Biochemical Identification and Susceptibility of Bacteria Isolated from Intensive Care Units in Some Basrah City Hospitals

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Abstract
One hundred and three were collected from intensive care units from(ICU) Basrah hospitals (Al-Fayhaa General hospital,Al-Mawanee General hospital, Al-Sadder teaching hospital, AL-Basrah children's specialty hospital, Basrah Oil company hospital).from Dec 2020 till John 2021to identify the source and the type of bacterial contamination in ICU and to study the sensitivity of bacterial isolates to commonly used antibiotics in hospitals.The samples were including clinical and environmental samples, The clinical samples including (blood, urine) and the environmental samples including (beds ,walls and different instruments).all samples were cultured by inoculated on nutrient agar ,blood agar, manitol agar and maconckey agar ,incubated for culture growth ,all bacterial isolates that grow on these media were identified by biochemical test and vitek2 compact system forty-seven pure isolates were obtained .the results of identification by vitek 2 compact system showed that the most common bacteria was Enterobacter spp. 20 (42.5%) followed by 16 (34%) Sstaphylococcus spp.,7(14.8%) Pseudomonas spp.,2(4.2%) Klebsiella spp.,1(2.1%) Pantoea spp.and E.coli 1(2.1%). Staphylococcus spp show a high resistance to commonly used antibiotics when Enterobacter spp showed less resistance.
Keywords: Bacteria, ICU, sensisvity ,Enterobacter ,staph, identification

1. Introduction

Intensive care unit is an structured system for the provision of care to critically ill patients that needs specialized nursing and medical care , despite the fact an ICU is based in a defined geographic area of a hospital, ICU can provide invasive basic and observance life support for a short a mount of time. [1].The first intensive care unit created 1953 [2]. ICU is a multidisciplinary and interprofessional speciality specifically designed for the management of patients at risk of developing or with established, life-threatening organ failure Hayden et al., [6], And they add that Contamination may happen either by transmission of microorganisms that contaminating healthworkers' hands or directly by patient shedding of microorganisms in the immediate environment of a patient's bed . Intensive care units organized based on the age group of the patient admitted (adult or pediatric) or by the pathologies/conditions treated (burns, trauma, e.g. neurological, medical or surgical ICUs) [7]. The occurrence of ICU-acquired infections is meaningfully higher in developing countries than in industrialized countries, varying between 4.4% and 88.9% [8].
Antibacterial sensitivity assessment in ICUs should be mandatory this due to continuous changes in antibacterial susceptibility patterns, periodical. [9] . Albrich et al.,[10] pointed that Intensive care units (ICUs) are generally considered epicenters of antibiotic resistance and the principal sources of outbreaks of multi-resistant bacteria. The results of the Canadian National Intensive Care Unit (CAN-ICU) study found that the 10 most common organisms isolated from 79.5% of all clinical specimens were methicillin-susceptible Staphylococcus aureus (MSSA) (16.4%), Escherichia coli (12.8%), Pseudomonas aeruginosa (10.0%), Haemophilus influenzae (7.9%).
Heth, Kaushal et al. [11] showed that The most frequently isolated pathogens were Staphylococcus aureus (32.1%), Enterococcus spp. (13.7%), , Pseudomonas aeruginosa (8.4%), and Escherichia coli (7.9%).
The prevalence of infections due to gram negative bacteria such as Acinetobacter baumannii, Extended Spectrum Beta lactamases (ESBL's) and Metallo Beta lactamase (MBL) producing E. coli and Klebsiella and drug resistant gram positive organisms are high in Indian ICU's [12].
MDR bacteria have been reported as contaminating microorganisms of surfaces, commonly used medical equipment and high-contact communal surfaces (e.g., telephones, keyboard, medical charts) in ICU (Galvin et al .,2012 and Ulger et al ., 2009).[13.14]

2. Material and Methods

One hundred and four samples were collected from Basrah hospitals (Al-Fayhaa General hospital, Al-Mawanee General hospital,AL-Basrah children's specialty hospital and Basrah Oil company hospital).The samples were including clinical and environmental samples. The clinical samples including (blood, urine. Environmental samples include Fifty nine Sterile swab saturated with sterile

doi.org/10.31838/hiv23.03.172 Received: 25.11.22, Revised: 16.12.22, Accepted: 11.01.23.

normal saline was taken from tables ,beds, walls and different instrument and equipment in the ICU .swaps were placed in sterile tubes containing 5ml brain heart infusion broth and transported in a cool box to the laboratory after then the tubes were incubated for 48hr at 37 °C (Alsaimary et al., 2014;Ghane and Azimi,2014) .

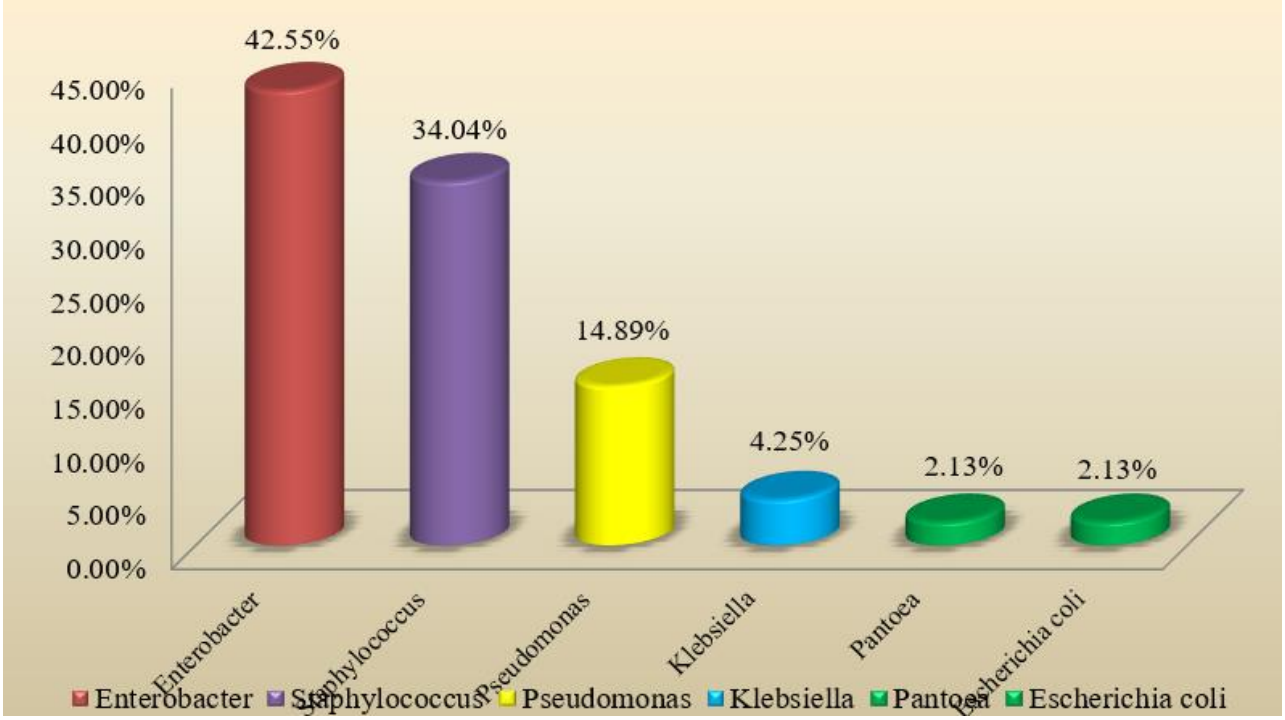
For bacterial growth and bacterial identification and other tests ,Mac-Conkey agar No.3, Mannitol salt agar, Nutrient agar Cm0003 and Brain heart infusion broth were used, media used in the present study were prepared according to the manufacturers instruction fixed on the containers.

All media were sterilized in the autoclave at 121°C for 15 min. After sterilization and cooling at 45-50°C,the media was poured in plates ,Blood agar base was supplemented with 5% human blood . suability to antibiotic ,antibiotics discs include CefoxitinScreen,Benzylpenicillin,Oxacillin,Gentamicin,Tobramycin,Levofloxacin,Moxifloxacin,Clindamycin,Azithromycin, Erythromycin, Clindamycin, Linezolid,Teicoplanin, Vancomycin,Tetracycline,Tigecycline,Nitrofurantoin, Rifampicin,rimethoprim/Sulfamethoxazole. All bacterial isolates were stained by Gram-stain, then examined under light microscope.

3. Results and Discussion

As intensive care unite is a department of hospitals , there are a few published reports available on microbial analysis of patients'samples, determination of antibacterial susceptibility patterns, and the period of stay on hospital . Such data could be beneficial reducing how long they stay in the hospital (Aziz, et al.,2009).

The recent study showed in figure (1) that Identification of (47) bacterial species depending on biochemical Reactions were confirmed by Vitek2compact system .the results of Vitek 2 compact showed that (20) isolates were identified as Enterobacter, (16) isolates were identified as Staphylococcus species, (7) pseudomonas ,(2) Klebsialla,(1) pantoea and (1) Escherichia coli spp Table(4-12) as following 20 (42.55%) isolate were identified as Enterobacter spp, 16 (34.04%) isolate were identified as Staphylococcus spp, 7 (14.89%) isolate were identified Pseudomonas ssp , 2 (4.25%) isolate were identified as Klebsiella spp, 1 (2.13%) isolate were identified as Pantoea spp, and 1 (2.13%) isolate was identified as Escherichia coli



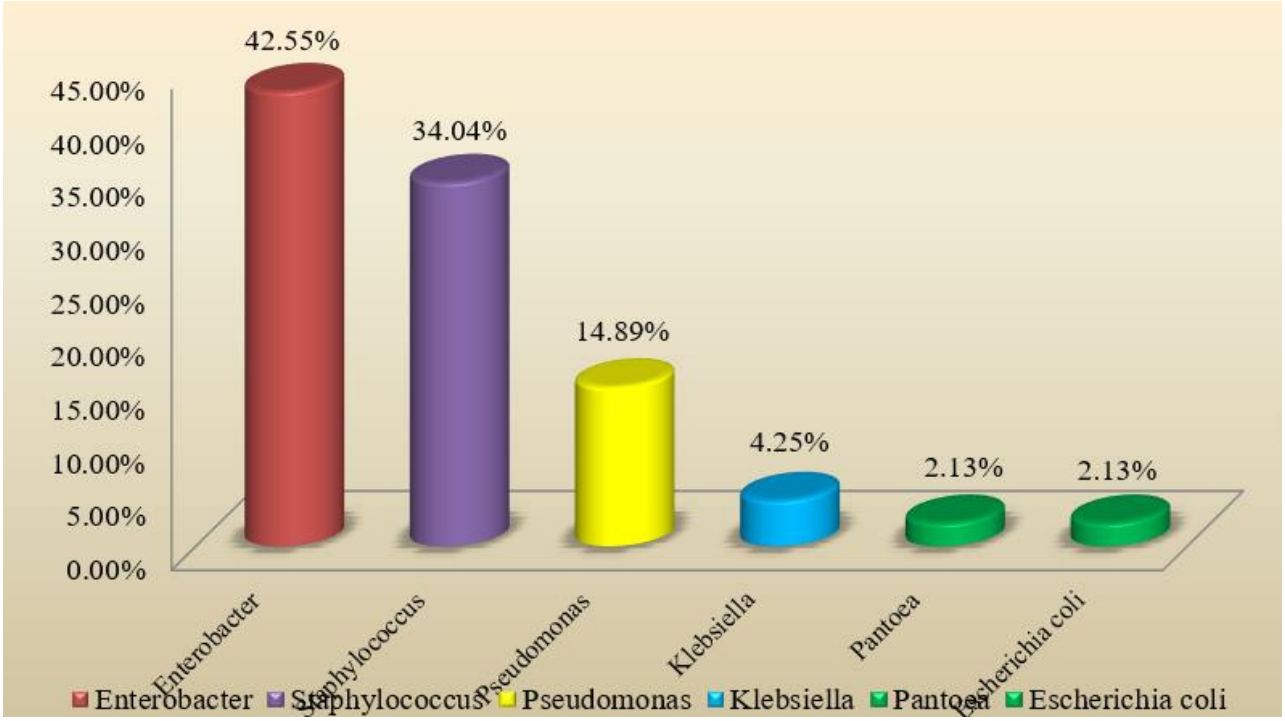


Figure (7) Percentage of bacterial spices .isolated from different areas in ICUs

Nazar et al., [15] in their study found in Sixty eight of pure isolates were obtained including 24 (35.29%) Gram positive bacterial isolates, and 44(64.71%) of Gram negative bacterial isolates, the highest rates (19.11%) of bacterial contamination had been found on the walls and the floor. Other study by Manges et al., [16],11 have being also showed that The most prevalent genus among Gram positive bacteria was Bacillus spp. (18 isolates) found in 7 out of 17 sites, while the most prevalent genus among Gram negative was Enterobacter cloacae (15 isolates). On the other hand 6 isolates of Staphylococcus spp. (25%) among Gram positive bacteria were identified. The antibiotic sensitivity pattern of Staphylococcus spp . showed that the most resistant antibiotic was Erythromycin with percentage (75%) followed by Clindamycin with percentage (50%) ,Trimethoprim/Sulfamethoxazole (35.50%) , Gentamicin (25%),Tobramycin (25%) ,Tetracycline (25%), Rifampicin(25%), Levofloxacin(18.75%), Moxifloxacin(18.75%), Teicoplanin(12.50%), Vancomycin (12.50%), Nitrofurantoin(6.25%) as showed in figure(2)

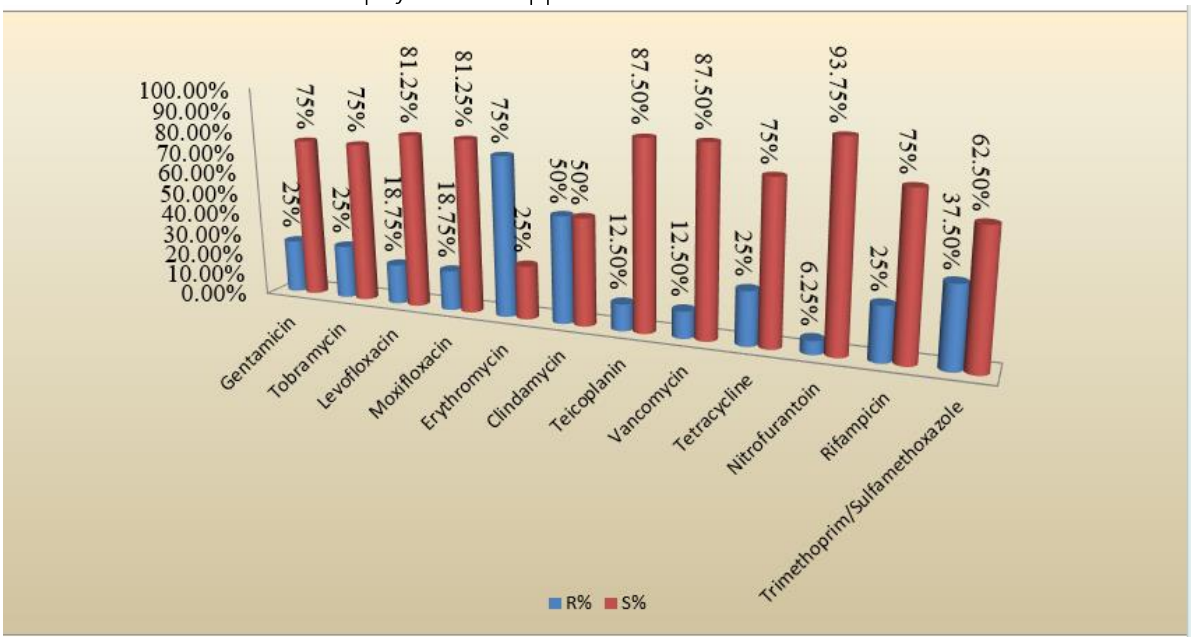


Figure (2) Antibiotics Resistance Percentages for staphylococcus spp

most Enterobacter spp showed the same percentage of resistance to antibiotics (15.00 %) followed by Ticarcillin , Ticarcillin/Clavulanic Acid, Piperacillin and Piperacillin/Tazobactam (10.00 %)in figure (3).

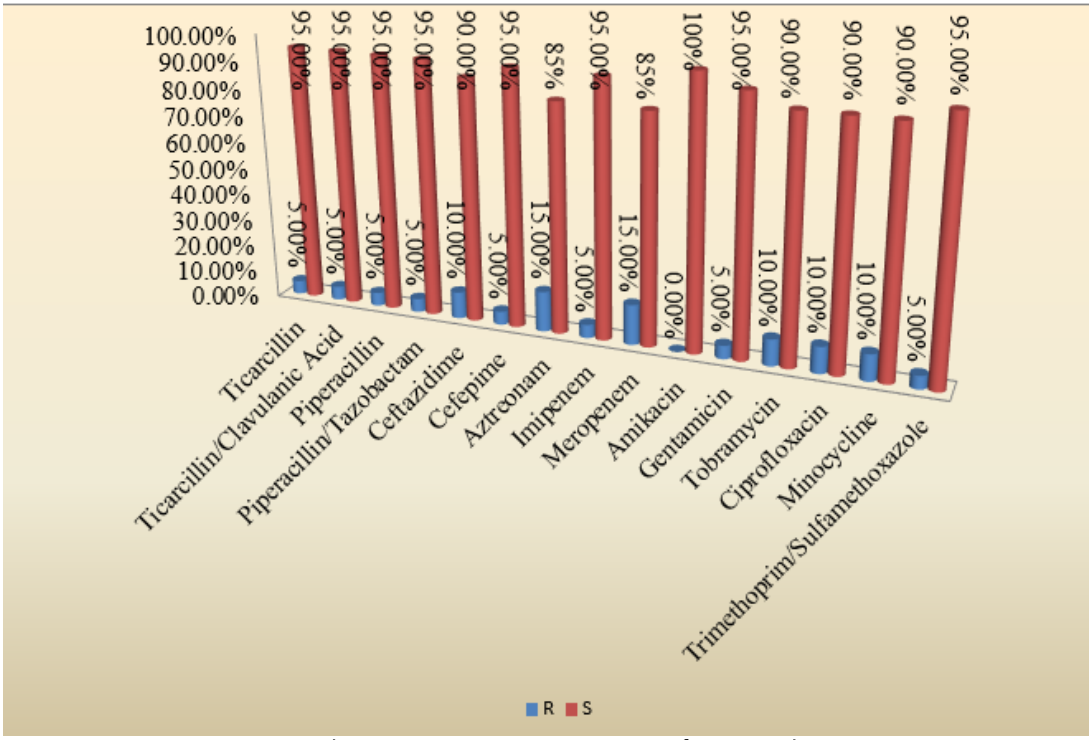


Figure (9) Antibiotics Resistance Percentages for Enterobacter spp .

The gradual increase in the resistant of Enterobacteriaceae against β-lactame antibiotics (1st and 2nd generation of pencillins and cephalosporines) reduce the efficacy of these antibiotics in eradicating diseases of bacterial etiology completely since these resistance will lead to continuous change in the epidemiology of these disease [17]., while the effect of Extended Spectrum β-lactamase (ESBLs) became more evident against the 3rd generation of penicillins and cephalosporines [12]

The high sensitivity of the studied isolates for Imipenem belong to Carbapenems group, one of the recently used antibiotic, could be due to its limited use in Iraq. Although resistant was also recorded among 4.41% of these isolates, and the cause could be related to the development in the mechanism of bacterial resistance such as its production for Carbapenemases enzymes related to β - lactamases enzymes type B and D[18]. The results of Ghosoon and Yahia showed that the isolates identified into the species Enterobacter and showed high sensitivity to antibiotic [19].

4. Conclusion

Staphylococcus spp and Enterobacter spp were the most prevalent bacterial contaminants of ICUs environment predominantly at the walls and the patients beds . Staphylococcus spp show a high resistance to commonly used antibiotics when Enterobacter spp showed less resistance. Gradual increase in the resistant of microbes to previously and recently produced antibiotics may interfere with the tremendous effort provided by health facilities to control the spread of microbial disease in the community. These calls for improving the existing infection prevention and antibiotic stewardship program with the application of strict follow up to reduce bacterial contamination of medical equipment and surfaces.

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