RF,CS,Fg,RC P-nil R-KF,CB,AK,PR,SF,TE
27	1524	30-6-20012	6	F	*Staphylococcus aureus*	S-CC,TE,Cd,DC P-Va R-Lz,Ak,CB,SF,IM
28	1536	306-2012	45	F	*Klebsiella*	S-PT,RC P-AK R-PR,TE,KF,SF,RP,Fg+
29	1537	30-6-2012	24	F	*Klebsiella*	S-PT P-TE,AK R-SF,PR,KE,RP,Fg,RC
30	1538	30-6-2012	35	M	*Staphylococcus aureus*	S-LZ,Va,Kr,Cd,CC,PR P-TE,RP,SF R-RC
31	1548	1/7/2012	15	F	*Klebsiella*	S-PT,SF,Fg R-AK,TE,Pr,RP,KF,RC
32	1565	2/7/2012	35	F	*MRSA*	S-VA,Li,AZM,CM R-AM,OX,CX,FX,Er
33	1593	4/7/2012	23	F	*E.coli*	S-PT,CS,RC P-CC R-Fg,CB,RP,TE,AK
34	1627	6/7/2012	25	M	*Klebsiella*	S-CS P-AK,PT,RC,KF R-CB,Fg,SF,RP
35	1628	9/7/2012	19	F	*Klebsiella*	S-CS P-AK,PT,Fg+ R-KF,RC,CB,SF,RP
36	1629	9/7/2012	38	M	*Sterile*	

37	1663	12/7/2012	40	M	*E.coli*	S-RF,CS,RP P-PT,Fg+ R-RC,KF,Ak,CB
38	1664	12/7/2012	52	M	*Sterile*	
39	1665	12/7/2012	38	M	*Pseudomonas aeruginosa*	S-AK,CS,RF P-RP R-CB,Fg+,RC,PT,KC
40	1675	13-7-2012	40	M	*Sterile*	
41	1684	13-7-2012	40	M	*Sterile*	
42	1687	14-07-2012	45	F	*Enterococcus*	S-AK,LI,VA,QB,A/S R-AM,TE,OF
43	1690	15-7-2012	6	F	*Staphylococcus aureus*	S-CD,CB,PT,CC,Va P-TE R-RC,KF,RP,AK,CB
44	1705	16-7-2012	30	F	*Sterile*	
45	1706	17-7-2012	32	F	*Sterile*	
46	1717	18-7-2012	22	F	*Sterile*	
47	1764	21-7-2012	25	M	*Klebsiella*	S-CS P-Fg+,PT R-CB,RP,AK,RC,KF,TE
48	1770	22-7-2012	46	F	Coagulase Negative *Staphylococcus aureus*	S-PT,CC,RP,AK,CB R-Va,CG
49	1791	23-7-2012	25	F	Sterile	
50	1794	24-7-2012	26	M	*Pseudomonas aeruginosa*	S-RF,CS P-PT,Fg,Ak.RP R-CB,CG,RC,TE
51	1801	25-7-2012	35	M	Sterile	
52	1865	27-7-2012	30	F	*Pseudomonas aeruginosa*	S-PT,CB P-RF,TF R-CC,TE,Fg,RP,AK,CS
53	1903	1/8/2012	35	F	Sterile	
54	192	6/8/2012	54	M	Coagulase Negative *Staphylococci*	S-TE,CM,CC,Li P-VM,CG,AK R-CL,CB
55	1928	8/8/2012	18	M	*Pseudomonas aeruginosa*	S-PT,CB,CS,AK P-TE,RF,CG R-CL,RP,Fg
56	1957	10/8/2012	26	M	Sterile	
57	1958	10/8/2012	26	F	*Pseudomonas aeruginosa*	S-Cs,RF R-PT,AK,Fg,Rp,CG,CL,TE
58	1959	10/8/2012	30	M	Sterile	
59	1981	11/8/2012	6	F	*Pseudomonas aeruginosa*	S-CS,AK R-PT,TE,RP,CB,Fg,CG
60	1983	12/8/2012	43	F	Coagulase Negative *Staphylococcus aureus*	S-LZ,CC,PT,Va,Cd,CG P-RP R-AK,CL,TE,CB
61	2009	13-8-2012	45	M	*E.Coli*	S-Pt,Fg R-RP,CG,CB,AK,TE,CI
62	2012	14-8-2012	20	F	*Pseudomonas aeruginosa*	S-PF,PT R-CB,RP,Fg,Ak,CL,CG

63	2013	15-8-2012	38	F	Sterile	
64	2014	16-8-2012	40	F	*Pseudomonas aeruginosa*	S-RF,PT R-CG,CL,RP,AK,CB,Fg
65	2015	17-8-2012	20	M	*E.coli*	S-PT,RF P-AK,Fg R-CL,CG,CB,RP
66	2016	18-8-2012	80	M	Sterile	
67	2026	19-08-2012	60	F	*MRSA*	S-AZM,CM,LI,VA R-Er,FX,AM,OX,CX
68	2032	20-8-2012	25	M	*E.coli*	S-PT R-TE,AK,RP,Fg,CB,CG
69	2045	21-8-2012	3	M	*Staphylococcus aureus*	S-Nt,TE,Va P-CH,QB R-Er,Pef,GM,RP,CP
70	2049	22-8-2012	30	M	Sterile	

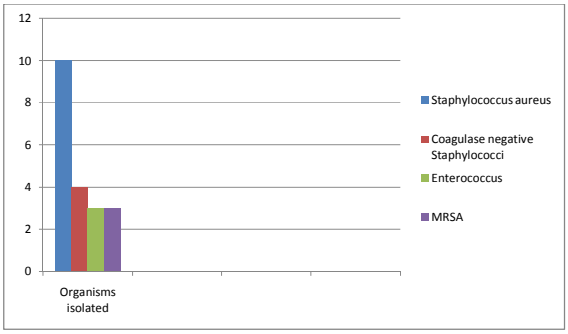
In this study Staphylococcus aureus in Gram positive and Pseudomonas aeruginosa was the predominant microorganisms in the OPD and IPD patients and various antibiotic resistance and sensitivity patterns were observed.

Graph No. 1: Column diagram representing total organisms isolated from Burn patients.



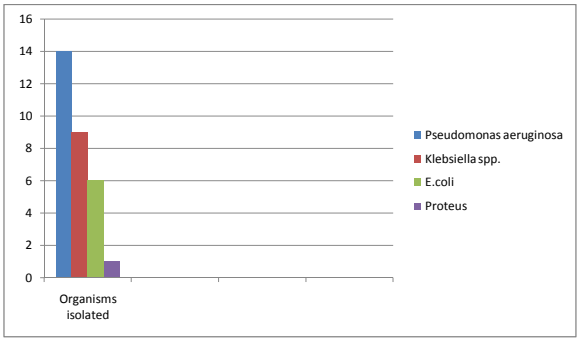
(Gram positive organisms -20 and Gram negative organisms-30, Sterile samples-20)

Graph No. 2: Column diagram representing Gram positive Organisms (20) isolated from burn patients



(*Staphylococcus aureus*-10 ,Coagulase negative *Staphylococci*-4, *Enterococcus spp*.-3, MR*SA*-3)

Graph No. 3: Column diagram showing Gram negative organisms (30) isolated from burn patients.



(*Pseudomonas aeruginosa* -14 ,*Klebsiella*-9 , *E.coli* -6, *Proteus* spp. -1)

REFERENCE

1. American Burn Association. *Burn incidence and treatment in the US:2000 fact sheet*, **2000.**
2. Ananthanarayan and Paniker's Textbook of Microbiology.R. Ananthanarayan, C.K.Jayaram Paniker, 7 th Edition.
3. Agnihotri, N., V. Gupta, and R. M. Joshi. *Aerobic bacterial isolates from burn wound infections and their antibiograms—a five-year study.*Burns. **2004,** 30:241–243.
4. Baker, C. C., C. L. Miller, and D. D. Trunkey. *Predicting fatal sepsisin burn patients.* J. Trauma. **1979,** 19:641–648.
5. Barret, J. P., and D. N. Herndon. *Effects of burn wound excision on bacterial colonization and invasion.* Plast. Reconstr. Surg. **2003,** 111:744–750.

6. Color Atlas and textbook of DIAGNOSTIC MICROBIOLOGY-fourth edition by Koneman ,Allen,Janda,Schreckenberger,Winn.
7. Cartotto, R. C., W. J. Peters, P. C. Neligan, L. G. Douglas, and J. Beeston. *Chemical burns*. Can. J. Surg. **1996,** 39:205–211.
8. Dyer, C., and D. Roberts. *Thermal trauma.* Nurs. Clin. N. Am. **1990,** 25:85–117.
9. Edwards, R., and K. G. Harding. *Bacteria and wound healing.* Curr. Opin. Infect. Dis. **2004**, 17:91–96.
10. L. M. Bariar : Review of 400 cases of burns at Aligarh, Indian Journal of Burns, 2(1) , April **1994,** 35 – 40.
11. Japoni A, Alborzi A, Kalani M, et al. Susceptibility patterns and cross-resistance of antibiotics against *Pseudomonas aeruginosa* isolated from burn patients in the South of Iran. Burns. **2006,** 32:343–347.
12. Kaushik R., Kumar S., Sharma R. and Lal P. Bacteriology of burn wounds, the first three years in a new burn unit at Medical College Chandigarh. Burns. **2001,** 27(6): 595-597.
13. Rajput, A.; Singh, K.P.; Kumar, V.; Sexena, R. and Singh, R.K. Antibacterial resistance pattern of aerobic bacteria isolates from burn patients in tertiary care hospital. Biomedical Research. **2008,** 19 (1): 1-4.
14. Srinivasan S, Vartak. Bacteriology of the burn wound at the Bai Jerbai Wadia Hospital for children, Mumbai, India-A 13-year study, Part I-Bacteriological profile. Indian J Plast Surg. **2009,** 42:213-8.