Estimate of Antibiotics Sensitivity profiles of Some Selected Clinical Isolates from laboratories

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Abstract

This study show the estimate of antibiotics sensitivity profiles of some selected clinical isolates from clinical laboratories. 10 antibiotics were bought from different pharmacy and their sensitivity profiles were tested against some clinical isolates obtained from microbiology section of medical laboratories, these include (*E coli, P aeruginosa, P mirabilis, and S aureus).*The results were recorded as sensitive/ resistant according to ATCC strains as control strains. *S aureus* was sensitive to 06(60%) and resistant to 04(40%) of 10 antibiotics used. *E coli* was sensitive to 07 (77.7%) and resistant to 02 (22.2%) of 9 antibiotics used.

P aeruginosa and *P mirabilis* were both sensitive to 07(70%) and resistant to 03 (30%) of 10 antibiotics.

Key words: Antibiotics, Multidrug resistant (MDR), Clinical Isolates, Sensitivity Profiles.

Access this article online	
Quick Response Code:	Website: www.innovativepublication.com
	DOI: 10.5958/2394-5478.2016.00034.0

Introduction

The detection of antimicrobial agent had a great impact on the rate of duration from infections. However, the changing modality of antimicrobial resistance caused a request for new antibacterial agents.[1] Deciding the antibiotic susceptibility of pathogenic bacteria is an important function of clinical microbiology laboratories. Using a standard testing method, we can find the minimum inhibitory concentration (MIC) and inhibition zone diameter, which denote whether the pathogen is sensitive or resistant to antibiotic used in clinical performance.[2-3]

Bacterial antimicrobial drug resistance is worldwide problem that is aggravated by the diminishing number of new antimicrobial in the pharmaceutical pipeline[4]. The widespread organisms that are usually isolated from clinical samples such as urine are *P aeruginosa* and Enterobacter spp. These widespread microorganisms have been found to be resistant to most chemotherapeutic agent[5]. *E coli* is one of the main causes of both nosocomial and community-acquired infections in humans[6]. Pathogenic isolates of *E coli* have a relatively large potential for developing resistance[7]. Diffusion methods were developed further in the 1940s.

In 1940 Heatly introduced the use of absorbent paper for carrying antimicrobial solutions[8]. In this study was a report the estimate of antibiotics sensitivity profiles of selected clinical isolates from laboratories.

Material and Method

Bacterial Strains: The study includes clinical isolates of *E coli, P aeruginosa, P mirabilis, and S aureus* obtained by screening samples of urine, pus, wound, sputum, etc. clinical isolates were isolated from microbiology section of the Al Yarmok Hospital.

At first strains were identified based on the morphological behavior of the isolates on various differential media. All media were prepared according to the manufacture's specification and sterilized at 121°C for 15 min at 15 Ib pressure. The species level identification was then carried out by standard biochemical test (Bergy's manual of Determinative Bacteriology Ninth Edition) and by comparing their characteristics with those of known taxa, as describe[9-10-11].

Antibiotic Susceptibility Testing: Antibiotic sensitivity testing was performed by Kirby-Bauer's disk diffusion method on Muller-Hinton agar (Hi media, Mumbai, India) in accordance with the standards of the Clinical Laboratory Standards Institute (CLSI, formerly National Committee for Clinical Laboratory Standards [NCCLSI] guidelines[12]. The antibiotic concentration per disk was as follow:

Ampicillin 10µg, erythromycin 5 µg, ciprofloxacin 5 µg, gentamycin 10 µg, amikacin 30 µg, cephalothin 30 µg, doxycycline 30 µg, rifampin 30 µg, trimethoprim 5 µg, vancomycin 10 µg.

E coli ATCC, *P aeruginosa* ATCC, *P mirabilis* ATCC, *and S aureus* ATCC were used as control strains.

Planning and culturing of Test Plate: Culture of each sample was planned from 18-24 hours, culture suspended in sterile distilled water and mixed to provide homogenous liquid suspension. The swab was then used to streak the entire dried surface of the paper disk medium. The cultured plates were incubated for 20

min to allow excess moisture to dry. Antibiotic disc were placed at equidistance from each other on the plate with the aid of a pair of sterile forceps. Each disc was then pressed firmly onto the agar with the sterile forceps to ensure complete contact with the agar. The plates were incubated at 35°C for about 18 hours.

Explanation and Translation of Result: The section between the end point and the areas explore no visible growth was taken as the zone of growth inhibition and was measured by means of a ruler diagonally in millimeter from the underside of the plates. Sickly growth near the edge of the inhibition zones were regarded as resistant strains. AB Bio disk manual for interpretive zone diameter standards were used to interpret the diameter of zone inhibition. Isolation was then listing as either sensitive or resistant.

Results

The isolates used were settled to be *E coli, S aureus, P. aeruginosa, and P. mirabilis*. The result of antibiotics susceptibility profiles of these test bacteria given in Tables 1and 2. The antibiotics susceptibility profiles of these organisms also differ among the test antibiotics used.

Table 1: Antibiotic Susceptibility Profiles of G+ve Isolates

S/N	Antibiotics (µg)	*S aureus*
1	Ampicillin(10 µg)	S
2	Erythromycin(5 µg)	S
3	Ciprofloxacin(5 µg)	S
4	Gentamycin(10 µg)	S
5	Amikacin(30 µg)	R
6	Cephalothin(30 µg)	R
7	Doxycycline(10 µg)	R
8	Rifampin(30 µg)	R
9	Trimethoprim(5 µg)	S
10	vancomycin(10 µg)	S

-S Sensitive
-R Resistant

Table 2: Antibiotic Susceptibility Profiles of G-ve Isolates

Antibiotics (µg)	*E coli*	*Pseudomonas aeruginosa*	*Proteus mirabilis*
Ampicillin(10 µg)	S	S	S
Erythromycin(5 µg)	N.A	S	S
Ciprofloxacin(5 µg)	S	S	S
Gentamycin(10 µg)	S	S	S
Amikacin(30 µg)	S	R	S
Cephalothin(30 µg)	R	R	R
Doxycycline(10 µg)	S	S	S
Rifampin(30 µg)	S	S	S
Trimethoprim(5 µg)	S	S	R
vancomycin(10 µg)	R	R	R

S-Sensitive
R-Resistant
N.A-Not Applicable

Table 1 explores the antibiotics susceptibility profiles of gram positive bacteria. From the results, the gram positive bacteria were sensitive to (Ampicillin, Erythromycin, Ciprofloxacin, Gentamycin, Trimethoprim and Vancomycin) with 100% inhibitory activity and resistant to (Amikacin, Cephalothin, Doxycycline, and Rifampin with 100% resistivity (Table 1).

So the gram positive isolate, *S aureus* was sensitive to 06 (60%) and resistant to 04 (40%) of 10 antibiotics used. *S aureus* showed some degree of resistant to some of the test antibiotics. Tables 2 explore the antibiotics susceptibility profiles of gram negative bacteria. From Table 2, all gram negative bacteria were sensitive to (Ampicillin, Ciprofloxacin, Gentamycin, Doxycycline, and Rifampin) with 100% inhibitory activity and resistant to (Cephatothin and Vancomycin) 100%. Of 9 antibiotics tested against *E coli* was sensitive to 07 (77.7%) and resistant to 02 (22.2%). Of 10 antibiotics tested against *P aeruginosa* and *P mirabilis*, were sensitive to 07 (70%) and resistant to 03 (30%). *E coli* was resistant to (Cephalothin and Vancomycin), *P aeruginosa* was resistant to (Amikacin, Cephalothin, and Vancomycin). *P mirabilis* was resistant to (Cephalothin, Trimethoprim, and Vancomycin) as explore in Table 2.

Discussion

In this study we describe the antibiotic sensitivity of bacteria. 10 types of antibiotics were used in this study and tested on 4 bacteria (G+ve and G-ve). *S aureus* was sensitive to 06 (60%) and resistant to 04 (40%) of 10 antibiotics used. *E coli* was sensitive to 07 (77.7%) and resistant to 02 (22.2%) of 9 antibiotics used. *P aeruginosa* and *P mirabilis* were sensitive to 07 (70%) and resistant to 03 (30%) of 10 antibiotics used. From the study, the grade of sensitivity shown by these antibiotics against the test organisms denotes their potencies[13]. The sensitivity of a chemotherapeutic agent is usually distinct on the basis of the lowest concentration of MIC or higher zone of inhibition[14]. Antibiotics sensitivity tested show that all the bacterial pathogen were sensitive to (Ampicillin, Ciprofloxacin, Gentamycin) in similar proportion (100%). However the pathogens tested in this study explore varying degree of resistant (1 to 4 of the antibiotics).

All tested bacteria were resistant to vancomycin unless for *S aureus* which was sensitive to vancomycin. Resistant to amikacin was common to *S aureus* and *P aeruginosa* except for *E coli* and *P mirabilis*. Resistant to cephalotin was common to all isolates. *S aureus* was resistant to doxycycline while *E coli*, *P aeruginosa* and *P mirabilis* were sensitive. Also the resistant to rifampin was common to *S aureus* while *E coli*, *P aeruginosa* and *P mirabilis* were sensitive. Trimethoprim-resistant was common to *P mirabilis*. However, *S aureus*, *coli*, and *P aeruginosa* were sensitive to trimethoprim. The finding of this study is a

perversion from what was recently reported by[1] who reported 100% resistance to ampicillin by all isolates and 100% resistance to vancomycin by gram negative isolates. All isolates shows sensitivity to erythromycin except *E coli* show not applicable to erythromycin that the same reported[1]. Ciprofloxacin, gentamycin, rifampin and trimethoprim exhibited high levels of sensitivity ranging from (90%) to (100%). A study carried out in Dschang, Cameroon, reported a sensitivity of (91.7%) to gentamycin, (81.3%) to ciprofloxacin and (100%) to vancomycin[15]. Sensitivity to gentamycin might be due to the way of administration which block its frequent misapply while the high sensitivity observed in ciprofloxacin, has been attributed to the fact that it is a relatively expensive drug, therefore less available for perversion[16]. *S aureus* has been reported to have resistance to beta-lactam antibiotics of which benzyl penicillin is one. Outbreak of *S aureus* resistant to beta-lactam antibiotics have been frequently related with destructive nosocomial infections[17]. In this study, *E coli* revealed a high degree of sensitivity to most of antibiotics [07 (77.7%)] used and resistant to cephalothin and vancomycin. This is a deviation to what was reported by [1] and [18], who reported that *E coli* to be resistant to ciprofloxacin in their study on antimicrobial drug resistance in Singapore hospitals. *P aeruginosa* showed resistant to 03 (30%) antibiotics in vitro (Amikacin, Cephalothin, and Vancomycin). This is also comparable to the findings of[1], who reported resistant to 2 antibiotics (Chloramphenicol, and Vancomycin). *P aeruginosa* was also isolated by [19] in their study of nosocomial, urinary tract infection and [20], in their study on clinical samples. *P mirabilis* showed resistant to 03 (30%) antibiotics (Cephalothin, Trimethoprim, and Vancomycin) as reported by [21], *P mirabilis* were resistant to (Ampicillin, Cephalothin, Trimethoprim, Tobramycin, Gentamycin, Amikacin, and Ciprofloxacin). The existence of multiresistance *P mirabilis* strains in hospital environment makes constant monitoring for presence of those microorganisms in specific hospital words a necessity.

The study detects the currency of multi-drug-resistance *E coli, S aureus, P. aeruginosa, and P. mirabilis* in the environment; hence caution must be applied whenever antibiotics therapy is to be administered. Resistance due to over use and adulteration of the antibiotics has also been reported[13].

Conclusion

A relatively high proportion of bacterial isolates from health personnel in this study were resistant to antibiotics commonly used in this setting. Although prevalence of multi-drug-resistant isolates were high, results obtained call for regular detecting of susceptibility profiling as a guide to empiric antimicrobial therapy for bacterial infection. So, the result can avail to linial any native effort aimed toward reducing the antimicrobial resistance problems of local hospitals.

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How to cite this article: Badri RM. Estimate of Antibiotics Senstivity profiles of some selected clinical isolates from labortories. Indian J Microbiol Res 2016;3(2):145-148.