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KEY WORDS:

PREVALENCE AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF PSEUDOMONAS AERUGINOSA ISOLATES FROM WOUND INFECTIONS

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ABSTRACT

INTRODUCTION: Wound infections are the most common sources of morbidity worldwide. According to recent studies conducted it has come to light that various wound infectons are caused by *Pseeudomonas aeruginosa* than *Staphylococcus aureus*. *Pseudomonas aeruginosa* is one of the most important microorganisms that cause clinical problems resulting from high resistance to antimicrobial agents. Therefore the present study was undertaken to find out the antibiotic susceptibility patterns of *P.aeruginosa* from various specimens of wound infections.

AIM AND OBJECTIVES: To detect the prevalence and antibiotic susceptibility pattern of *Pseudomonas aeruginosa* isolates from wound infections.

MATERIALS AND METHODS: A total of 100 samples were collected from both male and female patients of all ages of both IP and OP patients attending Saveetha Medical college and hospital Thandalam Chennai. Swabs were taken from wounds by the use of swab sticks and scalpel blades. The antibiotic disc used were Amikacin, Gentamicin, Amoxycillin, Tetracycline, Ampicillin and Ofloxacin. The results were interpreted as sensitive or resistant based on CLSI guidelines.

RESULTS: In our study on antibiotic susceptibility pattern of *P.aeruginosa* isolates the percentage of resistant strains 51% and 35.5% respectively against gentamicin and amikacin. In our study the most number of strains were susceptible to ofloxacin(75.5%), gentamycin(58.5%), ceftriazone(56.3%) which could be used as reserve drugs in case of severe illiness due to pseudomonas infection.

CONCLUSION: The result of this research showed that *Pseudomonas aeruginosa* was the most frequent pathogen isolated accounting for the total no of cases seen in Saveetha medical college. The susceptibility profile of *P.aeruginosa* isolates to the ten antimicrobials tested in vitrowere relatively low compared to the sensitivity pattern to different antipseudomonal drugs reported worldwide.

INTRODUCTION:

Wound infections are the most common sources of morbidity worldwide. Bacterial acquired wound infections are the most common cause among hospital settings. There are reports of considerable number of carriers for *P.aeruginosa* among the healthy people within the hospital environment, capable of transmitting infection to the patients undergoing treatment. According to the recent studies conducted it has come to light that various wound infections are caused by *P.aeruginosa* than Staphylococcus aureus. In the past 4 years some of the Indian studies have shown Pseudomonas species as the most predominant isolate from wound infections. It has also been noted that most of the infections occurring with Pseudomonas species occur in compromised hosts. The pathogenicity of these organisms is based on its ability to produce a variety of toxins and proteases and also on its ability to resist phagocytosis. *Pseudomonas aeruginosa* is commonly resistant to antibiotics and because of this it is a dangerous and dreaded pathogen. The only antibiotic agents to which strains are regularly sensitive are cephalosporin, carbenicillin, colistin, gentamicin, polymyxin, quinolones and streptomycin; however degrees of cross-resistance between these agents have been reported. *P.aeruginosa* is one of the most important microorganisms that cause clinical problems resulting from high resistance to antimicrobial agents. Though it is rarely found in the normal flora of humans it is frequently isolated from patients with burns, cystic fibrosis and neutropenia. One of the main and crucial challenges in managing *P.aeruginosa* infections is an inherent resistance mechanism referred to as intrinsic resistance. Its multiplicity of resistance mechanism may render this microbe less amenable to control by antibiotic cycling. The bacillus almost never causes infections in healthy individuals and often infects the immunocompromised and wounded. Therefore the present study was undertaken to find out the antibiotic susceptibility patterns of *P.aeruginosa* from various specimens of wound infections.

MATERIALS AND METHODS

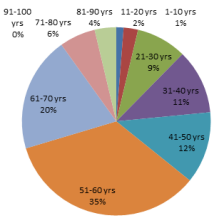
A total of 100 samples were collected from both male and female patients of all ages of both IP and OP patients attending Saveetha Medical College and Hospital, Thandalam Chennai. Swabs were taken from the wounds and transported to the laboratory and after gram staining they were inoculated on blood agar, chocolate agar and MacConkey agar. Suspected colonies were identified using colonial morphology, motility testing, grams reaction and biochemical test as described by Cheesburgh (2000). THE *Pseudomonas aeruginosa* strains were subjected to antibiotic susceptibility testing by Kirby-Bauer disc diffusion method in Mueller Hinton agar based on CLSI guide lines. ATCC strains of *Pseudomonas aeruginosa* (ATCC 27853) and E.coli (ATC 25922) were used as quality control. The antibiotic discs used were Amikacin, Gentamicin, Amoxycillin, Tetracycline, Cefoperazone, Ceftazidime, Ampicillin, Ciprofloxacin and Ofloxacin. Organisms were confirmed by their growth characteristics and biochemical identification by antibiotic susceptibility test which was done on Muller Hinton agar aaccording to CLSI guidelines.

RESULT:

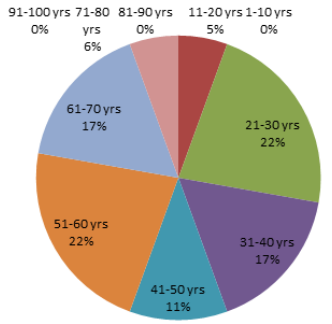
A total of about 100 samples were taken from both the IP and OP ward of Saveetha Medical College mostly taken from the specimens of wound swab, pus etc.

Statistics were taken and analyzed of the age group of people who were admitted to both IP and OP patients.

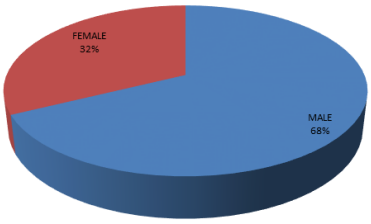
IP analysis



OP analysis

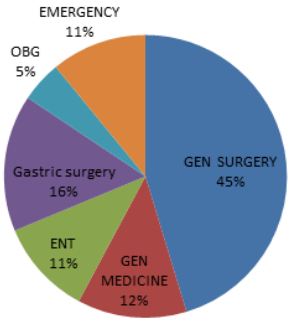


The number of specimens obtained from both male and female patients was analyzed and it was found that the highest number of specimen was obtained from the male patients than the female patients.

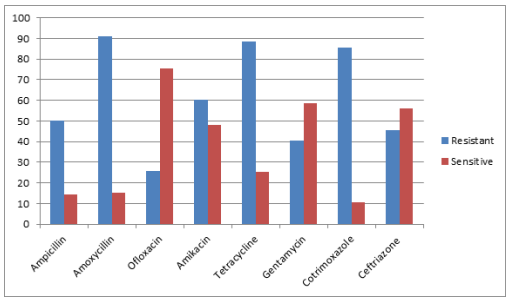


Department analysis showed that the highest number of specimen was obtained from the General Surgery ward followed by General Medicine ward and the ENT ward.

Department wise Analysis



In our study on antibiotic susceptibility pattern of *P. aeruginosa* isolates, the percentage of resistant strains was 51 and 35.5 respectively against Gentamicin and Amikacin. 34.4% were resistant to Ceftazidime, a 3rd generation cephalosporin. Amoxycillin showed 91.1% resistance. So, infections due to those Pseudomonas strains have to be treated only after performing the antibiotic susceptibility testing by including these drugs. In our study, the most number of strains were susceptible to Ofloxacin (75.5%), Gentamycin (58.5%) and Ceftriazone (56.3%), which could be used as reserve drugs in case of severe illness, due to Pseudomonas infection. Increase in resistance to antibiotics used other than Ofloxacin and Gentamycin. As a result regular antibiotic susceptibility testing of Pseudomonas isolates is required for effective treatment of those cases.



Antibiotics Sensitivity Pattern of P.aeruginosa Isolated in Wound Infections				
Antibiotics	**Disc content(ug)**	**Number & Resistant%**	**Number& %Sensitive**	
Ampicillin	10		50.4	14.5
Amoxycillin	10		91.1	15.1
Ofloxacin	5		25.8	75.5
Amikacin	30		60.4	48.2
Tetracycline	30		88.5	25.5
Gentamycin	30		40.3	58.5
Cotrimoxazole	20		85.7	10.6
Ceftriazone	20		45.4	56.3

DISCUSSION

The wound is considered one of the major health problems in the world and infection is one of the most frequent and severe complications in patients who sustained wounds (Zogani et al. 2002).The result of this research showed that the prevalence rate of *P.aeruginosa* was 11% in hospitals, this bacterium is a common cause of wound infections, especially of thermal burns, this is because burns have large exposed areas of dead tissue of any defenses and therefore are ideal sites for infection by bacteria from the environment or normal micro biota. This finding is in contrast with the work done by AL-Akayeleh (1999) in U.A.E, it was reported that out of 88 surgical wound patients examined microbiologically for surgical wound infection, and 51.1% had Staphylococcal surgical wound infection while 35.5% had *P.aeruginosa* infection. This research was in contrast with similar studies carried out by Anupurba et al. (2010) which showed that *P. aeruginosa* was the most frequent pathogen isolated accounting for 36%of the total number of organisms. The susceptibility profile of *P. aeruginosa* isolates to the ten antimicrobials tested in vitro were relatively low compared to the sensitivity pattern to different anti pseudomonal drugs reported worldwide. Such high antimicrobial resistance is probably promoted due to selective pressure exerted on the bacteria due to numerous reasons like non adherence to hospital antibiotic policy and excessive and indiscrimate use of broad –spectrum antibiotics. However recent studies have showed that *P. aeruginosa* was the most frequent pathogen isolated, accounting for 36% of the total number of the organisms. Thus routine microbiological surveillance and careful in vitro testing prior to antibiotic use and strict adherence to hospital antibiotic policy may help in the prevention and treatment of multi-drug resistant pathogens in wound infection. Ongoing surveillance of *P.aeruginosa* resistance against antimicrobial agents is fundamental to monitor trends in susceptibility patterns and to appropriately guide the clinician in choosing the therapy especially when new antimicrobial agents may not be readily available in near future. Since *P.aeruginosa* is one of the most common causes of wound infection in many of the clinical cases seen in the wards and this organism is being considered fatal because of its increasing resistance to the antibiotics used against it many studies were carried to find the antibiotic susceptibility. Based on these above conclusions this study was carried out from the samples taken from Saveetha medical college and this report was made based on the samples taken from the different departments of the hospital among which the highest number of samples were obtained from the General Medicine department. Analysis was also done based on the age of the patients from whom the samples were taken. Analysis was also done for the type of specimen obtained from the different departments. On comparing with the other research papers that have been published the most type of specimen that was obtained was the wound swab. In our study notable resistance to *P.aeruginosa* was observed against Amoxycillin. The resistance may be due to the production of metallo lactamases which can be chromosomally encoded. Among the antibiotics that were tested to find the antibiotic susceptibility for *P.aeruginosa* it has been observed that the

highest percentage of susceptibility was seen against amikacin. There was also an analysis taken on a random basis to find out the reason for the development of resistance against these antibiotics. Moreover based on the data analysis it can also be concluded that *P.aeruginosa* infection can also be dependent on age, sex and duration of stay of the patient in the hospital. Many theories were proposed to explain this cause and one of the most accepted theories was that the development of resistance to antibiotics was due to the irrational and inappropriate use of antibiotics. There may be a variation in the prevalence and sensitivity of *P.aeruginosa* between various communities and hospitals. It is therefore of prior importance for the surveillance of antibiotic resistance in our community by instituting the collection and collation of both clinical and microbiological data. Hence there should be an implementation of the concept of reserve drugs so that there is minimized misuse of the antimicrobials. This study can be concluded by saying that result regular antibiotic susceptibility testing of Pseudomonas isolates is required for the effective treatment of the patients.

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