Original Article

Bacterial profile and antimicrobial sensitivity pattern of pus in Dhaka National Medical Institute Hospital

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Abstract

Objectives: To assess the causative bacteria and antibiotic sensitivity pattern of different bacteria isolated from pus.

Methods: This cross-sectional study was conducted from January to December, 2014 to assess the bacterial profile isolated from pus received from the patients at the Microbiology department of Dhaka National Medical Institute Hospital. Data were collected by interviewer administered questionnaire. The pus was collected by sterile cotton swab. Bacteria were isolated and sensitivity pattern were examined.

Results: A total of 149 patients were included in this study with the average age of 32.5 years. More than half of them (64.4%) were female. Half of the respondents (49.7%) were admitted in hospital. Higher portion of the respondents had history of operative treatment under surgery (44%), gynecology (36%) and other departments. Higher portion (30%) of the specimens was collected from abdomen. Among 149 samples, organisms were revealed from 109 (73%) specimens. S. aureus was the most frequently isolated bacteria constituting 55 (49%) isolates, followed by E. coli 23 (20.5%) isolates. Gram positive bacteria were highly sensitive to vancomycin, linezolid and fusidic acid. They were resistant to amoxicillin and ceftazidime. Gram negative bacteria were highly sensitive to amikacin, imipenem and tazo piperacillin. They showed resistance to amoxicillin, cephradine, cefuroxime and cotrimoxazole.

Conclusion: Pus was caused predominantly by Gram positive organisms commonly S. aureus. The bacteria were showing resistant to commonly used antibiotics. Appropriate antibiotic coverage is needed to avoid development of the resistant organisms.

Key words: *Pus, Bacterial Resistance, Bacterial profile.*

Introduction

Pyogenic infection has been the most important cause of morbidity and 70% to 80% of mortality (Zafar A, 2008). This pyogenic infection may be nosocomial and community acquired infection. Multidrug resistant strains are emerging due to the treatment of this condition. So, this problem is a major concern. Appropriate and judicious use of antibiotics could limit the drug resistant bacteria (Rao R et al., 2014). Misuse of antibiotics may result in surgical wound infections. Infections are caused by breaching of skin and the infection control practice of hospital (Hajare et al., 2014).

There were many studies done on bacterial profile of pus. They found that the most common causative organism is Staphylococcus species (Akhter M et al, 2013; Rao R et al., 2014; Zafar A, 2008). As it is the most common ubiquitous organism, it has the major contribution in pus formation.

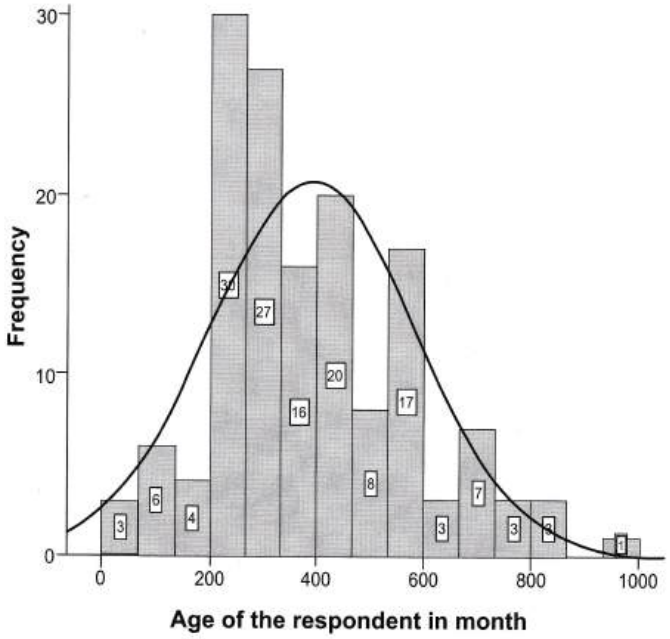
Methodology

This was a cross-sectional study done on 149 patients of having pus attending in Microbiology laboratory of Dhaka National Medical Institute Hospital for routine microscopic examination along with culture sensitivity test. This study was conducted from January to December, 2014. Permission was taken from the departments of Community Medicine and Microbiology. Patient was asked for permission before data collection. The samples were collected by sterile cotton swab. The samples were inoculated on to blood agar and Mac Conkey's agar media, incubated aerobically at 37° C for 24 hours. Isolated organisms were identified by their colony morphology, staining characteristics and biochemical tests. Antimicrobial susceptibility was tested by disc diffusion method against different antimicrobial agents. All information was documented in interviewer administered questionnaire by face to face interview. The laboratory reports were examined. The collected and corrected data entered into computer and analyzed by using SPSS program version 20. Only descriptive statistics were computed.

Results

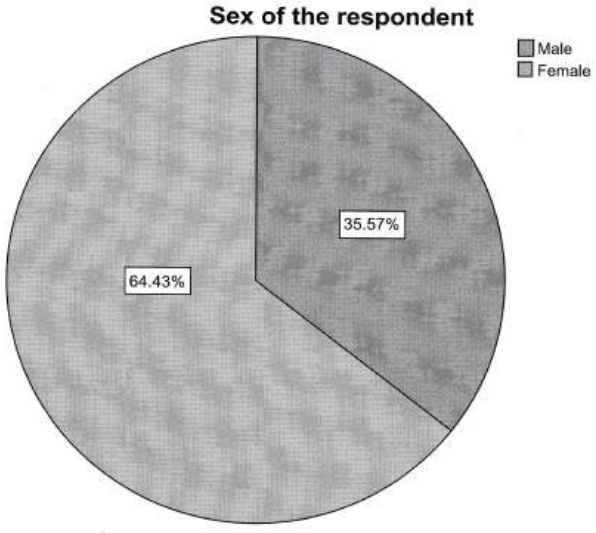
The average age of the respondents was 32.55 years ranging from 5 months to 92 years with SD 15.86 years.

Figure 4.1 Distribution of the respondents by age



About two-third (64.7%) of the respondents were female.

Figure 4.2 Distribution of the respondents according to sex



The number of respondents was 149. Out of 149 pus sample, 109 (73.2%) cases yielded positive culture. Among 109 culture positive pus samples 18 (12.1%) yielded mixed infection.

Table 4.1 Culture positivity among pus sample

No. of organisms	Frequency	Percentage (%)
No organism	40	26.8
Single organism	91	61.1
>Two organisms	18	12.1
Total	149	100

About half of the respondents (49.7%) were admitted in the hospital. The portion of the patients staying in the cabin was 37.6%.

Table 4.2: Place of staying in the hospital

Place of staying in the hospital	Frequency (%)
Indoor	
A. Cabin	56 (37.6)
B. Ward	19 (12.8)
Out door	74 (49.7)

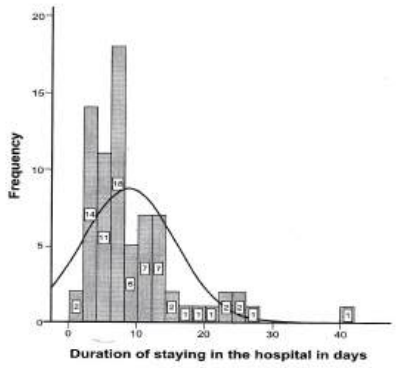
Among the hospitalized patients higher portion of the respondents (44.0%) were treated under surgery department, near to it 36% respondents were treated under gynecology department.

Table 4.3 Distribution of Departments

Departments	Frequency (%)
Surgery	33 (44.0)
Medicine	6 (8.0)
Gynaecology	27 (36.0)
Orthopaedics	7 (9.3)
Paediatrics	1 (1.3)
ENT	1 (1.3)

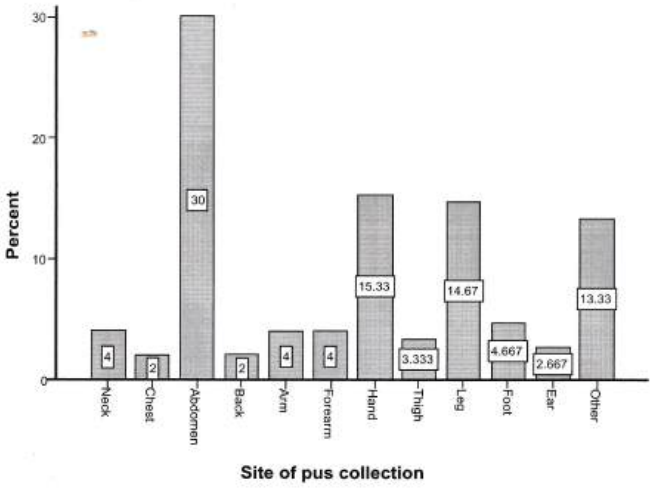
The mean duration of staying in the hospital is 8.69 days with a lowest value of 1 day and maximum value of 26 days though only one patient was found staying 40 days with a SD of 6.9 days.

Figure 4.3 Duration of staying in the hospital



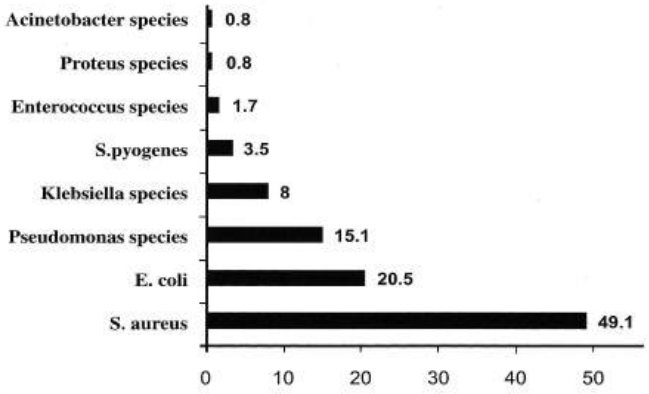
About one third of the isolates (30%) were found in abdomen, 15.3% in hand, 14.6% in leg, 4.7% from vaginal discharge and foot. Other sites contributed 30.7% cases which included neck, chest, back, arm, forearm, thigh, eye, ear, urethral discharge etc.

Figure 4.4 Site of pus collection



Staphylococcus aureus (49.1%) were the predominant Gram positive organisms. Number of others Gram positive organisms were *Streptococcus pyogenes* 4 (3.5%) and *Enterococcus* species 2 (1.7%). Gram negative organisms found are *Proteus* 1 (0.8%), *Klebsiella* 9 (8 %), *Pseudomonas* 17 (15.1%), *Escherichia coli* 23 (20.5%) and *Acinetobacter* 1 (0.8%).

Figure 4.5 Species wise distribution of isolates



Gram positive bacteria were highly sensitive to vancomycin, linezolid and fusidic acid. They were resistant to amoxicillin and ceftazidime.

Though, Gram negative bacteria were highly sensitive to amikacin, imipenem & tazo piperacillin but showed resistance to amoxicillin, cephradine, cefuroxime and cotrimoxazole.

Table 4.4 Antibiotic sensitivity pattern of Gram Positive Bacteria

Antibiotics	S. aureus, n=55; (%)		S. pyogenes, n =4; (%)		Enterococcus species, n=2; (%)	
	S	R	S	R	S	R
Amikacin	45 (81.8)	10 (18.2)	3 (75)	1(25.0)	-	2 (100)
Ceftriaxone	37 (67.3)	18 (32.7)	4 (100)	-	-	2 (100)
Erythromycin	11 (20)	44 (80)	4 (100)	-	-	(100)
Vancomycin	53 (96.4)	2 (3.6)	4 (100)	-	2 (100)	-
Amoxicillin	1 (1.8) 54	(98.2)	4 (100)	-	1 (50)	1 (50)
Ceftazidine	3 (5.5)	52 (94.5)	4 (100)	-	1 (50)	1 (50)
Cephradine	40 (72.7)	15 (27.3)	4 (100)	-	1 (50)	1 (50)
Fusidic acid	50 (90.9)	5 (9.1)	4 (100)	-	1 (50)	1 (50)
Cefuroxime	41 (74.5)	14(25.5)	4 (100)	-	-	2 (100)-
Ciprofloxacin	35 (63.6)	20 (36.4)	4 (100)	-	-	2 (100)-
Cloxacillin	20 (36.4)	35 (63.6)	4 (100)	-	-	2 (100)-
Linezolid	51 (92.7)	4 (7.3)	4 (100)	-	2 (100)	-

Table 4.5 Antibiotic sensitivity pattern of Gram Negative Bacteria

Antibiotics	E. coli, n=23; (%)		Pseudomonas species, n=17; (%)		Klebsiella species, n=9; (%)	
	S	R	S	R	S	R
Amikacin	23(100)	-	14(82)	3(18)	8(88.9)	1 (11.1)
Ceftriaxone	12 (52)	11 (48)	-	17 (100)	5 (55.6)	4 (44.4)
Imipenem	21(91)	2(9)	13 (76)	4(24)	8 (88.9)	1 (11.1)
Tazo piperacillin	19 (83)	4(17)	15 (88)	2(12)	5 (55.6)	4(44.4)
Amoxicillin	5 (26.3)	18(73.7)	-	-	-	9 (100)
Azactam	6 (26)	17(74)	10 (59)	7 (41)	6(66.7)	3(33.3)
Ceftazidime	8 (35)	15(65)	10 (59)	7 (41)	4(44.4)	5 (55.6)
Cephradine	5 (26.3)	18(73.7)	-	-	-	9 (100)
Cefixime	6 (26)	17 (74)	-	-	3(33.3)	6 (66.7)
Cefuroxime	5 (26.3)	18(73.7)	-	-	2 (22)	7 (78)
Ciprofloxacin	12(52)	11 (48)	11 (64.7)	6 (35.3)	4 (44.4)	5 (55.6)
Gentamycin	16(70)	7 (30)	11 (64.7)	6 (35.3)	6 (66.7)	3 (33.3)
Cotrimoxazole	5(26.3)	18(73.7)	10(59)	7(41)	6(66.7)	3(33.3)

Discussion

Average age of the respondents of this study was 32.55 years, ranging from 5 months to 92 years. In this study more than half (64.4%) of the respondents were female. About half of the respondents (49.7%) of this study were hospitalized patient. Higher portion of the hospitalized patients were treated under Surgery department (44.0%) followed by Gynecology (36%) department.

Rao R (2014) found similar findings in South Indian Tertiary Care Hospital. They had the highest contribution from Surgery department (35.29%).

Majority portion of the sample were collected from the abdomen (30.0%). About three fourth of the isolates were culture positive (73.2%). The commonest organism found in this study was S. *aureus* (49.1%) followed by E. coli (20.5%). Zafar A et al. (2008) found similar findings. That study reported that S. *aureus* (41.28%) followed by E. coli (13.76%). Rao R et al. (2014) revealed that the highest contribution by S. *aureus* (24.29 %). Tiwari (2010) found S. aureus (342; 35.5%) commonest among 952 cultures.

The present study revealed that most of S. aureus were sensitive to vancomycin, linezolid and fusidic acid. However, Tiwari (2010) found that S. *aureus* were 100% sensitive to vancomycin.

In this study, Gram negative bacteria (mostly *E. coli* and *Pseudomonas species*) were highly sensitive to amikacin and imipenem. Rao R et al. (2014) also reported that Gram negative bacteria were sensitive to Imipenem (80%).

Conclusion: Proper precaution should be taken before any surgical procedure. Pus was caused predominantly by Gram positive organism specially S. *aureus*. The bacteria were showing resistance to common antibiotics. The bacteria were susceptible to some expensive and rare antibiotics. So, culture and sensitivity test is needed to avoid development of the resistant bacteria.

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