High Prevalence of *Mycoplasma Pneumoniae* in Patients with Respiratory Tract Symptoms: A Rapid Detection Method

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Mycoplasma pneumoniae has been implicated as a cause of upper respiratory tract infection and atypical pneumonia since its discovery in 1962.[1] *M pneumoniae* accounts for up to 20% of pneumonias in the general population and up to 50% of pneumonias in closed populations,[2,3] is endemic in North America and Great Britain, and is not usually seasonal.[4,5] Although most studies have focused on younger patients, there may be a higher than expected prevalence of *M pneumoniae* in patients over 60 years of age.[6,7]

Although *M pneumoniae* is a common cause of upper respiratory tract infections and bronchitis, the lack of a rapid method of identifying the presence of *M pneumoniae* has prevented an understanding of its true prevalence. The diagnosis has previously been made by either isolation of the organism or a fourfold or greater rise in complement-fixing antibody. Isolation of the organism is technically difficult and not readily available. Complement-fixing antibody testing requires acute and convalescent specimens, and the results are not available for 14 days. The cold agglutinin test has also been used to diagnose *M pneumoniae*, but it is nonspecific, and a positive response is present in only about 50% of patients.[2] The development of a rapid serum latex agglutination test has made it possible to determine the presence of IgG and IgM mycoplasma antibodies in minutes (m-Clone, Access Medical Systems, Inc, Branford, Connecticut). This preliminary study investigated the prevalence of *M pneumoniae* in ambulatory patients with respiratory tract symptoms.

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Methods

All patients who came to the Gates County Medical Center, a rural family practice in North Carolina, between December 1988 and April 1989, who were older than 4 years and had not had any antibiotic treatment in the preceding 7 days, were eligible. Patients with symptoms of sore throat, chest or head congestion, cough, asthma, or earache had their temperature taken, were asked about a history of fever, and were asked the duration of their symptoms. The ears, nose, pharynx, sinuses, and lungs were examined carefully by one of the investigators (D.K.), and the presence of abnormal signs was noted on a standardized form. Patients were informed of the purpose of the study and, if they consented, had blood drawn for a rapid latex agglutination test for *M pneumoniae*.

Patients without symptoms having blood drawn for glucose, cholesterol, or anemia screening were tested for *M pneumoniae*. These patients had no respiratory tract symptoms and were tested on days that testing was done on symptomatic patients. No patients refused. Testing was not done on most Mondays, Wednesday afternoons, Thursday afternoons, or Saturdays because of a shortage of staff. The m-Clone positive rate in these patients provided an approximation of the rate of previous or asymptomatic infection. Age, sex, race, and current smoking status were recorded for both groups.

The latex agglutination test detects IgM and IgG antibodies to *M pneumoniae*. The test is recorded as either positive or negative. Two independent observers determined each result. The patient's serum is mixed with black latex particles coated with purified antigens. If antibodies are present in the serum, the agglutination is easily observed on the white test card. Office staff can run the test in less than 10 minutes. The m-Clone test has a sensitivity of 96.2% and a specificity of 96.0% when

Table 1. Characteristics of Patients Tested for *Mycoplasma pneumoniae*

Characteristics	Patients with Symptoms (n=187) No. (%)	Patients Without Symptoms (n=97) No. (%)
Age range (y)		
5-15	37 (20)	1 (1)
16-25	38 (20)	16 (17)
26-40	60 (32)	15 (16)
41-60	30 (16)	28 (29)
>60	17 (9)	37 (38)
Sex		
Male	77 (41)	27 (28)
Female	110 (59)	70 (72)
Race		
Black	76 (41)	53 (55)
White	109 (58)	44 (45)
Smoking status		
Yes	40 (21)	23 (24)
No	141 (75)	71 (73)

NOTE: Data are missing on a few patients.

compared with complement fixation; it has had 100% correlation with the DNA probe in limited testing.[6]

While not all eligible patients during the study period were tested, the staff were not allowed to select individual patients. The statistical analysis of the data used chi-square for all comparisons.

Results

During the 4 months of the study, 521 patients were seen with respiratory tract symptoms. One hundred eighty-seven patients (36%) with respiratory tract symptoms had blood drawn for m-Clone testing. Ninety-seven patients without respiratory tract symptoms were seen for other testing and had serum tested with m-Clone. The patient characteristics are shown in Table 1.

The m-Clone mycoplasma test was positive in 43% of patients with symptoms and 7% of patients without symptoms. Further, the prevalence of mycoplasma in patients with respiratory tract symptoms was greater than 30% in all age groups (Table 2).

Table 2. Results of m-Clone Mycoplasma Test, by Age Group in Patients with Respiratory Symptoms

Age Range (y)	Patients with Symptoms	
	No. Tested	% Positive
5-15	37	46
16-25	38	32
26-40	60	43
41-60	30	50
>60	17	59

Table 3. Historical Factors and Results of m-Clone Test in Patients with Respiratory Tract Symptoms

Presence or History of Symptom	Patients with Symptom and Positive m-Clone	
	No. (%)	*P* Value
Asthma (n=8)	4 (50)	.96
Sore throat (n=75)	27 (36)	.16
Earache (n=7)	2 (29)	.64
Head congestion (n=56)	24 (43)	.93
Chest congestion (n=57)	27 (47)	.68
History of fever (n=82)	30 (37)	.11
Symptoms >3 days (n=75)	33 (44)	.95
Productive cough (n=32)	19 (59)	.07

Among patients with symptoms, no historical factor was significantly associated with a positive m-Clone test (Table 3). No physical finding was significantly associated with a positive m-Clone test (Table 4).

Discussion

The prevalence of *M pneumoniae* in community practice and the nature of its causative role in respiratory tract infections has not been well defined. Much of the difficulty in more fully understanding *M pneumoniae* infection has been the lack of an accurate and rapid method of detecting its presence. Rapid latex agglutination tests may alleviate this difficulty.

The current study found a 43% prevalence of a positive mycoplasma test in patients with respiratory tract symptoms compared with only a 7% prevalence in patients without symptoms. The prevalence in symptomatic patients was not affected by age. Neither the patient's symptoms nor physical examination findings predicted a positive test.

The finding of only a 7% prevalence of *M pneumoniae* in patients without symptoms suggests that the patients with symptoms were different. The results of this rapid latex agglutination test were not compared with complement fixation titers, so conclusions should be considered preliminary. Whether mycoplasma is the primary

Table 4. Presence of Physical Findings and Result of m-Clone Test in Patients with Respiratory Tract Symptoms

Presence of Physical Finding	Patients with Finding and Positive m-Clone	
	No. (%)	*P* Value
Temperature >100°F (n=32)	14 (44)	.91
Tender sinus (n=15)	5 (33)	.52
Red pharynx (n=114)	50 (44)	.91
Pharyngeal exudate (n=13)	2 (15)	.13
Purulent rhinitis (n=13)	6 (46)	.18
Lung rhonchi or wheeze (n=19)	12 (63)	.14

cause of symptoms, a secondary infection after a viral infection, or simply a commensal is not known.

The introduction of an office diagnostic kit for *M pneumoniae* may make it easier to evaluate the epidemiology of mycoplasma infections. The test is done on serum, with results available in less than 30 minutes, in time to affect treatment decisions. In this study, no attempt was made to direct treatment based on the test result, nor was there any effort to follow the patients prospectively.

The current study was limited to one rural family practice and to one season (winter). Previous studies, however, have shown mycoplasma to be endemic and not limited to the rural population.[4,5]

Not all patients were tested, making it more difficult to generalize from this sample. Furthermore, both symptomatic and asymptomatic patients were missed because of inadequate staff on certain days. Still, the difference between groups is so large, that even if all of the patients not tested had a negative m-Clone test, the prevalence among ill patients would have been twice the prevalence of the asymptomatic patients.

M pneumoniae is common in outpatients with respiratory tract symptoms. Further research is needed to understand which patients will have complications and whether early treatment will be beneficial. The ability to make the diagnosis within minutes could be a great help to clinicians.

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