Original Article

ERA'S JOURNAL OF MEDICAL RESEARCH VOL.10 NO.1

10.24041/ejmr2023.4

PREVALENCE AND ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF *PSEUDOMONAS AERUGINOSA* ISOLATED FROM VARIOUS CLINICAL SAMPLES AT ELMC&H

Nighat Parveen, Vineeta Khare, Sarah Hassan, Syed Abid Asghar*

*Department of Microbiology, Department of Community Medicine**

Era's Lucknow Medical College and Hospital, Era University, Sarfarazganj Lucknow, U.P., India-226003.

Received on : 17-02-2023
Accepted on : 21-06-2023

Address for correspondence

Dr. Sarah Hassan
Department of Microbiology
Era's Lucknow Medical College & Hospital, Era University, Lucknow-226003.
Email: drsarahabid@gmail.com
Contact no: +91-9015035558

ABSTRACT

To identify *P. aeruginosa* prevalence in different clinical samples along with to. Evaluate its antibiotic sensitivity method isolated from variety of clinical. Over the course of the six- month trial period, 1200 samples in total were analyzed. To identify and isolate *P. aeruginosa*, each of them underwent direct microscopy and culture. In this study 63 *P. aeruginosa* were isolated and identified out of 1200 clinical samples. Pus and urine were where the majority of *P. aeruginosa* were isolated from specimens. There found sensitivity to Piperacilin- tazobactam (10µg) 35% and Gentamycin (10µg) 38% respectively by kirbey-Bauer disc diffusion method. As an opportunistic organism with a high prevalence that is growing more common due to antimicrobial agent resistance, *P. aeruginosa* may pose a risk to health.

KEYWORDS: Pseudomonas aeruginosa, Pus samples, Antibiotics sensitivity testing.

INTRODUCTION

In healthy peoples, *P. aeruginosa* is a common microbial species. It is also identified frequently isolated as an opportunistic pathogen that infects hospitalized patients (1).This organism was discovered in individuals with severe burns, respiratory tract infections, foot infections, surgical site infections and other illness (2). *P. aeruginosa* is a common organism that can be found in many different non- polluting circumstances. By including humans, animals, plants and other living things, it can be separated from life sources, Due to the organism's ability to survive with little food and under a variety of physical conditions, it can endure for a very long time in both communal and medical settings (3). A non-fermenting, Occurring various distinct forms, gram-negative bacteria, *P. aeruginosa*. Because it occurs often in both nature and the hospital environment, particularly among patients receiving ventilator support in intensive care high dependency units, it is a prevalent cause of nosocomial infections (4). This bacterium is mostly to blame for ventilator- associated pneumonia, surgical site infection, urinary tract infection, and sepsis in patients in intensive care units (5). Infections caused by multi resistant *Pseudomonas* isolates are frequently treated with Carbapenems (Imipenem and Meropenem), which have strong antipseudomonal action. The adoption of Carbapenems in clinical practice brought about a significant improvement in the management of severe bacterial infections brought by beta lactam- resistant bacteria (6).The MBL-producing organisms are linked to greater rates of death, morbidity, and medical expenses. Most nations are largely unaware of the global epidemiology of Metallo beta-lactamase--producing *P. aeruginosa* (7).

AIM

To determine the incidence of *P.aeruginosa* in different clinical samples and their pattern of antibiotic sensitivity at ELMC&H.

OBJECTIVE

To identify the frequency of *P. aeruginosa* in different clinical Samples at Era Luck now Medical College & Hospital.

To assess the *P. aeruginosa* antibiotic sensitivity profile that was isolated from a range of clinical samples at ELMC&H.

MATERIAL&METHODS

In the microbiology department of Era Luck now Medical College and Hospital, a cross sectional analysis was done from the month of October 2019 and March 2020.

Chi-square test was used for data analysis. All samples have been collected and processed as per standard Microbiology protocols. The Sample size is calculated based on prevalence among the clinical samples using the formula n=za2pq/L2. The total samples are 1200 in size.

Inclusion Criteria

All samples taken from patients who attended IPD and OPD at Era's Luck now medical college & hospital.

Exclusion Criteria

Contaminated Specimen.

Patients who did not give consent to participate in study.

Direct examination

The laboratory received all of the samples shortly after they were all collected. On pristine sterile glass slides, the smears were created from each sample. They were dried, fixed with heat, stained using the Gram's Method, and examined under a microscope with the pus cells and microbes immersion in oil, which showed up pink color. After each sample was cultured on MacConkey agar and Blood agar plates, the culture plates were grown aerobically for 24 hours. Colonies smears were created the following day at 37ºC for gram's staining and motility tests using the hanging drop method. All biochemical tests, the Urease test, the citrate utilization test and the sugar fermentation test were performed in order to identify *P. aeruginosa*.

The clinical laboratory standard institute (CLSI) guidelines were used to interpret the result of an investigation into the antibiotic sensitivity pattern of *P. aeruginosa* isolates to Doripenem (10µg), Imipenem (10µg), Meropenem (10µg), Piperacillin-Tazobactam (10µg), Gentamycin (10µg) Tobramycin (10µg), Amikacin (30µg), Cefepime (30µg), Ciprofloxacin (5µg), Levofloxacin (5µg) by Kirby-Bauer method on Muller Hinton Agar (MHA).

Statistical analysis

Simple ratio and percentage statistics were used for the statistical study. To create the tables, Microsoft office 2007 was used.

RESULTS

In the current study, 1200 clinical samples over the course of six months yielded 63 (5.25%) isolates of *Pseudomonas aeruginosa*.

Abbreviations: BAL – Broncho alveolar lavage ET-endo-tracheal tube

According to the findings, the majority of *P. aeruginosa* isolates were aged of 41 to 60 years and older, with 30(47.61%) of them, followed by age group between 21-40 years with roughly 16(25.40%) isolates and the age group between 61-80 years with just 10(15.87%) isolates.

Samples	No of Samples	% of *P. aeruginosa*
Pus	500	49 24%
Sputum	50	1 5%
Urine	400	1 0%
Bal fluid	100	5 12%
Bile	35	2 19%
HVS	40	1 6%
ET	25	2 14%
Drain fluid	25	1 10%
Tip	25	1 10%
Total	1200	63 100%

Table 1: In this study, overall P. aeruginosa prevalence was 5.25% (n=63/1200)

Years of age	Number	Percentage
0-20 year	3	4.78%
21-40 year	16	25.40%
41-60 year	30	47.61%
61-80 year	10	15.87%
>80 year	4	6.34%
Total	63	100%

Table 2: Clinical samples of Pseudomonas aeruginosa are distributed according to age (n=63)

Gender-specific	Numeral	Percentage (%)
Males	49	77.77%
Females	14	22.23%
Total	63	100%
49 (77.77%) of these 63 P. aeruginosa strains were from men, while 14(22.23%) were from females.		

Table 3: Clinical isolates of P. aeruginosa by gender distribution (n=63)

Wards	Number of isolates (n=63)	Percentage (%)
MSW	19	30.15%
FSW	12	19.04%
Intensive care unit	03	4.76%
Male medicine ward	02	3.17%
OBST	01	1.58%
M&F TBC	09	14.2%
PRIVATE WARD	05	7.93%
NICU	01	1.58%
SICU	03	4.76%
PAED-F	01	1.58%
Male Ortho	02	3.17%
Causality ward	01	1.58%
OPD	02	3.17%
PICU	01	1.58%
MPSW	01	1.58%

Table 4: Distribution of P. aeruginosa clinical isolates by ward

Abbreviations: NICU-Neonatal intensive care unit, MPSW- Male post- surgical ward, PICU-Pediatric intensive care unit.

Most of those who were sequestered came from the male surgery ward. Female surgical ward 12(19.04%) came in second with 19(30.15%).

Infection	Numeral	Percentage
UTI	01	1.58%
Wound or abscess	17	26.99%
TB	14	22.23%
Surgical site infection	22	34.92%
Burn	01	1.59%
Accidental injury	01	1.58%
Gangrene infection	07	11.10%
Total	63	100%

Table 5: Distribution of therapeutic segregation of P. aeruginosa according to diseases (n=63)

Most of the isolates of *Pseudomonas aeruginosa* were from surgical site infections (22, 34.92%), Tuberculosis (14, 22.23%) and followed by Wound or abscess (17, 26.99%).

Antimicrobial disc	% of sensitivity isolates
Doripenem (10µg)	25
Imipenem (10µg)	27
Meropenem (10µg)	27
Piperacillin (10µg) -tazobactam	35
Gentamycin (10µg)	38
Tobramycin (10µg)	34
Amikacin (30µg)	27
Cefepime (30µg)	12
Ciprofloxacin (5µg)	18
Levofloxacin (5µg)	21

Table 6: Antimicrobial sensitivity sequence of Pseudomonas aeruginosa isolates

The high level Piperacilin tazobactam (10µg) and Gentamycin (10µg) sensitive were 35% & 38% respectively by kirbey-bauer disc diffusion method.

DISCUSSION

Over the duration of six months, 63 different strains of *P. aeruginosa* were recognized in distinct clinical samples. The majority of the isolates came from Pus 49(24%) followed by isolates from BAL fluid 5(12%).

Out of 63 isolated *P. aeruginosa* samples, the samples that we cultivated came from Pus 49(24%), Urine 1(14%), and Sputum 1 (5%), BAL fluid 5(12%), Bile 2(19%) High Vaginal swab1 (6%) and others 4(20%).These samples most frequently showed positive growth.

In the current investigations, the antibiotic sensitivity of each isolated *P. aeruginosa* strains was assessed Gentamicin, Amikacin, Cefepime, Doripenem, Ciprofloxacin and Levofloxacin, Imipenem and Meropenem on Mueller-Hinton agar. (8, 9).

In my investigation of *P. aeruginosa*, the vast majority of samples were isolated with regard to age of 41 to 60 years 30 (47.61%), and this is comparable to research by Bakele et al, in that the majority of the isolated were in the same age range 21(58.33%).(10).

P. aeruginosa typically infects people who have been hospitalized for a long time, have undergone medical procedures (such as bronchoscopy or endoscopy, among others), and have underlying conditions. (11).

In my investigation, the majority of *P. aeruginosa* isolates came from the surgical ward (03, 49.19%).Unlike the study by Jaswinder Sharma et al., where the majority of the isolates came from the ICU Ward (06, 42.8%). (12).

In my study there was predominance of male patients and similar result where seen in study carried out by Fatima and others. (13).

The majority of samples in my study of *P. aeruginosa* there isolated in the higher sensitivity drug Gentamycin (10µg) 38%. In comparison with the study carried by Sarada Dasari et al. Pipercillin-Tazobactam sensitivity showed highest 90.44%. (14).

In our bacteriological examination, a total of 1200 clinical samples were cultured for micro-organism analysis during the study period of October 2019 to March 2020 and 63 *Pseudomonas aeruginosa* are separated from these clinical samples and recognized.

Majority of isolates were found *Pseudomonas aeruginosa* in pus samples. All isolates were sensitive to Gentamycin leaving this one drug's treatment option.

Most of the *Pseudomonas aeruginosa* isolates originated from surgical site infections (22, 34.92%). A large majority of them were in the age range 41-60 years (30, 47.61%), patients between the ages of 61-80 years come next (10, 15.87%). In our study these 63 strains of *P. aeruginosa* 49 (77.77%) were from males, while we are from females 14(22.22%). In the current study, male surgery ward (19)30.15%, had the highest isolates, followed by female surgical ward (12) 19.04%.

ACKNOWLEDGEMENT

We appreciate the assistance offered by the lab of the Era's university department of Microbiology.

REFERENCES

1. Rashid A, Chowdhury A, Rehman SH, et al. Infections by Pseudomonas aeruginosa and Antibiotic Resistance Pattern of the Isolates from Dhaka Medical College Hospital. 2016; 1(2): 48-51.
2. Renuga S, Lakshmi K, Chitralekha S, et al. Prevalence of Pseudomonas aeruginosa and its antibiotic susceptibility pattern in a Tertiary Care Hospital. 2015; 6(1): 27-30.
3. Harris A.A., L. Goodman, and S. Levin. Community-acquired Pseudomonas aeruginosa pneumonia associated with the use of a home humidifier. 1984; 141(4): 521-523.
4. Carmeli YN, Troillet G, Eliopoulos GM, et al. Emergence of antibiotic resistance Pseudomonas aeruginosa: Comparison of risk associated with different antipseudomonal agents. Antimicrob Agents Chemother. 1999; 43 (6): 1379-1382.
5. Corona-Nakamura AL, Miranda-Novales MG, Leanos-Miranda B, et al. Epidemiologic study of Pseudomonas aeruginosa in critical patients and reservoirs. Arch Med Res. 2001; 32(3): 238-242.
6. Pitout JD, Gregson DB, Poirel L, et al. Detection of Pseudomonas aeruginosa Producing Metallo-βLactamases in a Large Centralized Laboratory. J Clin Microbiol 2005; 43(7): 3129-3135.
7. Rossolini GM, Mantengoli E. Treatment and control of severe infections caused by multiresistant Pseudomonas aeruginosa.Clin Microbiol Infect. 2005; 11(Suppl 4):17-32.
8. Orrett FA. Antimicrobial susceptibility survey of Pseudomonas aeruginosa strains isolated from clinical sources. J Natl Med Assoc. 2004; 96(8): 1065-1069.
9. Chen HY, Yuan M, Livermore DM. Mechanisms of resistance to beta-lactam antibiotics amongst Pseudomonas aeruginosa isolates collected in the United Kingdom in 1993. J Med Microbiol. 1995; 43(4): 300-309
10. Bekele Temesgen, Tesfaye Amene, Sewunet Tsegayeand, et al. Pseudomonas aeruginosa isolates and their antimicrobial susceptibility pattern among catheterized patients at Jimma University Teaching Hospital, Jimma ,Ethopia. Ann BMC Res Notes. 2015; 8: 488.
11. Hancock REW. Resistance mechanisms in Pseudomonas aeruginosa and other no fermentative Gram-negative bacteria. Clin Infect Dis. 1998; 27(Suppl 1): 93-99.
12. Jaswinder Sharma, Surindersingh, Amarjitkaur Gill, et al. Prevalance and antimicrobial susceptibility pattern of Pseudomonas aeruginosa isolated from pus samples in a tertiary care hospital,Bathinda. Int J Contemporary Med Res. 2016; 3(12): 3481-3483.
13. Fatima Anab, Naqvi Syed Baqir, Khaliq Sheikh Abdul, et al. Antimicrobial susceptibility pattern of clinical isolates Pseudomonas aeruginosa isolated from patients of lower respiratory tract infections. 2012; 1(1): 70.
14. Dasari Sarada, Prakash Ravichandra Surya. Prevalence of Pseudomonas aeruginosa in various clinical Samples and its Antibiotic Suceptibility Pattern in a Tertiary Care hospital. Int. J. Curr. Microbial. App. Sci. 2019; 8(6): 1720-1724.

Orcid ID:

Nighat Parveen

Vineeta Khare

Sarah Hassan

Syed Abid Asghar - https://orcid.org/

How to cite this article:

Parveen N., Khare V., Hassan S., Asghar S.A. Prevalence And Antimicrobial Susceptibility Pattern Of *Pseudomonas Aeruginosa* Isolated From Various Clinical Samples At ELMC&H. Era J. Med. Res. 2023; 10(1): 25-28.

Licencing Information

Attribution-ShareAlike 2.0 Generic (CC BY-SA 2.0) Derived from the licencing format of creative commons & creative commonsmay be contacted at https://creativecommons.org/ for further details.