

Correlation study of cough variant asthma and mycoplasma pneumonia infection in children

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Abstract: Cough variant asthma (CVA), as one of bronchitis diseases, features with repeated cough. In clinics, CAV does not show significant abnormal signs, therefore antibiotic therapy can hardly achieve satisfactory treatment effect. With the development of scientific technologies, the correlation between mycoplasma pneumoniae infection and CVA has become a hot research topic in clinics. In clinics, mycoplasma pneumoniae is extensively regarded as major cause for CVA, with complex pathogenic mechanism. The symptoms of CVA is characterized by chronic non abnormal inflammation, normally accompanied with bronchospasm and intestinal infection. Clinical practices show that about 6% of CVA children mainly show continuous cough till midnight during onset period, which is easily to misdiagnosed as bronchitis. Mycoplasma pneumoniae infection is a common disease threatening Children's health in China. With the annual increase of incidence of infantile pneumonia in China, mycoplasma pneumoniae infection has become a major reason leading to the death of child in China. More such mycoplasma pneumoniae infection is a sporadic disease spreading in a small range, and can onset in four seasons, making great impact on living quality and health of children. On this basis, this paper analyzes the correlation between Children's CVA and mycoplasma pneumoniae infection, in the hope of providing valuable reference for clinical treatment.

Keywords: Children cough variant asthma, mycoplasma pneumonia infection, correlation study.

INTRODUCTION

Children cough variant asthma is also called cough type asthma, concealed asthma or allergic asthma. Although there are many researches on children cough variant asthma in clinic, due to the complicated pathogens, repeated cough and non-significant physical sign changes in children patients, it is still difficult to treating it (Cao, 2013). The chief clinical characteristics of children cough variant asthma is of continuous and repeated cough usually in the morning and nighttime. Mycoplasma pneumonia (MP) infection is a common pathogen infection. The related counted data have displayed that the both mycoplasma pneumonia infection and cough variant asthma have an increasingly rising incidence rate and have a certain correlation in between.

In infantile asthma, cough variant asthma (CVA) is a peculiar one. CVA contains tracheospasm, and tracheospasm is mostly in the end of airway, which makes the wheezing be hardly heard (Xiao, 2013). Once the disease can't be treated timely, the condition can reveal a migration development and the serious situation can lead to severe infantile asthma and even the complications of pulmonary heart disease and emphysema, which induce serious influences on children patients' physical and mental health (Zhao and Nie, 2013). Mycoplasma

pneumonia infection is a common pathogen of infantile respiratory infection, taking on a gradually rising tendency. The in-depth researches have indicated that MP infection can induce the incidence CVA, so the relationship between CVA and MP infection has become the highlight of clinical research (Hashem, 2016). Based on those, this study was to analyze and investigate the correlation between cough variant asthma and mycoplasma pneumonia infection in children.

MATERIALS AND METHODS

General information

Clinical data of 200 children with CVA, who received the treatment in our hospital between October 2013 and October 2016, were recruited as the research group. All children patients had been diagnosed by related examination in clinic and met the diagnostic criteria of cough variant asthma in Guideline of Childhood Asthma. Before experiment, the informed consent form of all patients were obtained. Moreover, the study protocol and informed consent form were reviewed and approved by medical ethics committee. In the research group, there were 106 male children and 94 female children, aged ranging from 1 year to 13 years [average age at (6.8±1.5) years]. At the same time, clinical data 200 children with repeated upper respiratory infection in the same time range were selected as the control group, including 98 male children and 102 female children, aged between 1

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year and 13 years [average age at (6.8±1.8) years]. Those with previous history of mycoplasma pneumonia infection and allergy to drug treatment as well as without antiviral and anti-inflammation before treatment were excluded. Comparisons of related information showed the comparability for the children patients in both groups, with $P > 0.05$.

Methods

Blood samples (2 ml) were taken for children patients in both groups, and the serum was separated, which was applied to detect the mycoplasma pneumonia IgM antibody (MP-IgM); SERODIA-MYCO II, the diagnostic kit for measurement of antibodies to mycoplasma pneumonia (passive particle agglutination), was strictly performed abiding by the kit criteria. That the titer of IgM was no less than 1:160 was positive, showing that children patients with PM infection (Aldahlawi, 2016); Blood cell analyzer and radioimmunoassay were adopted for conventional eosinophil count and for detecting total serum IgE for children patients in the research group, respectively (Hyun, 2016).

Different treatment regimens were performed on the children patients in both groups. At the same time, children patients in both groups accepted the conventional antitussive and antispasmodic drug. Based on this, treatment of erythromycin (30mg per day) and azithromycin (10mg per day) was applied for children patients in the research group, with 4-week continuous treatment. Then the efficacy was observed and compared (Ding, 2013).

Observation indexes

Observe and compare the total effective rates of treatment between the two groups, including three evaluation criteria: evidently effective, effective, ineffective. The evaluation criterion for significant effectiveness is completely alleviated symptoms, mild attack occasionally, spontaneous remission without medicine. The evaluation criterion for effectiveness is alleviated asthma symptoms, medicine is still required. The evaluation criterion for ineffectiveness is non-alleviated symptoms, even aggravation of disease. The clinical effective rate is equal to the rate between case number of evidently effective and effective and total case number.

STATISTICAL ANALYSIS

SPSS 21.0 statistical software was adopted for data analysis; ($\bar{x} \pm s$) was used for measurement data; (n, %) was applied for enumeration data; t-test and Chi-square test were employed for intergroup comparison. $P < 0.05$ was considered statistically significant.

RESULTS

Comparisons on positive results of serum mycoplasma pneumonia antibody

Data counted in table 1 showed that in 200 children patients in the research group, there were 82 cases (41.00%) with serum titer no less than 1:160 and 12 cases (6.00%) with serum titer no less than 1:360, revealing the positive rate of 47.00% in MP-IgM; while in the control group, there were 30 cases (15.00%) with serum titer no less than 1:160 and 4 cases (2.00%) with serum titer no less than 1:360, revealing the positive rate of 17.00% in MP-IgM. The comparisons between the two groups showed statistical significances, with $P < 0.05$.

Data counted in table 2 displayed that the positive rate of MP-IgM in children between 6 and 13 years was higher than those between 1 and 5 years, with statistical significance and $P < 0.05$.

Data counted in table 3 manifested that the total serum IgE level and eosinophil count of peripheral blood for children patients of positive MP-IgM in the research group were distinctly higher than those in the control group, with statistical significance and $P < 0.05$.

Comparisons on the total treatment effective rate for children patients in both groups

Data counted in Table 4 uncovered that after the different treatment regimens, in the research group, there were 143 cases (71.50%) with evident effectiveness, 47 cases (23.50%) with effectiveness and 10 cases (5.00%) with ineffectiveness, revealing the total treatment effective rate of 95%; while, in the control group, there were 80 cases (40.00%) with evident effectiveness, 78 cases (39.00%) with effectiveness and 42 cases (21.00%) with ineffectiveness, revealing the total treatment effective rate of 79%. Compared with the children patients in the control group, the research group had a higher total treatment effective rate, showing a statistical significance and $P < 0.05$.

DISCUSSION

Cough variant asthma ranks a higher incidence rate in the children. According to the related counted information, it has showed that the incidence of CVA can reach a maximum rate of 40% in children with chronic cough (Zhao, 2014), and the major treatment drugs are anti-asthmatic drugs and anti-allergy drugs. Clinical researches have manifested that CVA pathogenesis is the same with typical bronchial asthmas. Meanwhile, it is mediated by IgE, with various cytokines and inflammatory mediators participating in. The main characteristics are chronic airway inflammatory response, airway hyperresponsiveness, and existing obvious relationships with environment, inheritance and infection (Alruqaie, 2016).

Table 1: Comparisons on positive results of serum mycoplasma pneumonia antibody [n, (%)]

Group	Cases	Titer of 1:160	Titer of 1:360	Positive rate
The research group	200	82	12	47.00%
The control group	200	30	4	17.00%
X ²				14.36
P				<0.05

Comparison on ages of detected positive MP-IgM for children patients in both groups

Table 2: Comparison on ages of detected positive MP-IgM for children patients in both groups [n (%)]

Group	Cases	Ages	Positive cases	Positive rate
The research group	102	1-5	28	26.67
	98	6-13	66	67.35
The control group	90	1-5	5	5.56
	110	6-13	29	26.36

Results comparisons on the total serum IgE level and eosinophil count of peripheral blood for positive children patients

Table 3: Results comparisons on the total serum IgE level and eosinophil count of peripheral blood for positive children patients ($\bar{x} \pm s$)

Group	Cases	Total serum IgE (U/L)	Eosinophil count ($\times 10^9/L$)
The research group	200	184.46 \pm 43.34	6.65 \pm 2.53
The control group	200	90.36 \pm 50.22	3.18 \pm 1.35
t		22.39	25.37
P		<0.05	<0.05

Table 4: Comparisons on the total treatment effective rate for children patients in both groups [n (%)]

Group	Cases	Evident effectiveness	Effectiveness	Ineffectiveness	Total effective rate
The research group	200	143 (71.50)	47 (23.50)	10 (5.00)	190 (95.00)
The control group	200	80 (40.00)	78 (39.00)	42 (21.00)	158 (79.00)
X ²					10.62
P					< 0.05

Relevant foreign research results have suggested that PM infection can induce CVA and have considered that one of the pathogenic factors of acute attack, difficult relief and disease deterioration of CVA is mycoplasma pneumonia, but there is still no unified theory of inducement mechanism. Some scholars have thought that because mycoplasma infection is the specific antigen, through delayed allergic reaction and immediate allergic reaction or high-interference and disorder to T-lymphocyte subsets, it can lead to airway inflammation and airway hyper responsiveness mediated by IgE, thus finally producing CVA (Abdul-Warith, 2016).

The results in this study showed that the positive rate of MP-IgM for children patients in the research group was obviously higher than that in the control group, with a significant difference and $P < 0.05$; Through the observation of ages, the positive rate of MP-IgM in children patients between 6 and 13 years was higher than those between 1 and 5 years, with a statistical significance and $P < 0.05$; The eosinophil count of peripheral blood and total serum IgE level of children with positive MP-IgM in

the research group were distinctly higher than those in the control group, with statistical significances and $P < 0.05$. Those fully suggested that PM infection could induce CVA in children. Furthermore, the research results also uncovered that treatment of erythromycin and azithromycin on CVA in children could achieve more ideal efficacy.

CONCLUSION

It is concluded that children cough variant asthma close has a close correlation to mycoplasma pneumonia infection and one of the major risk factors inducing children cough variant asthma is mycoplasma pneumonia infection. Macrolide anti-mycoplasma therapy applied in the treatment can significantly enhance the efficacy, worth future clinic application.

REFERENCES

Abdel-Warith A (2016). Potential use of green macro algae *Ulva lactuca* as a feed supplement in diets on

- growth performance, feed utilization and body composition of the African catfish, *Clarias gariepinus*. *Saudi J. Biol. Sci.*, **23**: 404-409.
- Aldahlawi A (2016). Analysis of CD95 and CCR7 expression on circulating CD4(+) lymphocytes revealed disparate immunoregulatory potentials in systemic lupus erythematosus. *Saudi J. Biol. Sci.*, **23**: 101-107.
- Alruqaie I (2016). Shanavaskhan, Morphological cladistic analysis of eight popular Olive (*Olea europaea* L.) cultivars grown in Saudi Arabia using Numerical Taxonomic System for personal computer to detect phyletic relationship and their proximate fruit composition. *Saudi J. Biol. Sci.*, **23**: 115-121.
- Cao, M (2013). Relationship of the young child with cough variant asthma and mycoplasma pneumonia infection. *Hebei Med.*, **6**: 919-912.
- Ding S, Song K Lv Q (2013). The treatment and effect of cough variant asthma caused by mycoplasma pneumonia. *CHN Mod. Doc.*, **28**: 143-144.
- Hashem A (2016). Alleviation of cadmium stress in *Solanum lycopersicum* L. by arbuscular mycorrhizal fungi via induction of acquired systemic tolerance. *Saudi J. Biol. Sci.*, **23**: 272-281.
- Hyun T (2016). Antioxidant, alpha-glucosidase inhibitory and anti-inflammatory effects of aerial parts extract from Korean crowberry (*Empetrum nigrum* var. *japonicum*). *Saudi J. Biol. Sci.*, **23**: 181-188.
- Xiao X, Guan Z, Diao S, Qiu J and Deng J (2013). The correlation study of cough variability asthma and mycoplasma pneumonia infection. *J. Liaoning Med. Univ.*, **3**: 36-38.
- Zhao Y and Nie C (2013). Correlation investigation of mycoplasma pneumonia infection and cough variability asthma. *J. Med. Forum*, **7**: 80-81.
- Zhao Z (2014). Observation on infection results and correlation between childhood asthma and mycoplasma pneumonia. *J. Clini. Pulmonary Med.*, **8**: 1497-1498.