

## The value of pro-calcitonin and C-reactive protein for early diagnosis and treatment of children pneumonia caused by Mycoplasma.

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### Abstract

**Objective:** To explore the value of pro-calcitonin and C-reactive protein for the early diagnosis and treatment of Mycoplasma pneumonia in children.**Methods:** During March 2015 to March 2016, 120 children who suffered pneumonia were referred to our hospital. Among them, 60 children diagnosed as Mycoplasma pneumonia were divided into the observation group, and the another 60 typical bacterial pneumonia children constituted the control group. The level of C-reactive protein and pro-calcitonin were detected by enzyme linked immunosorbent assay and compared between control and observation groups.**Results:** In the control group, the average level of C-reactive protein and pro-calcitonin is  $1.86 \pm 0.48$  mg/L and  $0.08 \pm 0.03$  mg/L, respectively. However, in the observation group, the C-reactive protein level is  $14.27 \pm 3.72$  mg/L, and the pro-calcitonin level is  $3.68 \pm 1.62$  mg/L. The level difference of pro-calcitonin and C-reactive protein between control and observation groups are significant ( $p < 0.05$ ).**Conclusion:** The level of C-reactive protein and pro-calcitonin have great values in diagnosis and treatment of children Mycoplasma pneumonia, thus Worthing widely clinical use.**Keywords:** Pro-calcitonin, C-reactive protein, Mycoplasma pneumonia.

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### Background

Mycoplasma pneumonia is an infection of the lungs by the bacteria *Mycoplasma pneumoniae*. This type of pneumonia is also called atypical pneumonia because the symptoms are different from those of pneumonia due to other common bacteria. Mycoplasma pneumonia develops slowly, and the incubation period is less than 3 weeks [1,2]. The obvious clinical symptoms of Mycoplasma pneumonia include fever, stimulating and paroxysmal cough, bloody sputum, and so forth [3,4].

One of the challenges in Mycoplasma pneumonia treatment is how to diagnose it at early stages. Nowadays, X-ray imaging and pathogen *in vitro* culture are always used to provide diagnostic information about Mycoplasma pneumonia. However, because most of the Mycoplasma pneumonia patients are children, it is hard to manipulate the X-ray imaging. The time needed for pathogen *in vitro* culture last for about 10-14 days, thus pathogen culture have no significant meaning to early diagnosis of Mycoplasma pneumonia.

Pro-calcitonin and C-reative proteins are used as blood indicators of inflammation caused by lung infection. The significance of testing pro-calcitonin and C-reative level in diagnosis of Mycoplasma pneumonia is controversial. Our results showed that there were significant difference in pro-

calcitonin and C-reactive protein level detected from Mycoplasma and bacterial pneumonia patients. These findings make contribution to distinguishing Mycoplasma infections from typical bacterial infections, thus guiding the diagnosis and therapy of Mycoplasma pneumonia and avoiding antibiotic abuse.

### Information and Methods

#### General information

In the observation group, 60 Mycoplasma pneumonia children are selected in our hospital from March 2015 to March 2016 and another 60 with bacterial pneumonia in the control group. The allergic history of all the children is excluded. The detailed information is provided in Table 1.

**Table 1.** General information of patients in control and observation group.

Group	n	Sex		Age (years)	Onset time (day)
		Male	Female		
Control	60	33	27	$1.3 \pm 0.3$	$0.3 \pm 1.1$
Observation	60	36	24	$1.1 \pm 0.3$	$0.3 \pm 1.2$

p	-	-	-	0.73	0.91
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Note: The difference in age, sex and onset time is not significant (p>0.05)

**Blood sample collection**

2 ml venous blood collected from children patients was collected and centrifuged 30 minutes at 3,000 rpm. The serum was isolated and used to detect the levels of C-reactive protein and pro-calcitonin by the means of enzyme linked immunosorbent assay [5,6].

**Observation index**

Compare the C-reactive protein level and the positive rate of two groups, the normal reference value is ≤ 10 mg/L, if it is higher than 10 mg/L, then it is positive. In terms of pro-calcitonin, the normal reference value is <100 µg/L [7,8].

**Statistical analysis**

The SPSS11.0 was used to analyse and process the data. If P<0.05, the result is of statistical difference. Among the indexes, levels of C-reactive protein and pro-calcitonin are measurement data. Data is represented with the mean ± and the standard deviation. And the result is represented with t test result index.

**Results**

**Level of C-reactive protein and pro-calcitonin level in control and observation groups**

The C-reactive protein level and the pro-calcitonin level in control and observation groups were detected by the means of ELISA. Next, we compared the level C-reactive protein and pro-calcitonin between these two groups and found that the C-reactive protein level and the pro-calcitonin level in the control group were much lower than that in the observation group. Details are shown as follows in Table 2.

**Table 2.** C-reactive protein level and the pro-calcitonin level groups.

Group	n	C-reactive protein level	Procalcitonin level
Control	60	1.86 ± 0.48	0.08 ± 0.03
Observation	60	14.27 ± 3.72	3.68 ± 1.62
t	-	1.77	1.63
p	-	0.0084	0.0335

Note: The difference between control and observation groups is statistically significant (P<0.05).

**Positive rates of C-reactive protein and pro-calcitonin in control and observation groups**

According to the laboratory sheets of all patients, we calculated the amount of C-reactive protein and pro-calcitonin, and figured out the positive rate of C-reative protein and pro-

calcitonin in both control and observation group. In the control group, we found 6 C-reactive protein positive and 9 pro-calcitonin positive patients. However, there are 53 C-reactive protein positive and 55 pro-calcitonin positive children in observation group. Table 3 shows more details.

**Table 3.** The positive rate of C-reactive protein and pro-calcitonin.

Group	n	C-reactive protein (%)	Pro-calcitonin (%)
Control	60	10.0% (6 positive)	15.0% (9 positive)
Observation	60	88.3% (53 positive)	91.7% (55 positive)
p	-	0.0241	0.0317

Note: There is statistically significant difference between control and observation groups (P<0.05).

**Discussion**

Mycoplasma is a microorganism sized between the bacteria and the virus, with no cell walls [9,10]. The infection of Mycoplasma can results in pseudomonas and it happens more often in autumn and winter, that’s because saliva and secret will spread in the air, and cause respiratory tract infection. Its condition varies, the typical symptoms are headache and weakness in the early period, if not treated in time, it will get worse after about 2 days. Then fever, chill, pharyngalgia, myalgia, and cough will start. Cough has two different types, dry cough and stubborn spasmodic cough. Light in the daytime, while severe at night, which seriously impacts patients’ sleep, leads to facial oedema, then chest distress, chest pain, swirl, purulent sputum and bloody sputum follow up one by one [11,12]. And their body temperature maintains around 39°C, which will last for about one week [13].

With the continuous development of detecting techniques over the past few years, CRP and PCT have more clinical applications, and lots of clinical meanings: (1) If patients suffer from diseases like acute inflammation, tissue damage, myocardial infarction, operative wound, radioactive damage and so on, levels of C-reactive protein and pro-calcitonin will multiply quickly within a few hours. If their condition improves, levels of C-reactive protein and pro-calcitonin will be close to normal. So the ascending range has correlation to infectious degree [14,15]. (2) C-reactive protein is closely related to inflammatory factors. So are white blood cells, erythrocyte sedimentation rate and polymorphonuclear leukocytes, among which, it has correlation to red blood cells [16,17]. (3) During the inflammatory response, C-reactive protein and pro-calcitonin have positive effects, they can strengthen nonspecific resistance [18,19]. (4) Bacteria and virus infection can be identified and diagnosed by detecting the levels of C-reactive protein and pro-calcitonin [20].

In this study, 60 children in our hospital with Mycoplasma pneumonia are in the observation group, and another 60 with bacterial pneumonia are in the control group. C-reactive protein and pro-calcitonin of the patients are detected with the method of enzyme linked immunosorbent assay. Then compare

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levels of pro-calcitonin and C-reactive, the positive rate of C-reactive and pro-calcitonin with which in the control group is of statistical significance.

In conclusion, in the early period of treating Mycoplasma pneumonia in children, detecting the level of C-reactive protein and pro-calcitonin can offer accurate diagnosis basis, which important to clinical treatment of Mycoplasma pneumonia in children. Also, due to its high clinical value, it worth wide use in clinics.

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