Incidence of *Pseudomonas Aeruginosa* in the aetiology of Pneumonia in a tertiary care hospital

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ABSTRACT

A total of 260 sputum samples were collected from patients showing clinical diagnosis of pneumonia. The sputum samples were collected and subjected to Gram’s stain, culture and biochemical reactions.

Out of 260 samples collected
166 samples (64%) – showed no bacterial growth
60 samples (23%) – *Klebsiella pneumoniae* were isolated
16 samples (6%) – *Staphylococcus aureus* were isolated
18 samples (7%) – *Pseudomonas aeruginosa* were isolated

The patients' previous history among 166 samples collected which no bacterial growth had indicated that they already completed one or more courses of antibiotics. The commonest isolate found was *klebsiella pneumoniae*, followed by *Staphylococcus aureus* and *Pseudomonas aeruginosa*.

Keywords: Pneumonia, *Pseudomonas aeruginosa*, sputum

INTRODUCTION

Pneumonia is an inflammatory condition of the lung—affecting primarily the microscopic air sacs known as alveoli. [1,2] It is usually caused by infection with viruses or bacteria and less commonly other microorganisms, certain drugs and other conditions such as autoimmune diseases [1][3]

Typical symptoms include a cough, chest pain, fever, and difficulty breathing [4] Diagnostic tools include x-rays and culture of the sputum. Vaccines to prevent certain types of pneumonia are available. Treatment depends on the underlying cause. Pneumonia presumed to be bacterial is treated with antibiotics. If the pneumonia is severe, the affected person is, in general, admitted to hospital.

Pneumonia affects approximately 450 million people globally per year, seven percent of population, and results in about 4 million deaths, mostly in third-world countries. Although pneumonia was regarded by William Osler in the 19th century as "the captain of the men of death", [5] the advent of antibiotic therapy and vaccines in the 20th century has seen improvements in survival. [6] Nevertheless, in developing countries, and among the very old, the very young, and the chronically ill, pneumonia remains a leading cause of death.[6][7]

It occurs in middle aged or older persons who have medical problems such as alcoholism, chronic broncho pulmonary disease or diabetes mellitus.

The disease is characterised by massive mucoid inflammatory exudates of lobar or lobular distribution, involving one or more lobes of the lung. Necrosis and abscess formation are more frequent than in pneumococcal pneumonia.
Pseudomonas aeruginosa is a gram-negative, rod-shaped, asporogenous, and monoflagellated bacterium that has an incredible nutritional versatility. It is a rod about 1-5 µm long and 0.5-1.0 µm wide. P. aeruginosa is an obligate respirer, using aerobic respiration (with oxygen) as its optimal metabolism although can also respire anaerobically on nitrate or other alternative electron acceptors. P. aeruginosa can catabolize a wide range of organic molecules, including organic compounds such as benzoate. This, then, makes P. aeruginosa a very ubiquitous microorganism, for it has been found in environments such as soil, water, humans, animals, plants, sewage, and hospitals [8]. In all oligotrophic aquatic ecosystems, which contain high-dissolved oxygen content but low plant nutrients throughout, P. aeruginosa is the predominant inhabitant and this clearly makes it the most abundant organism on earth [9].

**MATERIALS AND METHODS**

Specimens :- Early morning expectorated sputum samples (preferably two) were collected in sterile containers for all patients. The quality of the sputum was assessed by both macroscopic and microscopic examination.

Any sample which was thin, watery without any purulent matter was considered unsuitable for further processing. A Gram’s stain of the sputum in the area of maximal purulence was examined. Bartlett’s scoring method was used for microscopic evaluation of sputum [10]. A sputum was considered unsuitable if it had a final score of 0 or less. All unsuitable specimens were discarded and a repeat specimen was collected.

Isolation of bacteria from sputum:
A proportion of another purulent area of the sputum was used for microbiologic analysis. For isolation and identification of Gram-positive organisms, blood agar was used; for Gram-negative bacteria, Mac Conkey agar was used. Plates were incubated at 37°C and 5% carbon dioxide. Plates were examined for growth after 24 h and 48 h of incubation. Culture isolates were identified according to standard techniques[11].

Antibiotic sensitivity for the pathogenic organisms isolated in culture was done by Kirby-Bauer method according to CLSI standard[12].

**RESULTS**

About 260 samples s of sputum were collected from patients with clinical diagnosis of pneumonia. Out of 260 samples collected :
- 166 samples (64%) - showed no bacterial growth
- 60 samples (23%) - Klebsiella pneumoniae were isolated
- 16 samples (6%) - Staphylococcus aureus were isolated
- 18 samples (7%) - Pseudomonas aeruginosa were isolated

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**Incidence of Pseudomonas aeruginosa in aetiology of pneumonia**

- No Bacterial Growth
- Klebsiella species
- Pseudomonas species
- staphylococcus aureus

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DISCUSSION

In the present study, 260 samples of sputum were collected from patients with clinical diagnosis of pneumonia. All sputum samples were subjected to Gram’s stain before culture. Most of the culture positive samples showed presence of bacteria on Gram’s stain. Gram’s stain usually predicted the positive cultures and large bacterial load, although it has been shown to be less reliable at detecting the presence of bacteria than sputum culture itself [13] but it require laboratory assessment, and thus limits its practical use.

In the present study Gram negative bacilli were more isolated than Gram positive cocci. The commonest isolate was Klebsiella pneumoniae(23%) followed by Staphylococcus aureus (6%), and Pseudomonas aeruginosa (7%).

The patients’ previous history among 166 samples (64%) collected which had no bacterial growth indicated that they already completed one or more courses of antibiotics.

CONCLUSION

The study shows aetiological bacteria of pneumonia and Klebsiella pneumoniae was the most common isolate in the aetiology of pneumonia. The other aetiological bacteria isolated in this study were Staphylococcus aureus and Pseudomonas aeruginosa.

REFERENCES