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

By

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حدوث اصابات مكتسبة بجرثومة *Pseudomonas aeruginosa* في مستشفى البصرة العام مدينة البصرة / العراق

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تم جمع الف ومائتين وستا وعشرين عينة من المرضى الراقدين في مستشفى البصرة العام وخمسمائة وستة عشر مسحة من مواقع مختلفة في المستشفى خلال سنة واحدة وسجلت اصابات بجرثومة *P. aeruginosa* في كل اشهر السنة كان عدد الاصابات خمس وستون اصابة (٣ , ٥٪) منها ٦ , ٤٤٪ التهاب جروح ٠ , ٢٣٪ التهاب اذن و٤ , ١٨٪ التهاب مجاري بولية و٣ , ١٥٪ تجرثم الدم . وكانت نسبة الحدوث / 60) 0.1 incidence rate (516 في بيئة المستشفى ومن خلال عمل الحساسية الدوائية اظهرت عزلات جرثومة *P. aeruginosa* مقاومة عالية للمضادات الحياتية حيث كانت المقاومة ١٠٠٪ لكل من الامبسلين والاموكسسلين أو السبترين واللنكومايسين والكلنومايسين وكان الهدف هو معرفته التشابه على المستوى الوراثي بين العزلات المعزولة من بيئة المستشفى والمرضى . كما تم التحري عن اقل تأثير مثبط للمحاليل المطهرة المستخدمة في المستشفى وظهر ان ١٪ لمحلول محضر انيا يثبط نمو هذه الجرثومة وعند استخدام الاشعة فوق البنفسجية كعامل تعقيم اختزل النمو الجرثومي من 10×10^7 الى 0.2×10^1 مستعمرة / مل .

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ABSTRACT

One thousand and two hunderd 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 dittol 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 1.0×10^7 to 0.2×10^1 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 evalution 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. aeruginosea* has been confirmed as incriminated in hospital - acquired infection [4, 12, 13, 15, 16, 17, 18, 19, 24].

Materials and Methods

Data Collection

The data were collected during the period from Jan.-Dec. 1997. The study samples were collected from 1226 patients admitted to the General Basrah Hospital incubated period of one or two days befor noscomial manifested development and type of specimen selected dependent on the syndrome development, and 516 swaps from different hospital environment (it means 42 swabs per month).

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; Cefotxime sodium : 30 μ g ; Cloxacillin : 5 μ g; Ampoxycillin: 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 dittol solution

The [MIC] of dittol was determined against isolates of *Ps. aeruginosa* of either sources of patients and hospital evironment. The procedure according Finegold & Baron [22].

Ultraviolet light

The U. V. light irradition at wavelengths 280 nm was applied to reduce the growth of *Ps. aeuoginosa* by Muller - Hinton Agar (Oxoid) depth 4 mm (90 mm diameter petridish. The dish inoculum was 1.0×10^7 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 of the period January to December 1997 is shown in Figure I. 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 rat of *Ps. aeruginosa* in hospital environment was reported 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 succeptibility 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 dittol solution 1%, reducied 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 reduceing the number of bacterial growth from $1.0x10^7$ to $0.2x10^1$ 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 persistant 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 sychrophilic 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 speard through contaminted medical devices, the main source of which is the solution of disinfection, theater and suker (Table 2]. In spite of result of this which found that 1% dittol disinfectant solution is enough to prevent growth of *Ps. aeruginosa.*

Usualy 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 envronment 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 disinfactant and sterilized instrument proved to be crucial factors in the reduction of contamination.

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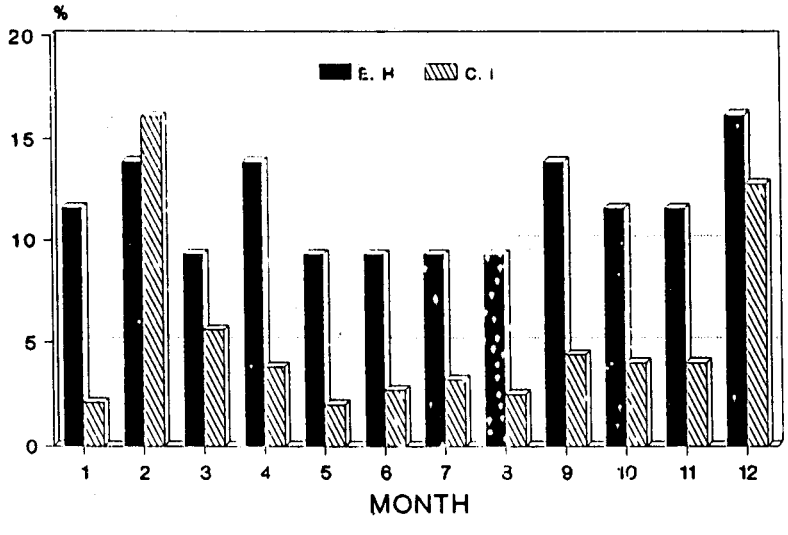

Figuer 1 : *Pseudomonas aeruginosa* in Basrah general hospital environments and cases illness isolates on period 1 - 12 / 1997.

E. H = hospitlized environment isoletes (60/516).

C. I = Cases illnes infection (65/1226).

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

Total of isolatea	Wound swab	Ear swab	urine specimen	Blood culture
65 5.30%	29 44.6%	15 23.0%	12 18.4%	10 15.3%

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

Months	Suker	linen	locar	Theater room	Disinfect solution	Chiken
1	xx			xx	xx	x
2		xx	x		xxx	
3		x	x		xx	
4	x	x		xxx	x	
5		x	x	x	x	
6				xx	x	
7	xx				x	
8					x	x
9				xxxx	xx	
10	xx		x		xx	
11				x	xx	x
12	xx			xx	xx	
	--	--	--	--	--	--
	10.5% (9/86)	5.81% (5/86)	4.6 % (4/86)	15.1% (13/86)	23.2% (20/86)	3.4% (3.86)

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

Type of antibiotics	Resistance %	
	Patient isolates (n = 65)	Environment isolates (n = 65)
Tetracycline	(28) 44.4	(10) 43.6
Cefotaxime	(1) 1.5	(2) 3.3
Cloxacillin	(65) 100	(60) 100
Ampicillin	(65) 100	(60) 100
Amoxycillin	(65) 100	(60) 100
Gentamicin	(21) 33.3	(8) 35.3
Chloromphencol	(50) 77.7	(16) 70.5
lincomycin	(65) 100	(60) 100
Trimethoprim	(65) 100	(60) 100
Clindamycin	(65) 100	(60) 100