

# Detection of *Mycoplasma pneumoniae* in Hospitalized Patients with Respiratory Tract Infection in Marrakech 2018

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## Abstract

**Background:** *Mycoplasma pneumoniae* (*M. pneumoniae*) is a commonly causative pathogen for Respiratory Tract Infections (RTIs) in humans. The aim of this study was to assess the prevalence of *Mycoplasma pneumoniae* infection in children and adult with RTIs and clinical, radiological features.

**Methods:** We retrospectively analyzed the clinical data of 338 consecutive RTIs patients (children and adults) who visited a teaching hospital from January to December 2018. *M. pneumoniae* was detected by real-time multiplex PCR in nasopharyngeal aspirates.

**Results:** *Mycoplasma pneumoniae* pneumonia was diagnosed in 3.55% of all respiratory tract infection investigated. The median (IQR) age was 6.48 years (range from 14 days to 36 years), most of the patients were children with clinical symptoms of RTIs (11/12). A cough (100%) and fever (66.66%) were more frequent symptoms observed in patients with *Mycoplasma pneumoniae* infection.

**Conclusion:** *M. pneumoniae* is a significant cause of LRTI in children and adult but still not a major respiratory pathogen with a low rate in Morocco and cause infection difficult to distinguish from a respiratory infection caused by other respiratory pathogens.

**Keywords:** Marrakech; Acute lower respiratory tract infection; *Mycoplasma pneumoniae*; Polymerase chain reaction

**Abbreviations** ALRTI: Acute Lower Respiratory Tract Infections; RSV: Respiratory Syncytial Virus; PCR: Polymerase Chain Reaction; FA-RP: Film Array Respiratory Panel; PIV-1-4: Para-influenza Virus types 1-4; Inf A: Influenza A Virus; ADV: Adenovirus; HMP: Human Metapneumovirus; HCoV: Human Coronavirus; HRV: Human Rhinovirus; HBoV: Human Bocavirus; MP: *Mycoplasma pneumoniae*; CP: *Chlamydia pneumoniae*; BP: *Bordetella pertussis*

## Introduction

*Mycoplasma pneumoniae* is a common causative pathogen for Lower Respiratory Tract Infection (LRTIs) in humans especially in children and young adults, this infections range clinically from mild, self-limiting upper respiratory symptoms to radiographically confirmed pneumonia requiring hospitalization with estimated prevalence ranging 2%-35%, depending on the identification method, the study period, and the population under investigation [1-4]. Data from 21 countries showed *M. pneumoniae* to be the most common

atypical pneumonia-causing bacterium, responsible for  $\cong 12\%$  of community-acquired pneumonia during 1996-2004 [5].

However, Real-time Polymerase Chain Reaction (PCR) has emerged as the primary techniques for detection of *M. pneumoniae* in clinical practices, due to its increased sensitivity and specificity compared with culture-based and serological methods [6].

To date, there is no epidemiological data on MP infections which have been collected in Morocco. Therefore, the prevalence of *M. pneumoniae* is unknown because of the low availability of reliable tests. So that in this study, we retrospectively analyzed patients of all age with *M. pneumoniae* RTIs during 2018 and we described the prevalence, epidemiology among patients with lower respiratory illness in Marrakech, Morocco.

## Material and Methods

### Study design

We performed a retrospective case analysis in all *M. pneumoniae* positive patients, all age included with severe respiratory illness (clinical signs of lower respiratory tract infections LRTI) hospitalized

at a tertiary medical center (Hospital Arrazi CHU Mohammed VI, Marrakech Morocco) from January to December 2018 in a regular ward or intensive care unit.

## Data collection

The TRI patients' basic information including age, sex, onset time, fever, clinical findings on physical examinations, radiological finding and underlying medical diseases was collected by hospital staff and uploaded into a database of hospitalized TRI patients.

## Specimen collection

We collected nasopharyngeal aspirates from patients and placed the specimens in universal transport medium.

## Detection of pathogens

Each specimen was tested for viruses, bacteria, and atypical bacteria with Film Array Respiratory Panel (FA-RP) according to the manufacturer's instructions. The FA-RP is an FDA certified multiplex Real-Time Polymerase Chain Reaction (RT-PCR) that can detect 17 viruses : (Respiratory Syncytial Virus (RSV); Para-Influenza Virus types 1-4 (PIV1-4); Influenza A and B viruses (InfA(H1,H1-2009,H3), InfB); adenovirus (ADV); human Metapneumovirus (hMP) ; human coronaviruses (HCoV-229E, HCoV-OC43, HCoV-NL63 and HCoV-HKU1); Human rhinovirus/Enterovirus (HRV/ETV); Human Bocavirus (HBoV) and 3 bacteria (*Mycoplasma pneumoniae* (MP); and *Chlamydia pneumoniae* (CP), *Bordetella pertussis* (BP) responsible for respiratory infection .

## Statistical analyses

Descriptive statistics were presented as frequency (percentage) or median and IQR where appropriate. Data were analyzed using Microsoft Excel 2013 and STATA version 10.0.

## Ethical considerations

Since the analysis used only de-identified and aggregated hospitalization and laboratory data, this study was considered to be exempt from human subjects' ethics review.

## Results

### Study population

During January to December 2018, we enrolled 338 patients hospitalized for lower respiratory tract infection, all were tested for 20 respiratory pathogens by real-time PCR in the nasopharyngeal specimen. 53.73% (187) were male, and 46.26% (161) were female; Among patients for whom age was known (322), 71.11% were <15 years of age, 22.36% were 15-59 years of age, and 6.52% were ≥ 60 years of age, with a median age of 14.10 years (range, 0.3 months to 90 years).

### Etiology

Among 338 samples, 31.06% (105) had no pathogen detected, 49.40% (167) had a single infection, 19.52% (66) had multiple infections. Among the single infections, the most common pathogen (26.33%, 89) was HRV followed by RSV (8.57%), MPV (3.25%) and

Parainfluenza (2.66%). Few infections of HEV, ADV, and Influenza A/B were detected (Table 1).

Virus	N	%
HRV only	89	26.33
ADV only	3	0.88
HEV only	1	0.29
Influenza virus (A/B) only	3	0.88
Parainfluenza (1-4) only	9	2.66
HMP only	11	3.25
Coronavirus (43/229E/NL 63 only)	7	2.07
RSV only	29	8.57
Bacteria	N	%
MP only	12	3.55
CP only	2	0.59
BP only	7	2.07
Copathogenes	N	%
Virus-Virus	46	15.38
Virus-Bacteria	14	4.14

**Table 1:** Prevalence of respiratory virus in 338 patients with LRTI.

### Detection Rate of *M. pneumoniae*

Overall, we detected *M. pneumoniae* in 3.55% (12/338) of persons tested. From 12 patients who had MP positive, 58.33% (7/12) were male, and 41.66% (5/12) were female with a median age of 6.48 years (range from 14 days to 36 years). We detected *M. pneumoniae* along with the other virus in 58.33% (07/12) of patients but never with atypical pneumonia-causing bacteria (*Chlamydia pneumoniae* or *Bordetella pertussis*). *Mycoplasma pneumoniae* was co-detected with Rhinovirus most frequently (33.33% (4/12)) (Table 2). We detected a few cases of MP during one year that why we couldn't talk about seasonality.

Respiratory pathogens	N	%
MP only	5	41.66
HRV+MP	4	33.33
ADV+MP	1	8.33
PIV +MP	1	8.33
ADV+HRV+MP	1	8.33

**Table 2:** detection of MP only or with another virus.

### Characteristics of ALRI Patients with *M. pneumoniae*

The most common respiratory manifestation was a cough (100%), fever was present in 66.66% and difficulty breathing in 58.33%. About 66.66% of the cases reported in our investigation was diagnosed as

pneumonia and 33.33% as bronchiolitis in 33.33%. Of these 2/12 (16.66%) had previously diagnosed and current asthma and had a severe exacerbation during the *M. pneumoniae* infection. Chest radiography was performed in all of the patients and 100% of these

had positive radiological findings. Two of the patients had severe manifestations of pneumonia and required intensive care because of respiratory distress (one aged 11 years with myocarditis, other aged 36 years with asthma) (Table 3).

Patients	Clinical symptoms	Radiological findings	Diagnosis
Patient 1 Male, 1 year	Fever+cough+rhinorrhoea+rales+dyspnea	Interstitial infiltration	Bronchiolitis
Patient 2 Male, 14 days	Acute distress respiratory+cyanosis+cough+fever	Alveolar syndrome	Pneumonia
Patient 3 Male, 2 years	Dyspnea+cough+cyanosis+fever	Alveolar syndrome	Pneumonia
Patient 4 Male, 18 days	Chronic cough	Interstitial infiltration	Bronchiolitis
Patient 5 Male, 2 years	Cough, dyspnea, Fever	Interstitial infiltration	Bronchiolitis
Patient 6 Female, 11years	Acute severe distress respiratory (cough ,cyanosis )+myocarditis	Patchy infiltrations	Pneumonia
Patient 7 Female, 5 years	A chronic cough, fever, night sweats, weight loss, asthma	Patchy infiltrations	Pneumonia
Patient 8 Female, 4years	Chronic Cough	Interstitial infiltration	Pneumonia
Patient 9 Male, 14 years	Steven Johnson syndrome+a productive cough+acute severe distress respiratory	Interstitial infiltration	Pneumonia
Patient 10 Female, 4 months	Cough	Interstitial infiltration	severe bronchiolitis
Patient 11 Male, 1year	Distress respiratory+Fever+pharyngitis	Interstitial infiltration	Pneumonia
Patient 12 Female, 36 years	chronic cough+ADR+asthma	Lobar consolidation	Pneumonie

**Table 3:** Clinical manifestations, radiological findings, and diagnosis of patients with *M. pneumoniae* infection.

## Discussion

To the best of our knowledge, this is the first paper investigating the role of respiratory pathogens in children and adults hospitalized with LRTIs in Marrakech and the first study about *Mycoplasma pneumoniae* detected by real-time PCR in Morocco. In our investigation, 338 patients hospitalized for ALRI were tested during 2018 and of this 3.55% (12/338) were positive for *M. pneumoniae*. For the regular wards (8/12), the positive detection rate of *M. pneumoniae* was 4 times greater than the rate in the ICU (2/12), this provides that MP is not a major respiratory pathogen in Marrakech. However, higher detection rates of 27%-30% among children with community-acquired pneumonia have been reported in the United States and Finland and

up to 60% among hospitalized adults with pneumonia in Japan [2,3]. The prevalence of *M. pneumoniae* varies depending on whether, a study was performed during an endemic or epidemic year, the laboratory detection method used, or the study participants [2]. Jain et al. reported that, among hospitalized children in the United States, *M. pneumoniae* was the most common bacterial cause of community-acquired pneumonia, accounting for 8% of cases and among hospitalized adults in the United States, *M. pneumoniae* was identified in  $\approx$  2% of cases [7,8]. The prevalence differences in our study compared with other studies might be attributable to a difference in enrollment criteria, the age group of participants.

*M. pneumoniae* was mainly detected in the 0-5 age group at a rate (9/12) that was 3 times higher than that in the  $\geq 6$  age group. One study showed similar results, with the positive detection rate of *M. pneumoniae* being highest in children aged 5-9 and 10-14 [9]. However, other studies have reported that the second most common age group for *M. pneumoniae* was 1-5 years in Australia and Thailand or 10-17 years in the United States [10,11].

In our study, a large proportion (58.33%) of *M. pneumoniae* patients were co-infected with a respiratory virus, of which Rhinovirus was the most common. Similarly, in 65% of *M. pneumoniae* patients,  $\geq 1$  additional pathogen were detected, of which *Streptococcus pneumoniae* (43%) and *Legionella* spp. (15%) were most frequently detected [9]. It has been suggested that multiplex PCR techniques demonstrate a high detection rate of viral co-infection [12].

The clinical presentation with a cough and fever were the most common manifestations observed in MP infection, whoever, even in older children, symptoms could not be distinguished from respiratory infections caused by other pathogens. Radiological finding in *M. pneumoniae* was not distinguishable from a respiratory infection in general.

Generally, *M. pneumoniae* causes mild respiratory infection, usually managed by primary-care physicians. However, recent studies have suggested that some patients with *M. pneumoniae* may develop severe respiratory manifestations requiring ICU admission, in our investigation, we found 2 patients required intensive care [13].

One child in our study was diagnosed with SJS, which is a known complication of *M. pneumoniae* [14]. All patients were immunocompetent and that are consistent with a previous report [13].

We have shown that, although the *M. pneumoniae* detection rate was low, *M. pneumoniae* detection is probably associated with illness, underscoring the need for testing, especially among patients at higher risk for severe disease. Such testing would result in earlier diagnosis and improved management.

This highlights the need to add *M. pneumoniae* to the differential diagnosis of severe CAP and the need to rule out *M. pneumoniae* as a possible cause of severe community-acquired pneumonia, particularly since current guidelines do not consistently recommend coverage for *M. pneumoniae* in CAP patients.

Our study provides baseline data, even small, that can be used for future surveillance programs to better understand respiratory pathogens especially *M. pneumoniae* in Morocco.

## Conclusion

*M. pneumoniae* is a significant cause of LRTI in infant, children, and adult but still not a major respiratory pathogen with a low rate in

Marrakech Morocco, it causes infection difficult to distinguish from a respiratory infection caused by other respiratory pathogens and it can cause severe pneumonia that requires intensive care.

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