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CEFTAZIDIME SENSITIVE BETA HEMOLYTIC *PSEUDOMONAS AERUGINOSA* – AN ESKAPE PATHOGEN

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ABSTRACT

Pseudomonas aeruginosa is the most rebellious hospital bug, causing life threatening diseasesoften challenging to treat. In view of this, a study was undertaken to uncover hemolytic P.aeruginosaand antibiotic susceptibility against selected antibiotics. Air samples from different locations within a hospital were collected by exposure plate technique and surface samples were collected by wiping the sterile moist swabs over the ventilator tube, bed railing, computer mouse/ keyboard,patient table, floor and wall from intensive care unit. Collected samples were subjected to standard isolation, characterization and hemolytic assay procedures. ßhemolytic P.aeruginosa was isolated from the collected samples. Antimicrobial susceptibility test was performed accordingto CLSI (2015) against gentamicin (120µg), ampicillin (10µg), amoxicillin (10µg), imipenem(10µg), andceftazidime (30µg).P.aeruginosa was sensitive to all antibiotics tested. The most imperative preventive measure against contagion is to rev- up decontamination protocol and continuous education to generate better understanding about the reservoir of Pseudomonas areuginosa, which is routinely over looked.

Keywords: ESKAPE pathogen, *Pseudomonas aeruginosa*, beta hemolysis, hospital infection, drug resistance.

INTRODUCTION

Antibiotic resistant ESKAPE pathogens are public health threat globally,*P. aeruginosa*is an ESKAPE pathogen known for its ubiquitous nature and antibiotic resistance (Jack *et al*., 2013).*P. aeruginosa*is termed as nosocomial terrorist causing nosocomial morbidity and mortality(Boucher *et al*., 2009). It is also called "water bacterium" because it is widely found in and around water sources (Luke*et al*., 2016). It is also reported to be found in liquid hand soap contaminated up to 8× 10 (5) cfu/g (Blanc *et al*., 2016).Despite the updated hospital care strategies, hospital infections emerge as the most frequent problem in health care setting world wide especially in developing countries (Simonsen*et al*., 2004). According to a prevalence study conducted by WHO in 2002, an average of 8.7% hospital acquired infections were reported from four WHO regions namely, Europe, Eastern Mediterranean, South East Asia and Western Pacific (Ducel*et al*., 2002). *P.aeruginosa* hassubstituted*Staphylococcus aureus,* the common health care setting associated pathogen (Hani *et al*.,2009). *P.aeruginosa*is known to cause wide spectrum of clinical conditions*viz.*, ventilator associated pneumonia, urinary tract infection, bacteremia, post operativewound infection and is associated with high mortality rates regardless of appropriate antimicrobial therapy(Rossolini*et al*., 2005, Desiree *et al*., 2010). Several reports claim life threatening diseases caused by *P.aeruginosa in*immunocompromised patients (Driscoll *et al*., 2007,2010, Gaynes*et al*., 2005,Emori*et al*., 1991).Antibiotics used to treat infections caused by*P.aeruginosa* are based on the type and severity of the clinical condition and zonal resistance patterns (Giamarellou*et al*., 2001).*P.aeruginosa* was reportedto demonstrate resistance to multiple antibiotics(Nikaido 2003, Farida *et al*., 2010,).The swift emergence of antibiotic resistant*P. aeruginosa*illuminatesit as one of the most stern health care associated pathogen(Nwamkwo*et al*., 2010).

MATERIALS AND METHODS

A total of 96 samples were collected from air,ventilator tube, bed railing, computer mouse/keyboard, patient table, floor and wall of intensive care unit from one of the leading hospital in Kuala Lumpur. Air samples were collected by open plate technique while surface samples were collected by wiping the sterile moist swabs over the surface of selected areas(Dharan*et al*., 2002Javed*et al*.,2008). The collected samples were transported to Research laboratory for isolation and characterization. The isolates were biochemically characterized and identified in accordance with standard procedures (Palleroni, 2015, Haynes, 1951). Hemolytic assay was conducted by inoculating pure culture of *P. aeruginosa*

on blood agar medium and incubated at 37^0C overnight to observe the hemolysis post incubation(Pyzh*et al*., 2011).Suspension of standard reference strain (*P aeruginosa* ATCC 27853) was used in this study.

Out of 76 *P.aeruginosa*isolates, 40 isolates were subjected to antibiotic susceptibility test according to CLSI (2015). Commercially manufactured antibiotic discs were obtained from Oxoid pharmaceutical, Malaysia.Antibiotic discs used in this study were of gentamicin (120µg), ampicillin (10µg), amoxicillin (10µg), imipenem (10µg), and ceftazidime (30µg) with varied potency respectively. Post incubation, the diameter of inhibition zone was measured and compared with standard antibiotic susceptibility table (CLSI, 2015). Resistance and sensitivity was categorized against the antibiotics tested.

RESULTS AND DISCUSSION

Isolation of *P.aeruginosa*

A total of 76 isolatesof *P.aeruginosa* were isolated in this study from various areas of the intensive care unit of selected hospital as indicated in Table 1.

Table 1: Isolation of *ß* hemolytic *Pseudomonas aeruginosa* from Intensive Care Unit

Samples	*ß* hemolytic *Pseudomonas aeruginosa isolates*
Air	28
Ventilator tube	22
Bed Railing	8
Computer Mouse and Keyboard	6
Patient Table	5
Floor	4
Wall	3
Total	**76**

*P.aeruginosa*showed highest prevalence in the air samples 28 (36.8%) followed by ventilator tubes 22 (28.9%), bed railing 8 (10.5%), Computer mouse and keyboard 6 (7.9%), patient table 5 (6.6%), floor 4 (5.3%) and wall 3 (4%) in accordance with (Felicity *et al*., 1968, Ana*et al*.,2008). This explains, the P.*aeruginosa* continues to be the hospital bug.Hemolytic assay, revealed beta hemolytic *P.aeruginosa* in line with other report (Piyush*et al.*,2008).

Antibiotic Susceptibility Testing

Table 2,confirms the susceptibility pattern of the confirmed isolates of *P.aeruginosa*.Largely, the isolates were found to be sensitive to all the antibiotics tested.

Table 2: Antibiotic sensitivity of*Pseudomonas aeruginosa*

Antibiotics	Sensitive (%)
Gentamycin	60.0
Ampicillin	42.5
Amoxicillin	40.0
Imipenem	37.5
Ceftazidime	32.5

Antibiotic susceptibility test revealed sensitivity to all the groups of antibiotics tested *viz.*, gentamycin, ampicillin, amoxicillin, imipenem and ceftazidime. Other reports, demonstratedceftazidime and gentamycin sensitivity Désirée*et al.,* (2010),Siva *et al*., (2009) in contrast to reports from Malaysia (Pathmanathan*et al*., 2009). Gentamicin sensitivity wasparallel with the results recorded by Anithaet *al*., (2016), in contrast to other reports (Herman*et al*., 1986,Alkalin*et al*., 1988,Milind D *et al*., 2014). However, other findings revealed resistance to gentamycin,ampicillin and amoxicillin (Jamshaid*et al*., 2008).

Ceftazidime sensitivity was in line with other reports(Indu*et al*.,2014, Tarana*et al*., 2015). The conspicuous observation of this study was ceftazidime sensitive *P.aeruginosa* as opposed to many reports that recorded ceftazidime resistance (Harris *et al*., 1999,Baba*yet al*., 2007, Tan*et al*., 2008,Asghar*etal*., 2009, Bukharie*et al*., 2010,Al-Agamy*et al*.,2011, Jianchen*get al*., 2013, Mohan*et al*., 2013,Milind*et al*., 2014,Mubashir*et al*., 2016,Zakieh*et al*., 2016).In addition, several studies have reported cephalosporin resistant*P.aeruginosa*(Anitha*et al*., 2016,Akhabue*et al*., 2011,Omar *et al*., 2016).

Amoxillin sensitive *P.aeruginosa*were recorded in this study while the other reports revealed resistance (Anitha*et al*., 2016).Imipenem sensitivity was similar with other reports (Dinic*et al*., 2008, Juhi*et al*., 2009,Siva *et al*., 2009, Garba*et al*., 2012, Ravichandra*et al*., 2012, Randa*et al*., 2016, Anitha*et al*., 2016,Premanadham*et al*., 2016, Sonal*et al*., 2016).

The variation of sensitivity and resistance is multifactorial, the reports of antibiotic overuse and misuse is ruinous globally,this is in agreement with the reports by (Ozumba,2003).

CONCLUSION

The credible approach to reduce morbidity and retain hospitals as life saving resources is by combined coordinated effort of hospital personnel and patient. It is important to urge the patient to adhere to the antibiotic strategies which should bea reinforced effort by surveillance champions cyclically. In addition, the maintenance ofpatient number and

clinician ratio may prove to be significant effort in infection control management to address the escalating scare ofESKAPE pathogens.

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