Incidence of Nosocomial infection of *Pseudomonas aeruginosa* in General Basrah Hospital in Basrah City / IRAQ

By

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*Pseudomonas aeruginosa* حدوث اصابات مكتسبة بجرثومة

في مستشفى البصرة العام مدينة البصرة/ العراق

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عبد الحافظ عريد الدبوان، صالح مهدي عبد العزيز

تم جمع الف ومائتين وستا وعشرين عينة من المرضى الراقيين في مستشفى البصرة العام وخمسائة وستة وعشرين مسحة من مواقع مختلفة في المستشفى خلال سنة واحدة وسجلت اصابات بجرثومة *P. aeruginosa* عشرين اصابة منها 16.4% اصابات بجرثومة في كل شهر من الأشهر كان عدد الاصابات خمس وستون اصابة (3 5/6%) منها 14.4% اصابات بجرثومة التهاب جروح 23.2% التهاب اذن و4.5% التهاب مجازري بولية و6.3% تهاب الدم. وكانت نسبة الحدوث (60) في بيئة المستشفى ومن خلال عمل الحساسية الدوائية أظهرت عزلات جرثومة *P. aeruginosa* مقاومة عالية للمضادات الحيوية حيث كانت المقاومة 100% لكل من الامبولين والاموكسيسيلين أو السيبتريدين والكلونو باسين والكلونو باسين وكان الهدف هو معرفتها التشابة على المستوى الوراثي بين العزلات المعزولة من بيئة المستشفى والمرضى. كما تم التجري عن أقل تأثير مبط للمحاليل المطهرة المستخدمة في المستشفى وظهر ان 1% لحلول مضخة اما يثبت نمو هذه الجرثومة وعدد استخدام الأشعة فوق البنفسجية كعامل تعقيم اختزال النمو الجرثومي من 10 x 10 إلى 0.2 x 10 مستعمرة / مل.

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ABSTRACT

One thousand and two hundred twenty six specimens were obtained from patients and 516 swabs from different surfaces of environments Basrah General Hospital were collected. Sixty five patients were suffering from Pseudomonas aeruginosa infection as shown by the following percentages (5.3%), 44.6% from wound infections, 23.0% from ear infections 18.4% from urinary tract infections and 15.3% from blood stream infections. The incidence rate of P. aeruginosa was 0.1 (60/516).

Antibiotic susceptibility was completely resistant 100% to Ampicillin, Amoxicillin, Trimethoprine, Lincomycin and Clindomycin. The minimum inhibitory concentration of ditto! solution was found to be 1%. The use of UV light as a sterilizing agent in laboratory experiment was shown to be effective and reduced the number of bacteria from $1.0 \times 10^7$ to $0.2 \times 10^1$ CFU / ml.

INTRODUCTION

Nosocomial infection has been recognized for centuries as an important complication of hospital care [1]. It results in substantial morbidity, prolongation of hospital stay, increased costs of direct patient care and high mortality [2, 3, 4]. It is reported to affect - from 5% to 10% of all patient hospitalized in acute - care in USA [3,5] and 9.2 in England and Wales [6]. Besides having economic consequences nosocomial infection adds significantly to the social burden by leading to a reduction in beds available for patients [7]. The correct quantification of the occurrence of nosocomial infection is essential for the evaluation efforts to control and prevent such infections. Different methods have been used for measuring the incidence of nosocomial infection [8, 9, 10, 11]. In the present study Ps. aeruginosa is used as a tool for the determination of the nosocomial infection in hospital, as Ps. aeruginosa has been confirmed as incriminated in hospital - acquired infection [4, 12, 13, 15, 16, 17, 18, 19, 24].

Isolation and identification

Bacterial isolation and identification was made by examination of the overnight culture on the basis of colony morphology and culture characteristic and their biochemical reaction according to standard procedures [20].

Antibiotic susceptibility

Ps. aeruginosa isolates from patients and hospital environment were tested for their sensitivity to the following antibiotics: Tetracycline : 30 μ g; Cefotaxime sodium : 30 μ g; Cloxacillin : 5 μ g; Ampoxicillin: 25 μ g; Gentamicin: 10 μ g; Chloramphenicol : 30 μ g; Trimethoprim: 1.25 μ g and Lincomycin : 2 μ g (the antibiotic disk were supplied from Oxoid limited Basing stoke, Hampshire England). Disk diffusion method [22] by Muller - Hinton Agar (Oxoid) was adopted for the analysis.

Minimal inhibitory concentration of ditto! solution

The [MIC] of ditto! was determined against isolates of Ps. aeruginosa of either sources of patients and hospital environment. The procedure according Finegold & Baron [22].

Ultraviolet light

The U. V. light irradiation at wavelengths 280 nm was applied to reduce the growth of Ps. aeruginosa by Muller - Hinton Agar (Oxoid) depth 4 mm (90 mm diameter petridish. The dish inoculum was $1.0 \times 10^7$ CFU / ml. The incubation under Uv light was performed using different
interval time 5, 10, 15, 20 minute followed by dark field.

RESULTS

The distribution of *Ps. aeruginosa* in Basrah General Hospital environment and infected cases illness during the period January to December 1997 is shown in Figure 1. The significant finding which is quite obvious that *Ps. aeruginosa* was noticed during all the months of the years, the peaks were noticed in (January, February, April, September, October, November and December.)

Recovery of *Ps. aeruginosa* infection as acquired hospital disease according to infection 15 (23.0%), from ear infection, 12 (18.4%), from urinary tract infection and 10 (15.3%) from blood stream infection. Incidence rate of *Ps. aeruginosa* in hospital environment was reported in 60 isolates out 516 isolates in 60 isolates out 516 (0.1) *Ps. aeruginosa* were involved 23.2% from disinfected solution 15.1% from Theater room, 19.5% from section probe of the sucker, 5.8% from lanein, 4.6% from locker and 3.4% from dish of the chicken (Table 2).

Antibiotic susceptibility for all the clinical and environmental isolates is listed in Table 3., the isolates were completely resistant (100%) to ampicillin, amoxycillin, trimethoprim, Lincomycin and clindamycin.

The MIC of ditto! solution 1%, reduced the rate of *Ps. aeruginosa* growth. The Uv light, as sterilizing agent, is shown to be more effective at interval time between 10-15 minute reducing the number of bacterial growth from $1.0 \times 10^7$ to $0.2 \times 10^1$ CFU/ml.

Discussion

*Ps. aeruginosa* is an important life threatening nosocomial pathogen worldwide [18, 23, 24]. Therefore it is applied as a tool for detection of nosocomial infection in hospital i.e infection was not found to be present or incubating at the time of admission. *Ps aeruginosa* was found persistent during all months of the year (Figure 1) with increased rate at the cold months. This might be attributed to the fact that, *Ps. aeruginosa* as syphrophilic bacteria. The increased rate of diarrhoea cases in summer period in this Hospital [Issa, 27] could account for the increased number of enterabacteriaceae following a fecal contamination, ultimately competitive with *Ps. aeruginosa* during the period June-August.

The increased risk associated with infection of surgical sases could be leading to septicemia [Teash et al., 11]. *Ps. aeruginosa* might have spread through contaminated medical devices, the main source of which is the solution of disinfection, theater and sucker (Table 2). In spite of result of this which found that 1% ditto disinfectant solution is enough to prevent growth of *Ps. aeruginosa*.

Usually it is difficult to identify wether an infection is community or hospital acquired in these cases of doubt. But the emerging of highly resistant *Ps. aeruginosa* hospital isolates to a number of antibiotics which was also detected by Yasseen [24], might be quite useful for tracing the route of nosocomial infection, antibiotic resistant genes in these isolated from patient and hospital environment as homologous resistant genome was observed (Table 3) and this agrees with Chen et al. [25,26].

Application of UV light for 10 - 15 minutes was successful to reduce bacterial growth. It is recommended to apply UV light sterilization in important sites of hospital such as theater room. Further epidemiological studies on hospital population are required to examine the effects of the duration lenght of patient staying, in hospital. Fresh disinfectant and sterilized instrument proved to be crucial factors in the reduction of contamination.

Acknowledgement

We thank the staff of the hospital laboratory, Microbiology division, Basrah General Hospital.

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24. Yaseen ME. Susceptibility of common bacterial isolates from burn wounds to cefotaxime and other antibiotics BJS 5, 199g (supplied).


University of Basrah, College of Science 1997.

Figuer 1 : Pseudomonas aeruginosa in Basrah general hospital environments and cases illness isolates on period 1 - 12 / 1997.

E. H = hospitalized environment isolates (60/516).
C. I = Cases illness infection (65/1226).
**Pseudomonas aeruginosa in General Basrah Hospital**

**Table (1):** The distribution of *Pseudomonas aeruginosa* infection among different patient specimen infected

<table>
<thead>
<tr>
<th>Total of isolatea</th>
<th>Wound swab</th>
<th>Ear swab</th>
<th>urine specimen</th>
<th>Blood culture</th>
</tr>
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<tbody>
<tr>
<td>65</td>
<td>29</td>
<td>15</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>5.30%</td>
<td>44.6%</td>
<td>23.0%</td>
<td>18.4%</td>
<td>15.3%</td>
</tr>
</tbody>
</table>

**Table (2):** Frequency of *pseudomonas aeruginosa* environmental isolates in Basrah General hospital.

<table>
<thead>
<tr>
<th>Months</th>
<th>Suker</th>
<th>linen</th>
<th>locar</th>
<th>Theater room</th>
<th>Disinfect solution</th>
<th>Chiken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>xx</td>
<td>xx</td>
<td>x</td>
<td>xx</td>
<td>xx</td>
<td>x</td>
</tr>
<tr>
<td>2</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xxx</td>
<td>x</td>
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<td>x</td>
<td>x</td>
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<td>x</td>
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<tr>
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<td>x</td>
<td>x</td>
<td>xxx</td>
<td>x</td>
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<td>x</td>
<td>xx</td>
<td>xx</td>
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<tr>
<td>12</td>
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<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>x</td>
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<tr>
<td>10.5%</td>
<td>5.81%</td>
<td>4.6%</td>
<td>15.1%</td>
<td>23.2%</td>
<td>3.4%</td>
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</tr>
<tr>
<td>(9/86)</td>
<td>(5/86)</td>
<td>(4/86)</td>
<td>(13/86)</td>
<td>(20/86)</td>
<td>(3.86)</td>
<td></td>
</tr>
</tbody>
</table>

**Table (3):** Percentage of antibiotics susceptibility of patient and environmental isolate aginst 10 antibiotics

<table>
<thead>
<tr>
<th>Type of antibiotics</th>
<th>Patient isolates (n = 65)</th>
<th>Environment isolates (n = 65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracycline</td>
<td>(28) 44.4</td>
<td>(10) 43.6</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>(1) 1.5</td>
<td>(2) 3.3</td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>(65) 100</td>
<td>(60) 100</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>(65) 100</td>
<td>(60) 100</td>
</tr>
<tr>
<td>Amoxycillin</td>
<td>(65) 100</td>
<td>(60) 100</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>(21) 33.3</td>
<td>(8) 35.3</td>
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<tr>
<td>Chloromphencol</td>
<td>(50) 77.7</td>
<td>(16) 70.5</td>
</tr>
<tr>
<td>Lincomycin</td>
<td>(65) 100</td>
<td>(60) 100</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>(65) 100</td>
<td>(60) 100</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>(65) 100</td>
<td>(60) 100</td>
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