FREQUENCY AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF ACINETOBACTER SPP IAOLATED FROM PUS AND WOUND SWABS (A TERTIARY CARE EXPERIENCE)

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ABSTRACT

Background: For the past two decades, Acinetobacter spp. has emerged as an important pathogen globally in various infections mostly in hospital settings.

Objectives: This study was conducted to determine the frequency and antibiotic susceptibility pattern of Acinetobacter spp isolated from pus and wound swabs.

Methods: This retrospective cross-sectional study included a total of 110 Pus and wound samples collected from patients presenting to Fatima Jinnah Medical University, Lahore laboratory from Jan 2016 to March 2016. The samples were processed and identified by standard protocol. The Acinetobacter isolates were tested for antibiotic resistance by Kirby-Bauer disk diffusion method according to the Clinical and Laboratory Standards Institute (CLSI) guidelines.

Results: From 110 wound samples, 87 (79%) showed significant growth of 87 positive cultures 20 samples (23%) showed growth of Acinetobacter, 11(12.7%) Klebsiella Spp 22(25.3%) Staphylococcus Spp 18 (20.6%) Pseudomonas Spp and 16 (18.4%) Escherichia coli. Out of 20 isolates of Acinatobacter, 13 (65%) were resistant to more than three classes of antibiotics (multidrug resistant) and 3 (15%) were resistant to all commonly used antibiotics (pan-drug resistant). Majority of the isolates were sensitive to Imipenem, Amikacin and Tigecycline and showed resistance rates of 45%, 50%, and 45%, respectively.

Conclusion:

This hospital-based epidemiological data will help to implement better infection control strategies and improve the knowledge of antibiotic resistance patterns in our region.

Keywords: Acinetobacter species, antibiotics, frequency, resistance

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INTRODUCTION

Acinetobacter species are free-living and saprophytic bacilli that can be obtained easily from soil, water, food, and sewage[1]. These are aerobic, gram-negative, non-fermenter of glucose, and opportunistic pathogens that emerge as an important cause of hospital-acquired infections. *Acinetobacter* has undergone significant taxonomic modification over the last 30 years. Its most common and important representative is *Acinetobacter baumannii*, and the other species such as *Acinetobacter lwoffii*, *Acinetobacter johnsonii*, and *Acinetobacter haemolyticus* are rarely isolated from patients[2]. Its great capacity to survive in low-moist environment coupled with its ability to develop resistance to antimicrobial agents can increase the possibility of spreading in hospitals[3]. The nosocomial infections caused

by *Acinetobacter* include pneumonia, septicemia, wound sepsis, urinary tract infection, endocarditis, and meningitis[4]. In addition to infection among hospitalized patients, community-acquired *Acinetobacter* infection is increasingly reported[5]. There is a significant difference in the behavior and spread of multi-drug resistant *Acinetobacter* spp recovered various geographic locations[6]. Since several factors cause resistance in *Acinetobacter* spp., treatment of infections caused by this organism should be based on antibiotic susceptibility tests. Therefore, having information regarding the prevalence and pattern of bacterial resistance to these drugs is important[7, 8].

METHODS

A retrospective, hospital record–based, cross-sectional study was carried out from Jan 2016 to March 2016 in Pathology Department of Allama Iqbal Medical College Lahore. A total of 110 wound samples were collected. A retrospective evaluation of patient's age and sex was carried out on the basis of the case record histories. A healthcare-associated infection or nosocomial infection is defined as a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent (s) or its toxin (s) that was not present on admission to the hospital.[9]

In the laboratory, all the collected samples were cultured aerobically on blood agar and MacConkey agar. All isolates were tested for antimicrobial susceptibility testing by the standard Kirby-Bauer disk diffusion method.[10] The following standard antibiotic disks were placed on the MHA plate: Augmentin (10ug), Ciprofloxacin (5ug), Amikacin (30ug), Ceftazidime (30ug), Imipenem (10ug), Ceftriaxone (30ug) and Tigecycline(15ug).The plate was incubated at 37°C overnight. The zone of inhibition were measured and interpreted according to the Clinical and Laboratory Standards Institute (CLSI) guidelines.[11]The isolate was considered as highly resistant when it was resistant to Imipenem, Amikacin, and Augmentin. Multidrug-resistant (MDR) *Acinetobacter* spp. are defined as those isolates resistant to more than three classes of antibiotics. An isolate was classified as pan-resistant when it was resistant to all the commonly used antibiotics.[12]

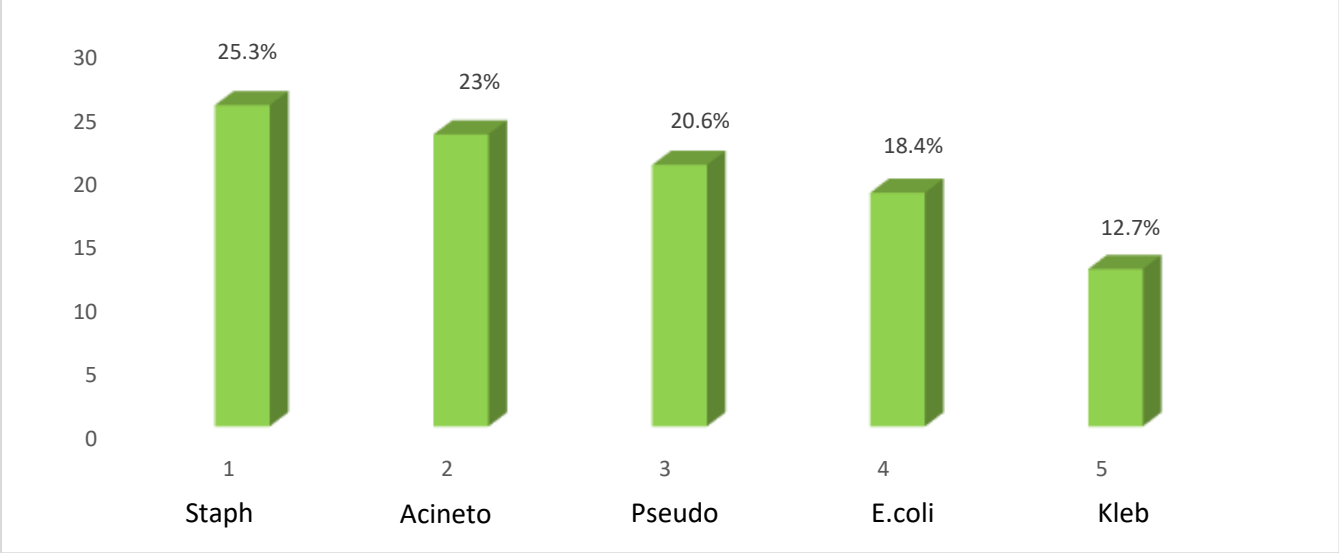

Figure 1: Frequency of bacterial pathogens in pus and wound swabs.

RESULTS

Out of 110 samples, 77 were from males and 33 from females.

During the study period from Jan 2016 to March 2016, a total of 110 wound samples were aerobically cultured, of which 87 (79%) yielded significant growth and rest of the samples 23 (21%) showed non-significant growth. Of 87 positive cultures 20 samples (23%) showed growth of *Acinetobacter SPP*, 11(12.7%) *Klebsiella SPP*, 22(25.3%) *Staphylococcus SPP*, 18(20.6%) *Pseudomonas SPP* and 16(18.4%) *Escherichia coli*

In the present study, most of the *Acinetobacter* spp. were highly resistant to Ceftazidime (100%), Augmentin (100%), Ceftriaxone (90%), Ciprofloxacin (80%), Amikacin (50%), Imipenem (45%) and Tigecycline (45%) The low resistant patterns of imipenem (45%), Tigecycline (45%) and

Amikacin indicate that they are effective drugs. The study showed that 65% isolates were multi-drug resistant.

Table 1: Antibiotic resistance profile of *Acinetobacter spp*

Antibiotics	Frequency	Percentage
Augmentin	20	100%
Ceftazidime	20	100%
Ceftriaxone	18	90%
Amikacin	10	50%
Ciprofloxacin	16	80%
Imipenem	9	45%
Tigecycline	9	45%

Table 2: Distribution of resistance in *Acinatobacter Spp*

Susceptibility pattern	No of isolates	Percentage
Sensitivity	4	20%
Multi drug Resistant	13	65%
Pan drug resistant	3	15%

In our study, most of the isolates were multi-drug resistant. Only 20% were sensitive while 65% were multi-drug resistant and 15% were resistant to all the antibiotics.

DISCUSSION

Acinetobacter spp are the second most common non-fermenting bacteria after *Pseudomonas* species that are isolated from human specimens, especially among nosocomial infections.[13] In recent years, this species has emerged as the causative agent of important nosocomial infections in the ICUs and emergency unit, which is probably related to the increasingly invasive diagnostic procedures used, the greater quantity of broad-spectrum antimicrobials used, and prolonged duration of stay in the hospital. Development of resistance against antimicrobials is a major problem in the treatment of *Acinetobacter* infections. Although they are considered as pathogen of mild virulence, they can rapidly acquire resistance.[14]

In our study, from 110 wound samples 20 (23%) *Acinetobacter* spp was obtained. In the present study, most of the *Acinetobacter* spp. was highly resistant to ceftazidime, augmentin, ceftriaxone and ciprofloxacin. The low resistant patterns of Imipenem, Tigecycline and Amikacin indicate that they are effective drugs.A similar result was obtained from a study conducted at a tertiary care hospital PIMS Islamabad from Feb 2011 to Dec 2011 where the prevelance of *Acinetobacter* was reported to be 16.48% in wound specimes. Most of the isolates were multi-drug resistant. The antibiotic susceptibility profile showed that minocycline and tigecycline were the most effective against *A. baumannii*.[15]A similar study was conducted at Institute of Molecular Biology and Biotechnology, The University of Lahore where the prevelance of *Acinetobacter Spp* in wound specimens was 25%. The multidrug resistance pattern showed 98.75% resistance to Ceftazidime,88.75% resistance to Ciprofloxacin,97.5% resistance to Cefotaxime and 77.5% for imipenem It showed sensitivity to Tetracycline derivative i.e., Tigeycycline (52.5%).These results are similar to our results.[16]In a study conducted at Nizam's Institute of Medical Sciences, Hyderabad, Telangana, India the prevelance of *Aacinetobacter Spp* in wound specimens was 20 % while 77% isolates were MDR which is similar to our results.[17]*Acinetobacter* is ubiquitous in the hospital setting. Its ability to survive for long periods coupled with its ability to demonstrate a number of antimicrobial resistance genes has made *Acinetobacter* a successful hospital pathogen.[3]

Most of the patients who were admitted in our hospital had previously attended primary and secondary care hospitals and usually received combination of β-lactam antibiotics like third- and fourth-generation Cephalosporins along with Aminoglycosides or Fluoroquinolones. Thus, majority of the isolates in our study were resistant to commonly used antibiotics such as Ceftazidime, Ceftriaxone, Amikacin, Ciprofloxacin and Augmentin. This means MDR isolates are increasing day by day, probably due to indiscriminate use of these antibiotics in healthcare settings. It is re-emphasized that broad-spectrum antibiotics should be used with caution.There are many measures that may impact on antimicrobial resistance; reducing and restricting the use of antimicrobials to only those situations where they are warranted, at proper dose and for the proper duration is the most appropriate solution.[18]

CONCLUSION

The high prevalence of the organism in clinical specimens together with its multidrug resistance has made *Acineto baumannii* an important nosocomial pathogen leading to significant morbidity and mortality. A combination of a review of hand-washing practice, education about the spread of bacteria via hands and contaminated environment, and the revision of infection control procedures would help in the control of this organism in

hospitals. To avoid resistance, antibiotics should be used judiciously and empirical antibiotic therapy should be determined for each hospital according to the resistance rates of that center. This should be regulated according to antibiogram results. Increasing Carbapenem resistance rates in *Acinetobacter* spp. leads to usage of new alternative antibiotics like Tigecycline.

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