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# Incidence of *Pseudomonas aeruginosa* in various hospital settings of Gulbarga city

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## ABSTRACT

*Pseudomonas aeruginosa* is an important agent of nosocomial infections. In the present investigation incidence of *P.aeruginosa* in various clinical manifestations in Gulbarga hospital settings is investigated. A total of 357 isolates of *P.aeruginosa* were obtained from 1026 non duplicate samples accounting to an incidence of 34.79%. *P.aeruginosa* displayed uniform biochemical activities. Highest incidence of *P.aeruginosa* was found in burn wounds (77.77%), followed by cellulitis (67.18%), diabetic foot ulcer (55.85%), urine (43.14%), open wounds (36.92%) and ear swabs (12.3%) and lowest in anterior nares (1.6%) and Blood (5.12%) samples. Incidence of gender wise distribution showed no significant variations. High prevalence of *P.aeruginosa* infection occurred in the age group of 20-29 years and least in >80years of age group. 

## KEYWORDS

*P.aeruginosa*;
Incidence;
Hospital settings.

## INTRODUCTION

*Pseudomonas aeruginosa*, is a motile gram-negative rod that belongs to the family Pseudomonadaceae and is a leading cause of nosocomial infections, especially among critically ill patients admitted in intensive care units and immune-compromised patients[1-3]

*P.aeruginosa* is known to cause a wide spectrum of diseases ranging from superficial infections to deep seated or systemic infections and hence can be isolated from various body fluids such as sputum, urine, wound, and blood. *P.aeruginosa* infections (eg: bacteremic pneumonia, sepsis, burn wound infection, meningitis) are associated with high mortality rate. It attacks up to two thirds of critically ill hospitalized patients and is responsible for 10-15% of nosocomial infections worldwide[1]. The organism is pathogenic when introduced in to areas devoid of normal defenses[4] and infections are both invasive and toxigenic[5].

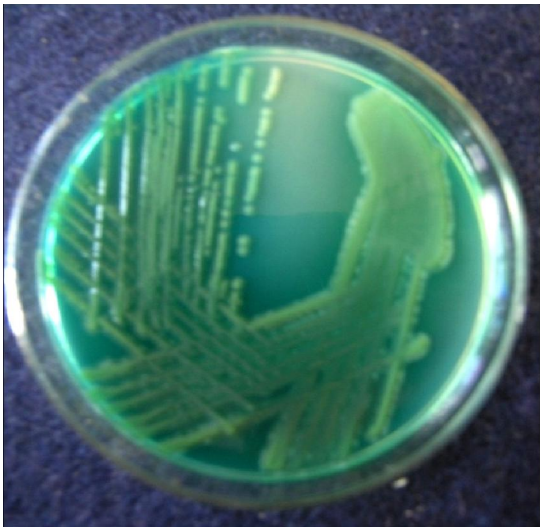
Epidemiologically, it is ranked as the fourth cause of nosocomial infections that accounts for 10% of all nosocomial infections in the United States[6]. In studies conducted in Nigeria, it is one of the leading gram-negative bacteria isolated from clinical specimens in hospital-based studies[7-12].

In the present investigation the incidence of *P.aeruginosa* among clinical infections in hospital settings of Gulbarga city, belonging to a socio economically backward region is reported.

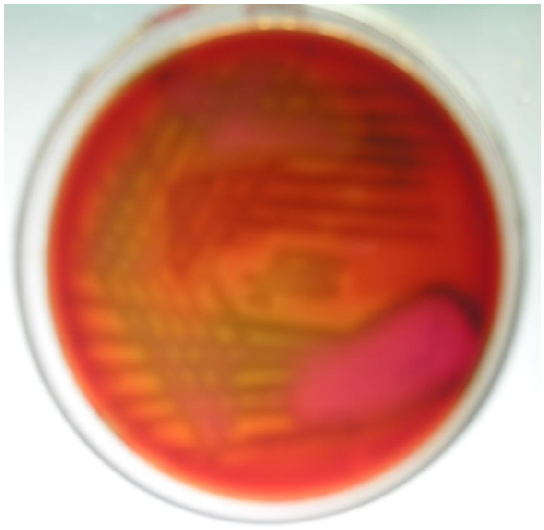
Regular Paper

## MATERIALS AND METHOD

The study group comprised of samples from clinically suspected cases of bacterial infections from various hospital settings of Gulbarga city during Oct 2008 to Jan 2010. The different clinical samples included urine, blood, and wound samples (burn wounds, diabetic foot ulcer, cellulitis, open wounds). A total of 1026 samples were collected and *P.aeruginosa* was isolated on primary and selective medias like citrimide agar, macConkey agar and blood agar (Plate 1). The isolates were confirmed as *P.aeruginosa* by morphological and biochemical tests (TABLE 1). The incidence was analyzed according to the sample, sex, age and source of the sample.



**(a)**



**(b)**

**Plate 1 : Pigment production on citrimide agar medium (a) and haemolysis on blood agar medium (b)**

**TABLE 1 : Colony morphology and biochemical characteristics of isolated *Pseudomonas aeruginosa***

| Sl. No. | Tests | Results |
|---|---|---|
| 1 | Gram staining | Gram Negative, Single rods |
| 2 | Motility | Motile |
| 3 | Colony Morphology | |
| | Nutrient Agar | Bluish green colour colonies |
| | MacConkey agar | Non lactose fermenting colonies |
| | Blood Agar | Hemolytic colonies |
| | Cetrimide agar | Bluish green colour colonies |
| 4 | Oxidase | Positive |
| 5 | Catalase | Positive |
| 6 | Growth at temperature 5 $^{o}$C | Negative |
| | 15 $^{o}$C | Positive |
| | 37 $^{o}$C | Positive |
| | 42 $^{o}$C | Positive |
| 7 | Growth at pH a) 5.7 | Positive |
| | b) 6.8 | Positive |
| | c) 8.0 | Positive |
| 8 | Urease | Negative |
| 9 | Indole | Negative |
| 10 | Methyl Red | Negative |
| 11 | Vogues Prosker | Negative |
| 12 | Nitrate reduction | Positive |
| 13 | Gelatin hydrolysis | Negative |
| 14 | Glucose | Positive |
| 15 | Sucrose | Negative |
| 16 | Lactose | Negative |
| 17 | Maltose | Negative |
| 18 | Mannitol | Positive |
| 19 | Xylose | Negative |
| 20 | Inositol | Negative |
| 21 | Raffinose | Negative |
| 22 | Starch hydrolysis | Negative |

## RESULTS

All species, those are gram negative, short rods, positive for catalase, oxidase, nitrogen reduction, and citrate utilization were phenotypically identified as *P. aeruginosa* (TABLE 1). A total of 1026 clinical specimens were collected over the study period, *P. aeruginosa* was isolated from 357 (34.79%) samples. The incidence of *P. aeruginosa* in different clinical samples fluctuated with highest incidence in burn wound swabs (77.77%), followed by cellulitis (67.18%), dia-

Regular Paper

betic foot ulcer (55.85%), urine (43.14%), open wound swab (36.92%) and ear swab (12.3%) (TABLE 2). The incidence of *P. aeruginosa* in other samples like anterior nares (1.6%) and Blood (5.12%) was found to be very less (TABLE 2).

Gender wise distribution of *P. aeruginosa* incidence did not show significant differences with 49.2% in males and 50.7% in females. High frequency of Pseudomonal infection was observed in the age group of 20-29 years and least among aged >80 years (TABLE 2).

**TABLE 2 : Distribution of *P.aeruginosa* in various clinical specimens**

| Clinical specimens | Number of samples | Number of *P.aeruginosa* isolates |
|---|---|---|
| Burn wound swab | 108 | 84 |
| Open wound swab | 130 | 48 |
| Diabetic foot ulcer | 68 | 38 |
| Cellulitis | 88 | 60 |
| Ear swab | 65 | 08 |
| Urine | 248 | 107 |
| Blood | 195 | 10 |
| Anterior nares | 124 | 02 |
| Total | 1026 | 357 |

**TABLE 3 : Age and gender wise distribution of *P.aeruginosa* isolates**

| Age group | Males (%) | Females (%) | Total (%) |
|---|---|---|---|
| 0-9 | 09(2.52) | 06(1.6) | 15(4.20) |
| 10-19 | 17(4.7) | 24(6.7) | 41(11.4) |
| 20-29 | 65(18.2) | 69(19.3) | 134(37.5) |
| 30-39 | 29(8.1) | 26(7.2) | 55(15.4) |
| 40-49 | 19(5.3) | 16(4.4) | 35(9.8) |
| 50-59 | 15(4.2) | 16(4.4) | 31(8.6) |
| 60-69 | 14(3.9) | 18(5.0) | 32(8.9) |
| 70-79 | 07(1.9) | 05(1.4) | 12(3.3) |
| 80-above | 01(0.2) | 01(0.2) | 02(0.5) |
| Total | 176(49.2) | 181(50.7) | 357(100) |

## DICUSSION

*P.aeruginosa* is ranked second among the gram-negative bacteria isolated from hospital environmental microflora and is a leading cause of nosocomial infections responsible for high morbidity and moratlity rate. High prevalence of Pseudomonal infections is common among critically ill patients on admission to intensive care units and those with underlying clinical conditions[13].

In the present study, the prevalence of *P. aeruginosa* in hospital infections in Gulbarga city during Oct 2008 to Jan 2010 was examined and was found to be 34.79%, this is relatively higher when compared with similar studies with lower prevalence level. In Zaria, Olayinka *et al*.[11] reported a level of 10.5%, while 30% was reported in a study conducted in Pakistan[14] and 20.3% in India[15].

The incidence of *P.aeruginosa* differed with different clinical specimens, In Zaria, Olayinka et al[11] reported 51.1% in urine, 41.3% in wounds and 1.1% in sputum, and in Ibadan, isolation rate of 16.8% was observed with 41.9% and 39.35 from ear and wound swabs respectively[16]. Majority of the isolates were recovered from patients on admission, this observation affirmed the significant role of this organism in nosocomial infections, similarly was the pattern in wounds and urine specimens.

The overall incidence of *P. aeruginosa* observed to be 34.79%.The burns units are a very susceptible habitat for bacterial colonization[17] and the highest incidence observed in burn wound swab source, lowest in blood. These results are in line with other findings, where incidence was high in clinical samples of pus and urine[18,19] and lowest in blood[11].

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