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Original Articles

Bacteraemia at Shaikh Zayed Hospital, Lahore: An Incidence and Aetiology

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SUMMARY

From March 1993 to August 1994, a total of 4993 blood culture samples were obtained from hospitalized patients at Shaikh Zayed Hospital, Lahore. Significant bacterial growth was obtained from 988 patients. Majority of the patients belonged to paediatrics and neonatology ward; 350 (35.42%) cases were below 1 year and 21 (2.12%) above 70 years of age. There were 622 (62.95%) males and 366 (37.04%) females, giving an overall incidence rate of 24.6 cases/1000 admissions. A total of 994 isolates were obtained. Gram positive micro-organisms accounted for 315 (31.69%) infections, while 679 (68.30%) infections were due to Gram negative micro-organisms. The most common aetiological agents were Klebsiella species 209 (21.02%), Staphylococcus aureus 199 (20.02%) and Salmonella species 166 (16.70%), respectively.

INTRODUCTION

Bacteraemia is a serious problem confronting clinicians, as it is associated with a high mortality. Detection of bacteraemia has great clinical significance in establishing the primary diagnosis for certain high-risk population[1]. A knowledge or regional patterns of bacteraemia is important for the formulation of policies for empirical antibiotic therapy. Studies from the developed countries showed clear predominance of hospital-acquired bacteraemia[2]. Studies done on bacteraemia in the West have shown a change in the pattern of the causative organisms, with increasing Gram negative bacteraemia[3-6]. Reports from developing countries have indicated community-acquired pathogens as the predominant cause of blood stream infections[7-8].

The aims of this study were to estimate incidence of bacteraemia, and document the relative frequency of different pathogens in bacteraemic patients.

MATERIAL AND METHODS

The results of blood cultures from patients admitted to the Shaikh Zayed Hospital, Lahore, during eighteen months, March 1, 1993 to August 31, 1994, were obtained retrospectively from the bacteriology department.

About 3-10 ml of blood was obtained by venipuncture aseptically in a disposable syringe. The collected blood sample was immediately transferred aseptically to blood culture bottle, containing tryptic soy broth in a ratio of 1:10. The blood culture bottle was incubated at 37 ° C. It was observed daily for the presence of turbidity, haemolysis, bubbles of gas and pellicle formation. Subculture was made asceptically, if any of the above was present. A loopful of the blood culture broth was streaked on blood agar and MacConkey agar plates. The inoculated plates of blood agar were incubated in 5-10 percent carbon dioxide and MacConkey agar in aerobic atmosphere at 37 ° C for 24 hours. On the second day, the plates were observed for bacteriological growth. All the isolates were further identified by standard microbiological techniques[9]. Blind subculture was done in the absence of above mentioned signs, on day 2, 5, and 7, before discarding the sample.

RESULTS

During the study period, a total of 4993 blood

cultures were obtained from the admitted patients. A total of 994 micro-organisms were isolated from 988 patients. Majority of the patients belonged to paediatrics 429 (43.42%) and neonatology 166 (16.60%) ward followed by medical 133 (13.46%), gastroenterology 52 (5.2%) and cardiology + CCU 52 (5.26%), respectively (Table 1).

Table 1: Cases of bacteraemia isolated from different wards during the 18 months period.

Wards	Number	Percent
Paediatrics	429	43.42
Neonatology	166	16.6
Medical	133	13.46
Gastroenterology	52	5.26
Cardio + CCU	52	5.26
Al-Nahyan	43	4.35
Nephrology + Dialysis	42	4.25
General Surgery	30	3.03
ICU	28	2.83
Gynae/Obs.	6	0.6
Orthopaedics	5	0.5
Urology	2	0.2
Total	**988**	**100.00**

The males were 622 (62.95%) while females 366 (34.04%) with the ratio of 1.6:1, giving an overall incidence rate of 24.6 cases/1000 admissions. Age ranges from 2 hours to 92 years. Increased number of cases 350 (35.4%) were seen in age group below 1 year (Table 2).

Table 2: Age and sex distribution of patients with bacteraemia.

Age (yrs)	Male	Female	Total	Percent
< 1	212	138	350	35.42
01-10	152	64	216	21.86
11-30	98	69	167	16.90
31-50	93	55	148	14.97
51-70	54	32	86	8.70
> 70	13	8	21	2.12
Total	**622**	**366**	**988**	**100.00**

Gram positive micro-organisms accounted for 315 (31.69%) infections, while 679 (68.30%) infections were due to Gram negative micro-organisms (Table 3). Staphylococcus aureus 199 (20.02%), and Staphylococcus coagulase negative 78 (7.84%) were the most common Gram positive micro-organisms, and Klebsiella species 209 (21.02%), Salmonella species 166 (16.70%) and Pseudomonas species 133 (13.36%) were the most common gram negative micro-organisms, respectively.

Table 3: Distribution of different aetiology agents of bacteraemia period.

Micro-organisms	Number	Percent
Gram-Positive		
Staphylococcus aureus	199	20.02
Staph. coagulase -ve	78	7.84
Enterococcus	23	2.21
Streptococcus pneumoniae	6	0.60
Streptococcus pyogenes	3	0.30
Streptococcus viridans	3	0.30
Bacillus spp.	2	0.20
Corynebacterum spp.	1	0.10
Gram-Negative		
Klebsiella spp.	209	21.02
Pseudomonas spp.	133	13.36
Salmonella typhi	118	11.87
Salmonella paratyphi A	15	1.50
Salmonella paratyphi B	4	0.40
Other Salmonella spp.	29	2.91
Escherichia coli	110	11.06
Acinetobacter spp.	36	3.62
Citrobacter spp.	13	1.30
Enterobacter spp.	10	1.00
Serratia spp.	1	0.10
Proteus spp.	1	0.10
Total	**994**	**100.00**

DISCUSSION

Bacteraemia is an important problem all over the world. Incidence rate of bacteraemia in our study was 24.6 cases per 1000 admission. An incidence of 7/1000 hospital admissions has been reported from Abu Dhabi, 10.9/1000 from Kuwait[10], and 13.5/1000 in Saudi Arabia[11]. Incidence reported from the United States and Europe has ranged from 3.4 to

28/1000 hospital admissions[3-6]. Bacteraemia was more prevalent in males than in females (1.6:1); which is consistent with the study of Morano-Amado et al.[12] with a ratio of 1.7:1.

The most frequent gram positive isolate in our study was Staphylococcus aureus, (149 = 20.02%), followed by Staphylococcus coagulase negative, Enterococci, Streptococcus pneumoniae, Streptococcus pyogenes, Streptococcus viridans, Bacillus species and Corynebacterium species, respectively. The results are in agreement with Scheckler[5] and Al-Orainey et al.[13], who also found Staphylococcus aureus as the most common Gram positive isolate of their studies. Klebsiella species were the most common Gram negative isolates of our study, (?09 = 21.02%), followed by Salmonella species, Pseudomonas species, Escherichia coli, Acinetobacter species, Citrobacter species, Enterobacter species, Serratia species and Proteus species, respectively. The results are inconsistent with Elhag et al.[10] and Eltahaway and Khalaf[11], who found salmonella species as the most common Gram negative isolates of their studies. This may either be due to increased number of lower age group patients included in our study, or due to the increase prevalence of Klebsiella species in our part of the world. Pseudomonas infections are important nosocomial infections. Therefore, Pseudomonas infections in our study may be nosocomial, because all the patients included in our study were hospitalized.

In our study majority of the cases (60.22%) were from the Paediatrics and neonatology wards, which is inconsistent with the studies of Eltahaway and Khalaf[11]; Hasony and Al-Samaraie[14], where most of the cases were from the medical wards. A high incidence of the paediatrics and neonatology group may reflect the hygiene conditions at home. Klebsiella, Salmonella and Staphylococcus infections are commonly seen in a community where over crowding, poor hygiene and laxity in hand washing may be an important contributing factor.

CONCLUSION

Blood culture is the definitive means of diagnosis of bacteraemia. This study demonstrates a slight increase in the incidence of bacteraemia as compared to other reported studies, mainly in the paediatrics and neonatology wards, with higher prevalence of the micro-organisms within male population and preponderance of Klebsiella species as aetiological agents. Further prospective studies are needed comparing incidence with other area hospitals, looking at hygiene, nosocomial aspects.

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