

Research on the Levels of Serum Vitamin D and IgE and Their Correlations in Infants with Different Allergic Risks

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Abstract: Objective: To investigate the levels of serum vitamin D and IgE in infants with different allergic risks and to analyze their correlations.

Methods: In the present study, the participants were selected and recruited from the infant ward of our hospital from February 2012 to December 2012. A total of 120 patients were selected and recruited. Among these patients, 64 patients with symptoms of allergic diseases were assigned to the experimental group. The remaining 56 patients who had respiratory infections, but without other symptoms of allergic diseases, were assigned to the control group. The serum 25-hydroxyvitamin D3 levels were measured using liquid chromatography tandem mass spectrometry and the IgE levels were measured using radioimmunoassay in both experimental and control groups. Subsequently, the serum 25-hydroxyvitamin D3 levels and IgE levels were compared between the experimental group and control group. **Results:** The following findings were obtained through data comparison. The serum 25-hydroxyvitamin D3 level in the experimental group was 18.19 ± 7.84 ng/mL, and the IgE level was 551.51 ± 705.88 IU/mL. The serum 25-hydroxyvitamin D3 level in the control group was 21.95 ± 7.834 ng/mL, IgE level was 49.39 ± 32.46 IU/mL. The data comparison indicates that the serum 25-hydroxyvitamin D3 level in the control group was higher than the experimental group, and the IgE level in the control group was lower than the experimental group ($P < 0.05$). **Conclusion:** The level of vitamin D3 in patients with allergic symptoms is relatively low. This may be one of the causes leading to allergies. At the same time, IgE is also one of the causes contributing to allergies. An elevation of the IgE level is very likely to cause the allergic, and there

is a correlation between serum vitamin D and IgE levels. At the same time, research has found that proper supplementation of vitamin D3 can help prevent allergic diseases, and can be considered in a new and high-quality program for the prevention of allergic diseases.

Keywords: Allergic diseases; Serum vitamin D; Total IgE levels

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1 Introduction

Infants and young children are more susceptible to allergic diseases which are one of the chronic diseases. There are many causes that contribute to the onset and development of allergic diseases, such as heredity and infection, but the most important cause is still allergy^[1-2]. Allergic diseases are characterized by an overreaction produced by the body, which is caused by one or more antigenic substances stimulating the body. It is difficult to accurately detect the cause of allergic diseases. At the same time, allergic diseases are prone to recurrence and it is not easy to effectively cure them. The difficulties of radical treatment affect the patient's physical growth and physical development, and at the same time reduce the quality of life of the patient, bring a great burden on the patient's family, and impart immense psychological stress to the patient's family. With the development in recent years, the incidence of allergic diseases in infants and young children is getting higher and higher, showing an increasing trend every year. According to incomplete statistics, 19% to 31% of infants and young children in

our country will develop allergies every year. Eczema, urticaria, asthmatic bronchitis, bronchial asthma, and allergic rhinitis are the more commonly known allergic diseases. This article will study the levels of serum vitamin D and IgE and their correlations in infants with different allergic risks. The specific research methods are shown in the following.

2 Materials and methods

2.1 Patient Information

The patients participating in this study were randomly selected and recruited from infant ward of our hospital from February 2012 to December 2012. A total of 120 patients were selected and recruited. All patients were diagnosed with allergies and met the inclusion criteria for this study. These study participants did not have other diseases, such as heart failure, congenital heart disease, epilepsy, etc. The 120 patients were randomly divided into two groups, namely experimental group and control group.

There were 64 participants, including 36 boys and 28 girls in the experimental group. Thirty individuals were affected by pneumonia, 16 individuals were affected by bronchitis, and 18 were affected by upper respiratory infections.

The control group consisted of 56 patients, including 26 boys and 30 girls. Twenty individuals were affected by pneumonia, 22 individuals were affected by bronchitis, and 14 were affected by upper respiratory infections.

The general data of patients in the experimental group and the control group were compared. The data showed that there was no significant difference in age and gender ($P>0.05$). Thus, the data of these two groups of patients were comparable. Family members of the individuals who participated in this study volunteered to take part in the study and signed a consent form with the hospital.

2.2 Research Methods

2.2.1 Determination of the level of serum 25-hydroxyvitamin D3

Method: Determination of the level of serum 25-hydroxyvitamin D3 by liquid chromatography tandem mass spectrometry

Specimen collection: Blood samples were collected from the patients who took part in the present study.

After admission into the hospital, blood specimens were collected from the patients before taking any meals early in the morning. Specifically, 2 mL of venous blood was collected from each patient. The blood specimen was collected using a common biochemical tube containing separation gel and progel. The venous blood was stored properly, and then, the nurse sent the collected venous blood specimens to the medical laboratory of our hospital for further processing and laboratory tests. After centrifugation, the blood specimen was placed in a pre-chilled tube for storage, and the blood specimen were stored in the refrigerator which was set at the temperature of 2 °C–4 °C. Afterwards, the professional lab technicians were sent to the medical laboratory to conduct further professional lab testing. The results were obtained after three working days.

2.2.2 Determination of the level of total IgE

Method: Immune assays were used to determine the level of total IgE

Specimen collection: Blood specimens were collected from the patients who took part in the present study. In the early morning of the second day after admission, blood specimens were collected from the patients before taking any meals. Two milliliters of venous blood were collected. To separate and obtain the serum, high-speed centrifugation which was set at 3000 rotations per minute (rpm) for 3 minutes was performed. Ten microliters of the separated serum were aliquoted and used for the determination of the level of total IgE levels using immune assays.

2.3 Observation indicators

The serum 25-hydroxyvitamin D3 level and total IgE level of the patients were compared between the experimental group and the control group, and the correlation between the serum 25-hydroxyvitamin D3 level and the total IgE level was compared between the two groups.

2.4 Statistical analysis

The data obtained in this study were all used to perform statistical analyses using Statistical Package for Social Sciences (SPSS), version 20. The data of quantitative variables ($\bar{x} \pm s$) were compared using the Student's t test, whereas the data of categorical variables (n, %) were compared χ^2 test. The difference with a P-value of less than 0.05 indicates statistical significance in the

comparison^[3].

3 Results

3.1 Comparison of general information of patients in the experimental group and the control group

The experimental results show that there is no significant difference in gender, age, and weight of the general data of patients ($P>0.05$). This indicates that the data in the experimental group and control group were

comparable.

3.2 Comparison of serum 25-hydroxyvitamin D3 levels (ng/mL) between the experimental group and the control group

By comparing the data, it can be seen that the serum 25-hydroxyvitamin D3 level of the patients in the experimental group was significantly lower than that in the control group ($P<0.05$). The data in the experimental group and control group were comparable. The specific data are shown in Table 1.

Table 1. Comparison of serum 25-hydroxyvitamin D3 levels (ng/mL) between experimental group and control group

Group	Number of patients	Level of serum 25-hydroxyvitamin D3 (ng/mL)
Experimental group	64	18.19±7.84
Control group	56	21.95±7.834

3.3 Comparison of total IgE levels (IU/mL) between the experimental group and the control group

By comparing the data, it can be seen that the total

IgE level of the patients in the experimental group was significantly higher than that in the control group ($P<0.05$). The data in the experimental group and control group were comparable. The specific data are shown in Table 2.

Table 2. Comparison of total IgE levels (IU/mL) between experimental group and control group

Group	Number of patients	Total IgE level(IU/mL)
Experimental group	64	551.51±705.88
Control group	56	49.39±32.46

3.4 Comparison of the correlation between serum 25-hydroxyvitamin D3 level and total IgE level in the experimental group and the control group

The data was obtained from the experiment were

compared. The serum 25-hydroxyvitamin D3 level and total IgE level were related in the experimental group. However, the serum 25-hydroxyvitamin D3 level and total IgE level were not related in the control group. The specific data are shown in Table 3.

Table 3. Comparison of serum 25-hydroxyvitamin D3 level and total IgE level between experimental group and control group

Group	Number of patients	Level of serum 25-hydroxyvitamin D3 (ng/mL)	Total IgE level(IU/mL)
Experimental group	64	18.19±7.84 ng/mL	551.51±705.88 IU/mL
Control group	56	49.39±32.46 IU/mL	49.39±32.46 IU/mL

4 Discussion

For infants, allergic diseases are one of the chronic diseases that are more susceptible to them. There are many causes leading to the onset and development of allergic disease, such as heredity and infection. However, allergies are still the most important etiology contributing to allergic diseases. The more commonly known allergic diseases include food allergies, eczema, urticaria, asthmatic bronchitis, bronchial asthma, allergic rhinitis, *etc*^[4]. Allergic diseases are prone to recurrence and it is not easy to effectively cure them.

The characteristics of each allergic disease are different. In addition, each allergic disease can also be caused by different allergens. For example, allergic rhinitis is a seasonal or perennial disease, which mostly manifests as a runny nose, nasal congestion, and itchy nose. On the other hand, bronchial asthma mostly manifests as recurrence and its main manifestations include cough, wheezing, and shortness of breath. Allergic diseases are generally prone to recurrence, and the disease duration is long. As the patient gets older, the symptoms of each stage of the patient are also different. As the age increases, some symptoms will

gradually disappear or the number of symptoms will decrease, but certain symptoms will gradually become more obvious. Usually children will first suffer from food allergies or eczema, followed by allergic rhinitis, and finally end up with bronchial asthma^[5]. Among these conditions, bronchial asthma is the most serious allergic disease in this series of conditions.

According to research in recent years, vitamin D in the human body plays an important role. With the development of the economy, the advancement of medical treatment and the development of information dissemination, people have become more aware of importance and health benefits of vitamin D. Vitamin D is not only helpful for bone metabolism but also for other functions of the body. Studies in recent years have shown that vitamin D plays a significant role in numerous diseases, such as children's respiratory diseases, cardiovascular diseases and autoimmune diseases^[6]. At present, more people are paying more attention to vitamin D, which is not only a nutrient that we need to supplement daily, but also an important hormone that the body needs. In order to ensure the normal functioning of our body, Vitamin D is an indispensable nutrient to our body^[7]. According to previous studies, vitamin D levels are also affected by many factors, such as season, age, gender, environment in which they grow, and changes in the four seasons.

In this article, the levels of serum vitamin D and IgE in infants with different allergic risks were compared and their correlations were analyzed. These data were obtained from the experiments. The serum

25-hydroxyvitamin D3 levels and total IgE levels were related in the experimental group, and this indicates that vitamin D can inhibit the occurrence of allergic diseases. Currently, there are many methods for treating allergic diseases, but each treatment method is coupled with different side effects. The present study also showed that serum 25-hydroxyvitamin D3 can reduce the incidence of allergic diseases, and patients can be appropriately supplemented with vitamin D to reduce the probability of hair loss, which can be used as a new type of treatment.

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