# In The Name Of God

**Islamic Azad University**

**College of Medicine**

Thesis:

**For Doctorate of Medicine**

Subject:

# Mycoplasma pneumonia infection among 6-12 years-old children attending with upper respiratory symptoms, Shemiranat 2007

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# بررسی میزان عفونت مایکوپلاسما پنومونیه در کودکان ۱۲-۶ ساله که با علائم شبه سرماخوردگی مراجعه کرده اند در مهد کودک و دبستان های شمیرانات در سال ۱۳۸۶

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# LIST

# Mycoplasma pneumonia infection among 6-12 years-old children attending with upper respiratory symptoms, Shemiranat 2007

**PURPOSE:** To determine the prevalence of mycoplasma pneumonia infection among 6-12 years-old children attending with upper respiratory symptoms, in Shemiranat during 2007.

**METHODS:** This study is a descriptive-analytical cross-sectional survey. We selected 100 consecutive children who attended with upper respiratory symptoms.

**RESULTS:** The mean age was 8.81±1.76 years. Among 100 children, 51 subjects (51%) were male and 49 (49%) were female. Mycoplasma pneumonia infection was seen in 21 children (21%).

**CONCLUSIONS:** It may be concluded that nearly 1/5 of children with upper respiratory symptoms had mycoplasma pneumonia infection. So, the 6-12 years-old patients with upper respiratory tract infections should be evaluated for infection with mycoplasma pneumonia.

***Keywords:*** Upper respiratory symptoms, Mycoplasma pneumonia, Prevalence

# INTRODUCTION

## Introduction

Mycoplasma pneumonia is a common cause of community-acquired pneumonia, and, usually, the disease has a prolonged, gradual onset. M pneumonia was first isolated in cattle with pleuropneumonia in 1898. In 1938, Reimann described the first cases of mycoplasmal pneumonia in man. Reimann coined the term "primary atypical pneumonia" after observing 7 patients in Philadelphia with marked constitutional symptoms, upper and lower respiratory tract symptoms, and a protracted course with gradual resolution. Peterson discovered the phenomenon of cold agglutinin in 1943, and high titers of cold agglutinins in patients with this type of pneumonia were discovered accidentally. In 1944, Eaton was credited with discovering a specific agent, coined Eaton's agent, as the principal cause of primary atypical pneumonia. First thought to be a virus, Eaton's agent was proved to be a Mycoplasma species in 1961.

Epidemiological study about the mycoplasma pneumonia and also its prevalence in children with upper respiratory symptoms would be necessary for health programming in health systems. So, we attempted to

determine the prevalence of mycoplasma pneumonia infection among 6-12 years-old children attending with upper respiratory symptoms, in Shemiranat during 2007.

# REVIEW OF LITERATURES

# Review of Literatures

## Pathophysiology

The responsible organism, M pneumoniae, is a pleomorphic organism that, unlike bacteria, lacks a cell wall, and unlike viruses do not need a host cell for replication. The prolonged paroxysmal cough seen in this disease is thought to be due to the inhibition of ciliary movement. The organism has a remarkable gliding motility and specialized filamentous tips end that allows it to burrow between cilia within the respiratory epithelium, eventually causing sloughing of the respiratory epithelial cells.

The organism has two properties that seem to correlate well with its pathogenicity in humans. The first is a selective affinity for respiratory epithelial cells, and the second is the ability to produce hydrogen peroxide, which is thought to be responsible for much of the initial cell disruption in the respiratory tract and for damage to erythrocyte membranes.

The pathogenicity of M pneumoniae has been linked to the activation of inflammatory mediators, including cytokines.

**Frequency**

**United States**

M pneumoniae is now recognized as one of the most common causes of community-acquired pneumonia in otherwise healthy patients younger than 40 years, with the highest rate in 5- to 20-year olds. M pneumoniae causes upper and lower respiratory illness in all age groups, particularly in temperate climates, and in summer, may cause up to 50% of all pneumonias.

Mycoplasmal pneumonia can occur at any time of the year, but large outbreaks tend to occur in the late summer and fall. The incubation period tends to be smoldering and averages 3 weeks, in contrast to that of influenza and other viral pneumonias, which generally is a few days. Epidemics of mycoplasmal pneumonia tend to occur every 4-8 years in the general population and tend to be more frequent within closed populations, such as in military and prison populations. Although M

pneumoniae is a common cause of pneumonia, only 5-10% of infected patients actually develop pneumonia.

**Mortality/Morbidity**

In almost all patients, the pneumonia resolves without any serious complications. M pneumoniae can cause severe pneumonia in children and has recently been associated with acute chest syndrome in patients with sickle cell anemia.

**Race**

No racial predilections exist in mycoplasmal diseases.

**Sex**

No difference in disease frequency exists between males and females, but illnesses are somewhat more severe in males.

**Age**

Mycoplasmal pneumonia is common in all age groups; however, it is most common in the first 2 decades of life and is rare in children younger than 5 years.

**CLINICAL**

**History**

Mycoplasmal pneumonia is a disease of gradual and insidious onset of several days to weeks. The patient's history may include the following:

- Fever
- Malaise
- Persistent, slowly worsening dry cough; absence of cough makes the diagnosis of M pneumoniae unlikely
- Headache
- Chills, not rigors
- Scratchy sore throat
- Sore chest and tracheal tenderness (result of the protracted cough)
- Pleuritic chest pain (rare)

**Physical**

Most cases of pneumonia due to M pneumoniae resolve after several weeks, although a dry cough can be present for as long as a month; some patients can have a protracted illness lasting as long as 6 weeks. Other findings may also include the following:

- A nontoxic general appearance
- Erythematous tympanic membranes or bullous myringitis in patients older than age 2 years, an uncommon but unique sign
- Mild pharyngeal injection with minimal or no cervical adenopathy, but no exudate
- Normal lung findings with early infection but rhonchi, rales, and/or wheezes several days later
- Various exanthems including erythema multiforme and Stevens-Johnson syndrome

**Causes**

- The causative agent is M pneumoniae, a bacterium lacking a cell wall, which belongs to the class Mollicutes, the smallest known free-living microorganisms.
- Because the organism can be excreted from the respiratory tract for several weeks after the acute infection, isolation of the organism may not indicate acute infection.

**DIFFERENTIALS**

Pediatrics, Pneumonia

Pneumonia, Aspiration

Pneumonia, Bacterial

Pneumonia, Empyema and Abscess

Pneumonia, Immunocompromised

Pneumonia, Viral

**Other Problems to be Considered**

Chlamydia pneumoniae

Legionella pneumophila

Chlamydia psittaci

Chlamydia trachomatis

Coxiella burnetii (Q fever)

**WORKUP**

**Lab Studies**

- The WBC count generally is not helpful, since results may be normal or elevated. Hemolytic anemia has been described, but it is rare.

- Sputum Gram stains and cultures usually are not helpful, since M pneumoniae lacks a cell wall and cannot be stained.
- Elevated erythrocyte sedimentation rates may be present but are nonspecific.

**Imaging Studies**

- Radiographic findings are variable, but abnormalities are usually more striking than the findings on physical examination.
    - Bronchopneumonia often involves a single lower lobe. Lobar consolidation is rare.
    - Platelike atelectasis is noted as thin, flat areas of collapsed lung and often is seen on a lateral image of the chest.
    - Reticulonodular or interstitial infiltrates, primarily in the lower lobes, may resemble other diseases with granulomatous pathology, such as tuberculosis, mycoses, and sarcoidosis.
    - Hilar adenopathy sometimes is mistaken for malignancy.

- Pleural effusions develop in fewer than 20% of patients; when present, they can be seen on lateral decubitus films.

- High-resolution CT scans of the chest are more sensitive than chest radiography in elucidating lung disease.

**Other Tests**

- M pneumoniae is difficult to culture and requires 7-21 days to grow; culturing is successful in only 40-90% of cases and does not provide information to guide patient management.

- Serology tests that demonstrate a 4-fold or greater increase or decrease in paired sera titers or a single titer greater than or equal to 1:32

    - Serum cold agglutination is a nonspecific test for M pneumoniae, but findings are positive in 50-70% of patients after 7-10 days of infection. Cold agglutinin tests can be obtained from diagnostic laboratories. A negative result does not exclude infection, and this test may be affected by cross-reactions with other pathogens, such as adenovirus, Epstein-

Barr, and measles viruses. A quick bedside test can be performed by partially filling a purple-top tube with blood and placing it in ice; a positive finding is one in which "grains of sand" appear on the glass portion of the tube.

- Other serological tests include complement fixation, enzyme-linked immunoassay, and indirect hemagglutination. All of these have acceptable sensitivity and specificity.

- Polymerase chain reaction
  - Polymerase chain reaction (PCR) has been shown to accurately diagnose atypical pneumonia and has been used for epidemiologic studies, but it is currently not used in most clinical settings. Real-time PCR is a promising test that allows detection of M pneumoniae DNA in all phases of infection, including early periods when the serum may be negative for antibody.
  - A radiolabeled DNA probe detects M pneumoniae ribosomal RNA in respiratory secretions with 90% sensitivity.

- Eosinophil cationic protein (ECP) has been studied in M pneumoniae infection and asthma and may show some promise. ECP measures damage to the respiratory epithelium.

## TREATMENT

### Emergency Department Care

Mycoplasmal pneumonia should be considered as a possible etiology in any emergency department patient presenting with 3 weeks of a steadily progressive cough. Patients are usually not critically ill, but seek relief from the persistent, worsening cough. Occasionally, various pulmonary and extrapulmonary complications may occur and may require emergent attention.

## MEDICATION

Several antimicrobials are effective in reducing the length of illness due to mycoplasmal pneumonia.

**Drug Category: Antibiotics**

Empiric antimicrobial therapy must be comprehensive and should cover all likely pathogens in the context of the clinical setting. In the treatment of mycoplasmal pneumonia, antimicrobials against M pneumoniae are bacteriostatic, not bactericidal.

| **Drug Name** | Erythromycin (EES, Erythrocin, E-mycin) |
|---|---|
| **Description** | Inhibits bacterial growth, possibly by blocking dissociation of peptidyl tRNA from ribosomes and causing RNA-dependent protein synthesis to arrest; for treatment of staphylococcal and streptococcal infections. |
| **Adult Dose** | 500 mg PO qid for 7-10 d |
| **Pediatric Dose** | 7.5-12.5 mg/kg/dose PO qid for 7-10 d |
| **Contraindications** | Documented hypersensitivity; hepatic impairment |
| **Interactions** | Coadministration may increase toxicity of theophylline, digoxin, carbamazepine, and cyclosporine; may potentiate anticoagulant effects of warfarin; coadministration with lovastatin and simvastatin increases risk of rhabdomyolysis |
| **Pregnancy** | B - Fetal risk not confirmed in studies in humans but has been shown in some studies in animals |
| **Precautions** | Caution in liver disease; estolate formulation may cause cholestatic jaundice; GI adverse effects are common (give doses pc); discontinue use if nausea, vomiting, malaise, abdominal colic, or fever occur |
| **Drug Name** | Azithromycin (Zithromax) |
| **Description** | Very effective against *M pneumoniae*. Perhaps the most common agent used to treat *M pneumoniae* given its ease of administration. |
| **Adult Dose** | Day 1: 500 mg PO<br>Days 2-5: 250 mg/d PO |
| **Pediatric Dose** | <6 months: Not established<br>>6 months: day 1: 10 mg/kg PO once; not to exceed 500 mg/d; days 2-5: 5 mg/kg/d PO; not to exceed 250 mg/d |
| **Contraindications** | Documented hypersensitivity; hepatic impairment; do not administer with pimozide |
| **Interactions** | May increase toxicity of theophylline, warfarin, and digoxin; effects are reduced with coadministration of aluminum |