



PULMONARY INFECTIONS BY KLEBSIELLA PNEUMONIAE–A REVIEW

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ABSTRACT

This review depicts the infectious nature of *Klebsiella pneumonia* and its process of infection in causing pulmonary diseases. The etiology of *Klebsiella pneumonia* and its routes of infection namely Pneumonia, nosocomial infections, urinary tract infection, blood stream infections, septic shock, Meningitis, Endophthalmitis, are discussed. The steps of diagnosis of its symptoms, laboratory diagnosis and pathophysiology along with its treatment is discussed

Key words: *Klebsiella pneumonia*- Pulmonary infections- Pathophysiology-Treatment

INTRODUCTION

Klebsiella pneumoniae was first discovered by Carl Friedlander in 1882 isolated from the lungs of the patient and the bacterium was originally named as Friedlander's *Bacillus*. Theodor Albrecht Edwin Klebs(1834 -1913) was a Swiss Microbiologist named the genus *Klebsiella*(1). His work is regarding infectious disease. *Klebsiella pneumoniae* is ubiquitous in nature and it is present in plants, animals and humans and it is an encapsulated bacterium that lives inside in our intestine and it is harmless unless it spreads to other parts of our body. It is also known as opportunistic pathogen(2). Some strains of *Klebsiella pneumoniae* develop multidrug resistance and it is also called as "SUPERBUGS"..it cannot be treated with commonly prescribed antibiotics. *Klebsiella pneumoniae* is infected to immunocompromised patients(3), prolonged hospitalized patients, urinary tract infection patients(4), respiratory infected patients etc., *Klebsiella pneumoniae* enters into the lungs causes bacterial pneumonia(5).

ETIOLOGY

Klebsiella pneumoniae belongs to the family Enterobacteriaceae. It is an encapsulated bacterium, gram-negative, non-motile and it is rod shaped bacterium and measures 0.3 – 1.5 um width and 0.5 – 5.0um long. Oxidase negative bacterium is aerobic but some are facultative anaerobes(6). It can grow in a normal medium and it doesn't require special medium to grow. The growth temperature of *Klebsiella pneumoniae* is well at 35 – 37⁰ C(7). The capsular polysaccharide of the bacterium is a most important virulence factor. next to capsule, lipopolysaccharide of the bacterium emits an inflammatory compound to the host and causes septic shock(8). Fimbriae of the bacterium also acts as a virulence factor and it allows the bacterium to attach with the host.

CAUSES OF KLEBSIELLA PNEUMONIAE

Klebsiella pneumoniae causes many infections such as Pneumonia, nosocomial infections, urinary tract infection, blood stream infections, septic shock, Meningitis, Endophthalmitis, Skin infections(9). *Klebsiella pneumoniae* infection causes in many ways. They are person to person by touching the infected wound, Prolong hospitalized patients(10). Patients on ventilators, Patients using catheter and Endotracheal tubes, COPD[Chronic obstructive pulmonary disease] patients, Alcoholics, Diabetic patients, Pulmonary infected patients(11), Immunocompromised patients. According to CDC[Centres for Disease Control and Prevention], *Klebsiella pneumoniae* is not airborne pathogen(12). It cannot be spread by air so as that the healthy individuals do not get worry about this infections.

PULMONARY INFECTIONS BY KLEBSIELLA

Klebsiella pneumoniae causes pulmonary infections that it causes infections lungs. This bacterium causes infections when it enters into the respiratory tract(13).

SYMPTOMS

The symptoms are fever, cough, shortness of breath, yellow or bloody mucus and chest pain. The infection is more serious in older adults, young children and those are immunocompromised(14).

DIAGNOSIS

It can be diagnosed by physical examination, culture test and imaging test such as X-ray, Ultrasound and CT scan. Culture test is to check bacteria in the samples of Urine, Pus swab, Wound swab, Sputum, Blood and CSF.

PATHOPHYSIOLOGY

The bacterium enters into the body our immune system gets activated and induce cells to invade bacteria. Our T-cells and B-cells get activated and produce polymorphonuclear leucocytes and some serum complement proteins to invade bacteria and our immune system also secretes LPB[Lipopolysaccharide binding protein] which defense against the bacteria.

TREATMENT

Some strains of *Klebsiella pneumoniae* secrete an enzyme called ESBL. This ESBL producing *Klebsiella pneumoniae* infection is difficult to treat. This type of infection may infect to prolong hospitalized patients and those are immunocompromised and prolong use of catheters, patients on ventilators it cannot be cured by common prescribed antibiotics and it requires special antibiotics to treat such as Carbapenam antibiotics. According to CDC[Centers for Disease Control and Prevention] these antibiotics are reserved high antibiotic resistance infections. Other than ESBL *Klebsiella* infection, third and fourth generation cephalosporins, quinolones or carbapenams are the best antibiotics to treat for other susceptible *Klebsiella* infection.

PREVENTION

Klebsiella pneumoniae infection spreads through person to person contact. Hence, to prevent this to wash our hands at regular intervals and we have to sanitize our hands with sanitizer.

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