STUDY OF BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN IN SAMPLES RECEIVED FROM PATIENTS ATTENDING TERTIARY CARE HOSPITAL IN MUMBAI

Sunayana Mukesh Jangla¹, Raji Naidu²

¹Microbiologist, Department of Pathology, Bhabha Atomic Research Centre (BARC) Hospital, Mumbai, Maharashtra.

²Pathologist, Department of Pathology, Bhabha Atomic Research Centre (BARC) Hospital, Mumbai, Maharashtra.

ABSTRACT

BACKGROUND

Bacterial infections are important cause of morbidity and mortality among patients and antimicrobial resistance is a significant growing global threat. In this era of multidrug resistance, it is mandatory to know the bacteriological profile and antimicrobial sensitivity pattern of one's own institute. Hence, the following study was conducted to document the common bacteria isolated from various clinical specimens from patients of our institute and describe their antibiotic susceptibility.

MATERIALS AND METHODS

The study was carried out in the Department of Microbiology from January 2016 to December 2016 in our institute. The study included 12,429 clinical samples comprising urine, blood, sputum, stool, pus, wound swabs, catheter tips, nasal swabs, throat swabs, vaginal swabs, sterile body fluids and tissue which were processed for culture, identification and antibiotic susceptibility testing as per standard recommended procedures.

RESULTS

Samples received were urine 55%, blood 21%, sputum 12%, wound swabs 3%, pus 2.5%, stool 2%, catheter tips 1%, body fluids 1% followed by others. Sample received from males and females were 47% and 53%, respectively. Samples received from 13 - 65 years' age group, geriatric age group, paediatric age group and neonates were 69.4%, 24%, 6% and 0.6% respectively. Samples received from Outpatient Department (OPD), Inpatient Department (IPD) and Intensive Care Unit (ICU) were 54%, 43% and 3% respectively. 3,014 different bacterial pathogens were isolated. The prevalence of Gram negative bacilli was 90% and that of Gram positive bacilli was 10%. Out of all isolates 60% were from OPD samples, 37% from IPD samples and 3% from ICU samples. Among the pathogens isolated, *Escherichia coli* was 40% followed by *Klebsiella pneumoniae* 27%, *Pseudomonas aeruginosa* 13.4% and *Staphylococcus aureus* 8% followed by others. Most of the Gram-negative isolates were sensitive to carbapenems, aminoglycosides and beta lactam - beta lactamase inhibitor combinations. Approximately, half of them were sensitive to third and fourth generation cephalosporins and fluoroquinolones. Most of the Gram-positive isolates were sensitive to tetracycline, clindamycin, nitrofurantoin, glycopeptides and vancomycin, but resistant to erythromycin, trimethoprim/ sulfamethoxazole and fluoroquinolones.

CONCLUSION

In general, most of our Gram-negative isolates showed good sensitivity to carbapenems, aminoglycosides and beta lactam - beta lactamase inhibitor combinations. Sensitivity to cephalosporins and fluoroquinolones prevailed amongst half of them. High resistance to fluoroquinolones was seen among Gram positive isolates also. *Methicillin resistant Staphylococcus aureus* (MRSA) prevalence was not very high. Such type of surveillance done regularly can help in optimising antibiotic use and thus help to curb antimicrobial resistance.

KEYWORDS

Antibiotic Susceptibility, Antimicrobial Resistance, Bacteriological Profile, Clinical Samples, Surveillance.

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BACKGROUND

Surveillance of antimicrobial resistance is the basic need to tackle the emergence of resistance among pathogens.¹

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Corresponding Author:

Dr. Sunayana Mukesh Jangla,

Microbiology Section,

Department of Pathology,

Bhabha Atomic Research Centre (BARC) Hospital,

Anushakti Nagar,

Trombay, Mumbai-400094,

Maharashtra.

E-mail: sunayanajangla79@gmail.com

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Susceptibility data obtained from clinical microbiology laboratory is useful in formulation of guidelines for empirical treatment, which is the need of time.¹ With this aim in mind, the present study was conducted in our hospital. It is a 390-bedded multispecialty tertiary care hospital in Mumbai, which provides health care facilities to its employees and their family members. In our study, bacteria isolated from various samples received in the Microbiology Laboratory from OPDs, IPDs and ICU obtained from these patients and their antibiotic susceptibility pattern was studied.

MATERIALS AND METHODS

Study Design

The present study is an observational study carried out at Department of Microbiology during the period of January 2016 to December 2016. Various clinical samples from all

patients from different age groups, that is neonates (<1 year), paediatric (1-12 years), adults and adolescents (13-65 years) and geriatric age group (>65 years) were processed for bacterial culture and antibiotic sensitivity. These samples were from various Outpatient Department (OPD)/ community areas like medical, surgical, Ear-Nose-Throat (ENT) and gynaecology, In-Patient Departments (IPD)/ hospitalised patients and Intensive Care Unit (ICU). Patient's demographical and clinical details were obtained from Hospital Information System (HIS). The study was approved by the scientific and Ethics Committee of the Institute.

Sample Processing

The samples collected were urine (clean catch mid-stream), blood, sputum (only mucoid), stool, pus, wound swabs, catheter tips (which included suction, drain, Foley's and other relevant catheter tips), ear swabs, nasal swabs, throat swabs, vaginal swabs, sterile body fluids (pleural, ascitic, cerebrospinal, peritoneal, synovial, continuous-ambulatory-peritoneal-dialysis fluid) and tissue. The samples were inoculated on Nutrient agar, 5% Sheep Blood agar and MacConkey agar (HiMedia, Maharashtra) using strict aseptic technique and incubated at 37°C for 24 hours.² Blood and sterile body fluids were inoculated in Bactec bottles (commercially available, Biomerieux) and loaded in BacT/Alert 3D machine, (Biomerieux) and processed according to standard operational procedures. Isolates obtained from various samples were identified up to species level by means of Gram stain, colony characteristics and various biochemical tests.³

Determination of Antibiotic Susceptibility

Antimicrobial susceptibility tests were performed as per Clinical Laboratory Standard Institute (CLSI, USA) guidelines 2015.⁴ Kirby Bauer's disc diffusion technique was used for antimicrobial susceptibility testing. In brief, lawn cultures of appropriate inoculums of respective organisms were performed in Mueller-Hinton Agar (or Mueller-Hinton Blood agar for fastidious organisms). Commercially available antibiotic discs of standard recommended strengths (HiMedia, Maharashtra) were placed on the surface of inoculated media and incubated overnight. Zones of inhibition were measured the next day and were correlated with CLSI interpretive breakpoints to characterise them as Sensitive, Intermediate and Resistant.⁴ Intermediate susceptible strains were considered resistant in our study. For Gram positive organisms, the antibiotic discs used were penicillin (10 units), amoxicillin/ clavulanic acid (20/ 10 µg), cefoxitin (30 µg), ciprofloxacin (5 µg), clindamycin (2 µg), erythromycin (15 µg), gentamicin (10 µg), linezolid (30 µg), levofloxacin (5 µg), trimethoprim/ sulfamethoxazole (1.25/23.75 µg), teicoplanin (30 µg), tetracycline (30 µg), vancomycin (30 µg), nitrofurantoin (300 µg- for urine samples). For *Enterococcus species*, in addition, High Level Gentamicin disc was used (HLG 120 µg). For Gram-negative organisms the antibiotic discs used were ampicillin (10 µg), amoxicillin/ clavulanic acid (20/10 µg), ceftazidime (30 µg), amikacin (30 µg), ceftazolin (30 µg), cefuroxime (30 µg), cefotaxime (30 µg), ceftriaxone (30 µg), cefepime (30 µg), ciprofloxacin (5 µg), ceftazidime/ sulbactam (30/10 µg), gentamicin (10 µg), imipenem (10 µg), levofloxacin (5 µg),

meropenem (10 µg), piperacillin/ tazobactam (100/ 10 µg), trimethoprim/ sulfamethoxazole (1.25/ 23.75 µg). In addition, for urine isolates norfloxacin (10 µg), nitrofurantoin (300 µg) and nalidixic acid (30 µg) discs were used. For *Pseudomonas aeruginosa* isolates, netilmicin (30 µg), tobramycin (10 µg) and aztreonam (30 µg) were used in addition to the above. For drugs not mentioned in CLSI, manufacturer's guidelines were followed. *Staphylococcus aureus* ATCC 25923, *Escherichia coli*, ATCC 25922 and *Pseudomonas aeruginosa* ATCC 27853 were used for quality control.

Statistical Analysis

All data entry regarding patients and specimen information, organisms and antibiotic sensitivity was done manually on a daily basis in the WHONET 5.6 (World Health Organisation NET) software available from www.who.int/drugresistance/whonetsoftware. The obtained sensitivity profile statistics were analysed using WHONET 5.6 software.⁵ The results were expressed as percentage analysis. The data was also analysed statistically using SPSS statistics version 19.0 (Chicago, IL, USA) and values of P < 0.05 were considered statistically significant.

RESULTS

Total of 12,429 clinical samples were analysed. Samples obtained were urine 6,786 (55%) followed by blood 2,621 (21%), sputum 1,453 (12%), wound swab 348 (3%), pus 322 (2.5%), stool 247 (2%), catheter tips 195 (1%), body fluids 136 (1%), ear swab 98 (0.8%), nasal swab 77 (0.6%), throat swab 75 (0.6%), vaginal swab 54 (0.4%) and tissue 17 (0.1%). Samples received from females were 6,586 (53%) and males were 5,843 (47%) [Table 1]. Number of samples received from 13 - 65 years' age group were 8,640 (69.4%), geriatric group were 2,950 (24%), paediatric group were 756 (6%) and neonates were 83 (0.6%) [Table 2]. Samples received from OPD were 6,772 (54%), IPD were 5,334 (43%) and ICU were 323 (3%) [Table 3]. 3,014 different organisms were isolated of which Gram-negative isolates were 2,704 (90%) and Gram-positive isolates were 310 (10%). Out of all isolates, 1,803 (60%) were from OPD samples, 1,129 (37%) from IPD samples and 82 (3%) from ICU samples [Table 4]. Among the Gram-negative isolates, *Escherichia coli* (*E. coli*) was 1,204 (40%), *Klebsiella pneumoniae* 802 (27%), *Pseudomonas aeruginosa* 406 (13.4%), *Proteus mirabilis* 66 (2%), *Acinetobacter baumannii* 56 (2%), *Salmonella typhi* 34 (1.4%), *Citrobacter freundii* 33 (1%), *Enterobacter cloacae* 33 (1%) followed by others like *Acinetobacter lwoffii*, *Salmonella paratyphi A*, *Enterobacter aerogenes*, *Klebsiella oxytoca*, *Serratia marcescens*, *Proteus vulgaris*, *Providencia species* and *Morganella morganii*. Among the Gram-positive isolates, *Staphylococcus aureus* was 232 (8%) followed by *Coagulase Negative Staphylococcus (CONS)* 34 (1%), *Enterococcus species* 33 (1%) and others like *Streptococcus pneumoniae*, *Streptococcus pyogenes* and *Streptococcus species*. The detailed antibiotic susceptibility pattern is shown in [Table 5] and [Table 6].

Sample	Male (No %)	Female (No %)	Total (No %)
Urine	2, 853 (42)	3, 933 (58)	6786 (55)
Blood	1, 409 (54)	1, 212 (46)	2, 621 (21)
Sputum	732 (50.3)	721 (49.7)	1, 453 (12)
Wound swab	196 (56)	152 (44)	348 (3)
Pus	173 (54)	149 (46)	322 (2.5)
Stool	128 (52)	119 (48)	247 (2)
Catheter tips	123 (63)	72 (37)	195 (1)
Body fluids	91 (67)	45 (33)	136 (1)
Ear swab	51 (52)	47 (48)	98 (0.8)
Nasal swab	44 (57)	33 (43)	77 (0.6)
Throat swab	32 (43)	43 (57)	75 (0.6)
Vaginal swab	0	54 (100)	54 (0.4)
Tissue	11 (65)	6 (35)	17 (0.1)
Total	5, 843(47)	6, 586(53)	12, 429 (100)

Table 1. Distribution of Samples among Males and Females

Sample	Adult (No/%)	Geriatric (No/%)	Paediatric (No/%)	Neonate (No/%)	Total (No)
Urine	4, 790 (70)	1, 745 (26)	247 (3.5)	4 (0.5)	6, 786
Blood	1, 864 (71)	307 (12)	390 (15)	60 (2)	2, 621
Sputum	902 (62)	540 (37)	11 (1)	0	1, 453
Wound swab	253 (73)	86 (25)	9 (2)	0	348
Pus	233 (73)	60 (17)	20 (7.3)	9 (4)	322
Stool	175 (71)	53 (21.6)	18 (7)	1(0.4)	247
Catheter tips	81 (42)	93 (48)	15 (7)	6 (3)	195
Body fluids	100 (74)	21 (15)	12 (9)	3 (2)	136
Ear swab	70 (71)	19 (19)	9 (10)	0	98
Nasal swab	50 (65)	15 (19)	12 (16)	0	77
Throat swab	52 (69)	10 (13)	13 (18)	0	75
Vaginal swab	53 (98)	1 (2)	0	0	54
Tissue	13 (76)	4 (24)	0	0	17
Total	8, 640 (69.4)	2, 950 (24)	756 (6)	83 (0.6)	12, 429 (100)

Table 2. Distribution of Samples among Different Age Groups

Sample	OPD (No/%)	IPD (No/%)	ICU (No/%)	Total (No)
Urine	4, 574 (67)	2, 119 (31)	93 (2)	6, 786
Blood	582 (22)	1, 900 (72)	139 (6)	2, 621
Sputum	769 (53)	663 (46)	21 (1)	1, 453
Wound swab	182 (52)	160 (46)	6 (2)	348
Pus	170 (52.5)	150 (47)	2 (0.5)	322
Stool	147 (60)	95 (38)	5 (2)	247
Catheter tips	52 (27)	94 (48)	49 (25)	195
Ear swab	89 (91)	9 (9)	0	98
Nasal swab	67 (87)	10 (13)	0	77
Throat swab	58 (77)	17 (23)	0	75
Vaginal swab	42 (77)	12 (33)	0	54
Body fluids	33 (24)	95 (70)	8 (6)	136
Tissue	7 (41)	10 (59)	0	17
Total	6, 772 (54)	5, 334 (43)	323 (3)	12, 429(100)

Table 3. Distribution of Samples received from OPD, IPD and ICU

Organism	OPD (No/%)	IPD (No/%)	ICU (No/%)	Total (No/%)
<i>E. coli</i>	808 (67)	365(30)	31(3)	1,204(40)
<i>Klebsiella pneumoniae</i>	416(52)	376(47)	10(1)	802(27)
<i>Pseudomonas aeruginosa</i>	233(57)	159(39)	14(4)	406(13.4)
MSSA	116(68)	54(31.5)	1(0.5)	171(6)
<i>Proteus mirabilis</i>	39(59)	27(41)	0	66(2)
MRSA	45(74)	14(23)	2(3)	61(2)
<i>Acinetobacter baumannii</i>	17(30)	24(43)	15(27)	56(2)
CONS	14((41)	18(53)	2(6)	34(1)
<i>Salmonella typhi</i>	11(32)	23(68)	0	34(1)
<i>Citrobacter freundii</i>	24(73)	9(27)	0	33(1)
<i>Enterococcus species</i>	25(76)	4(12)	4(12)	33(1)
<i>Enterobacter cloacae</i>	15(45)	15(45)	3(10)	33(1)
<i>Salmonella paratyphi A</i>	3(33)	6(67)	0	9(0.3)
Other Gram negative	29(48)	32(52)	0	61(2)
Other Gram positive	8(73)	3(37)	0	11(0.3)
Total	1,803(60)	1,129(37)	82(3)	3,014(100)

Table 4. Distribution of Isolates from OPD, IPD and ICU

Antibiotic	<i>E. coli</i> (n=1204)	<i>Klebsiella pneumoniae</i> (n=802)	<i>Pseudomonas aeruginosa</i> (n= 406)	<i>Proteus mirabilis</i> (n=66)	<i>Acinetobacter baumannii</i> (n=56)	<i>S. typhi</i> (n=34)	<i>S. paratyphi A</i> (n=9)
Ampicillin	14	12	0	41	0	69	100
Amoxicillin/ clavulanic acid	16	11	0	44	0	83	100
Cefazolin	29	20	0	57	0	0	0
Cefuroxime	29	28	0	57	0	0	0
Cefotaxime	44	49	15	65	15	100	100
Ceftriaxone	43	51	21	70	15	100	100
Ceftazidime	43	42	21	54	17	100	100
Cefepime	52	56	57	75	9	100	100
Piperacillin/ Tazobactam	73	57	61	97	39	100	100
Cefoperazone/ Sulbactam	86	62	70	88	42	100	100
Amikacin	86	86	83	99	37	0	0
Gentamicin	68	69	80	86	40	0	0
Nalidixic acid	15	24	0	17	0	26	50
Nitrofurantoin	47	15	0	0	0	-	-
Norfloxacin	33	32	0	33	0	-	-
Ciprofloxacin	44	56	47	79	29	26	50
Levofloxacin	52	60	61	55	36	26	50
Trimethoprim/ Sulfamethoxazole	36	37	20	57	21	88	80
Imipenem	92	72	69	100	29	100	100
Meropenem	69	69	70	100	38	100	100

Table 5. Antibiotic Sensitivity (in percentage) of most prevalent Gram-Negative Organisms

Antibiotics	MSSA (n=171)	MRSA (n=61)	CONS (n=34)	<i>Enterococcus sp</i> (n=33)
Penicillin	25	0	15	26
Amoxicillin/ clavulanic acid	43	0	12	12
Ciprofloxacin	29	13	50	41
Clindamycin	83	41	60	15
Erythromycin	44	26	20	24
Gentamicin	77	39	60	100 (HLG)
Levofloxacin	33	15	54	47
Linezolid	100	100	100	100
Tetracycline	70	59	69	22
Trimethoprim/ sulfamethoxazole	42	29	51	0
Teicoplanin	100	100	100	100
Vancomycin	100	100	100	96
Nitrofurantoin	100	83	39	91

Table 6. Antibiotic Sensitivity (in percentage) of most prevalent Gram-Positive Organisms

DISCUSSION

In India, the bacterial disease burden is very high and hence antibiotics play an important role in decreasing morbidity and mortality.⁶ As resistance pattern of pathogens varies from region to region, it is important to know the local resistance pattern for appropriate antimicrobial use.⁷ In our observational study of one year, highest number of samples received were urine followed by blood, sputum, wound swab, pus, stool, catheter tips, body fluids followed by less commoner samples like ear swab, nasal swab, throat swab, vaginal swab and tissue. This was similar to another study.⁸ Kaur S and Chauhan P also reported that most common samples received in their study were urine (83.9%) and least common sample were body fluids (0.7%).⁹ Urinary Tract Infections (UTI) are the commonest infections in clinical practice, as they significantly cause morbidity and are one of the commonest causes of hospital visits.¹⁰ There was a slight female preponderance of samples in our study especially urine and throat swabs, and maximum samples were from age group 13 - 65 years. More urine samples received were from females as compared to males and maximum were from 13 - 65 years' age group. Separate studies conducted by Kaur et al, Premanathan et al and Kotigre et al also showed similar findings.^{9,10,11} Women are more prone to UTI than men due to shorter urethra and its proximity to anus in females and higher sexual activity in this age group is an important behavioural factor for developing UTI.¹⁰ We received most of the throat swabs during winter from patients with complaints of dry cough and throat pain and more samples from females appeared purely coincidental. The other samples received were more in males as compared to females and most were from age group 13 - 65 years. A study conducted by Koripella et al showed that highest number of sputum samples they received were from males aged 21 - 60 years¹² and Biradar et al showed that highest number of pus samples received by them were from males aged 21 - 60 years.¹³ More samples were received from OPD/ community, especially urine in comparison to IPD and ICU samples except blood, sterile body fluids, catheter tips and tissue which were more from hospitalised patients. The prevalence of UTI in out and hospital patients can vary depending on geographical and regional location.¹⁰ Blood samples were more from hospitalised patients, as most had complaints of high-grade fever not responding to antibiotics and requiring diagnosis. Tips from various types of catheters were more from IPD as these must have been inserted during hospitalisation. 3,014 different bacterial pathogens were isolated, of which more were Gram negatives (90%) as compared to Gram positives (10%). Similar finding was reported by Javeed I et al.¹⁴ More isolates were from OPD (60%). Common Gram-negative organisms were *E. coli* (40%), *Klebsiella pneumoniae* (27%), *Pseudomonas aeruginosa* (13.4%), *Proteus mirabilis* (2%) followed by *Acinetobacter baumannii*, *Salmonella typhi*, *Citrobacter freundii* and *Enterobacter cloacae*. Most of the Gram-negative organisms were from urine followed by sputum, stool, pus and wound swab. *E. coli* and *Klebsiella pneumoniae* isolates showed good sensitivity to carbapenems, aminoglycosides and beta lactam-beta lactamase inhibitor combinations (except amoxicillin-clavulanic acid), but lower sensitivity to cephalosporins, fluoroquinolones and cotrimoxazole. All *Pseudomonas*

aeruginosa isolates were highly resistant to ampicillin and amoxicillin/ clavulanic acid, ceftriaxone, ceftazidime and ciprofloxacin but showed good sensitivity to aminoglycosides, carbapenems, beta lactam-beta lactamase inhibitor combinations (except amoxicillin-clavulanic acid), levofloxacin and aztreonam. Similar findings regarding drug resistance pattern of these three isolates have been observed by other researchers.^{14,15,16,17}

E. coli showed greater sensitivity to nitrofurantoin (47%) and lesser sensitivity to nalidixic acid (15%) as compared to *Klebsiella pneumoniae* which showed 15% sensitivity to nitrofurantoin and 24% to nalidixic acid in our study similar to another study.¹⁵ Regarding *Acinetobacter* isolates, most common species isolated was *Acinetobacter baumannii* (56 isolates). Most of these were from blood, catheter tips, wound swabs and urine. More isolates were from IPD samples and showed resistance to cephalosporins and ciprofloxacin and lower sensitivity to cefoperazone/ sulbactam, piperacillin/ tazobactam, carbapenems, amikacin and levofloxacin. In another study, *Acinetobacter* isolates showed maximum sensitivity to imipenem and amikacin, but greater resistance to piperacillin/ tazobactam.¹⁸ Our isolates were more sensitive to meropenem than imipenem, which may be due to prior exposure to imipenem, especially in patients transferred from another tertiary care centre. *Salmonella typhi* (34 isolates) was commoner than *Salmonella paratyphi A* (9 isolates) and isolated exclusively from blood. More isolates were from IPD patients. *Salmonella typhi* showed 100% sensitivity to cephalosporins and 'beta lactam-beta lactamase' inhibitor combination, high sensitivity to cotrimoxazole, amoxicillin/ clavulanic acid and ampicillin, but only 26% were sensitive to fluoroquinolones and nalidixic acid. This was comparable to a study by Porwal A,¹⁹ except that lower sensitivity was seen to ciprofloxacin in our study which may be due to frequent use of this drug. In the developing countries, screening for nalidixic acid resistance to detect Low Level Fluoroquinolone Resistance (LLQR) is a cost-effective method. In our study only 26% of the strains were sensitive to nalidixic acid and ciprofloxacin, thus indicating high LLQR similar to study by Mirza SH et al.²⁰ Similar sensitivity pattern was shown by *Salmonella paratyphi A*, except that they showed higher sensitivity to fluoroquinolones (50%) as compared to *S. typhi* in our study. Other Gram-negative isolates were resistant to ampicillin and amoxicillin-clavulanic acid, but sensitive to the rest. Among the Gram-positive isolates, most prevalent isolate was *Staphylococcus aureus* comparable to another study.¹⁴ Out of 232 *Staphylococcus aureus*, Methicillin resistant *Staphylococcus aureus* (MRSA) were 61 (26%) and more were from OPD. Similar finding was seen in other studies where it was 20% and 20.2%.^{21,22} MRSA rate was not very high in our study, possibly because our institute caters to a restricted in-house population. With population mobility, there is increased risk of transmission of antibiotic resistant genes.⁶ Also, chances of acquiring resistant strains from hospital were less as more isolates were from community in our study. All isolates were highly sensitive to vancomycin, teicoplanin and linezolid showed lower sensitivity to tetracycline, least sensitivity to fluoroquinolones comparable to another study²² except that our isolates showed lower sensitivity to trimethoprim-

sulfamethoxazole and fluoroquinolone. This may be due to over-the-counter availability and excessive use of these drugs.²³ *Methicillin Sensitive Staphylococcus aureus* (MSSA) were 171 (74%) of the total *Staphylococcus aureus* and isolates showed resistance to penicillin, fluoroquinolones, amoxicillin/ clavulanic acid, but were sensitive to other drugs comparable to another study¹⁵ except that our isolates showed lower sensitivity to erythromycin and trimethoprim/ sulfamethoxazole which may be due to excess use of these drugs in our greater OPD population. Most *Enterococcus species* were from urine and pus and hence more isolates from OPD. These showed 100% sensitivity to teicoplanin and linezolid, high sensitivity to vancomycin and nitrofurantoin but high resistance to other drugs comparable to another study.²⁴ *CONS* were more from blood followed by urine and hence more from IPD. These were highly resistant to amoxicillin/ clavulanic acid, cloxacillin, ampicillin, erythromycin and sensitive to others comparable to another study,²⁵ except that our isolates were more sensitive to gentamicin (60%). Variability exists in the antibiotic susceptibility pattern of *CONS* based on geographical locations, institutes and antibiotics tested.²⁶ Other less common Gram-positive isolates were sensitive to most of the drugs.

CONCLUSION

Thus, among most of the isolates, sensitivity to higher injectable drugs still prevails, but resistance to easily available especially oral drugs is rising in our institute. Thus, accurate and timely culture sensitivity reports, regular antimicrobial resistance, surveillance and good infection control practices are the key factors to curb this scenario and prevent it from worsening.

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