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CONSEQUENCES OF VITAMIN D DEFICIENCY IN PREPUBERTAL GIRLS WITH ASTHMA

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Abstract

This article is dedicated to studying the interrelationship between bronchial asthma and vitamin D deficiency in prepubertal girls. The research explores the immunomodulatory and antimicrobial properties of vitamin D, as well as its effect on airway inflammation. The results of the study indicate that controlling and maintaining adequate vitamin D levels is of significant importance in preventing exacerbations of the disease and increasing therapeutic efficacy in prepubertal girls with asthma.

Keywords

Vitamin D, bronchial asthma, deficiency, immune system, respiratory function, laboratory research, treatment, prophylaxis

Introduction: Vitamin D is one of the important elements in the human body, supporting the immune system and bone health. Vitamin D deficiency in prepubertal girls with asthma can lead to serious negative consequences. Vitamin D regulates the metabolism of calcium and phosphorus in the body, which ensures bone strength. It also strengthens the immune system and controls inflammatory processes. The main sources of vitamin D are: sunlight, fish oil, egg yolk, fortified dairy products.

Main Functions:

- Regulation of calcium and phosphorus metabolism
- Strengthening the immune system
- Combating inflammation
- Strengthening the musculoskeletal system

Bronchial asthma is a chronic allergic disease of the airways, widespread worldwide, affecting over 300 million people, including children. In recent years, the connection between vitamin D deficiency and bronchial asthma has attracted the attention of scientists. Prepubertal girls constitute one of the most vulnerable groups for this problem.

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Asthma is associated with inflammatory processes in the airways. Vitamin D regulates the production of substances that control inflammatory processes. Thus, vitamin D deficiency can exacerbate asthma symptoms and increase airway inflammation.

Research Objective

The aim of this research is to study vitamin D levels in prepubertal girls with asthma and assess its impact on asthma symptoms, level of inflammation, and overall health.

Research Design

1. Research Type:

– Observational or cross-sectional study

2. Participants:

– Prepubertal girls (6-18 years old) with asthma. Their asthma diagnosis must be confirmed.

3. Data Collection:

– Demographic data: age, weight, height, family history.
– Vitamin D level: Vitamin D level is determined from a blood sample.
– Asthma symptoms: Standardized questionnaires (e.g., Asthma Control Test) are used to assess asthma symptoms.
– Markers of inflammation: Determination of eosinophil levels and other inflammatory markers in the blood sample.

Data Analysis

• Statistical analyses (e.g., correlation analysis) are conducted to determine the relationship between vitamin D levels and asthma symptoms.

• Multivariate regression analyses may be performed to account for the influence of potential factors (e.g., age, weight, allergic history).

Expected Results

• Association between the degree of vitamin D deficiency and asthma symptoms.

• Association between vitamin D levels and markers of inflammation (e.g., eosinophils).

• The impact of vitamin D levels on the overall health of girls with asthma.

Conducting laboratory research on the topic of vitamin D deficiency in prepubertal girls with asthma is of great importance in determining the effect of vitamin D levels on asthma symptoms and inflammatory processes. Such research includes numerous laboratory methods, and the results aid in managing asthma and developing preventive measures.

Types of Laboratory Research

1. Blood Samples

– Vitamin D level: The level of 25-hydroxyvitamin D (25(OH)D) is determined in a blood sample. This is the main form of vitamin D, indicating its presence in the body.

– Inflammatory markers: Blood tests are performed to measure markers of inflammation such as eosinophils, C-reactive protein (CRP), interleukin-4 (IL-4), interleukin-5 (IL-5).

2. Spirometry

– Spirometry is performed to assess asthma symptoms and determine respiratory function. This method allows measuring the condition of the airways, respiratory rate, and lung volume.

3. Allergy Tests

– Skin tests or blood tests (e.g., specific IgE for allergies) are conducted to identify allergens that trigger allergic reactions and asthma symptoms.

4. Inflammation Analyses

– Cytological and histological analyses may be performed on samples obtained from the airways (e.g., bronchial lavage) to assess the degree of inflammation.

Research Process

1. Participant Selection

– Prepubertal girls with asthma, whose asthma diagnosis is confirmed. The girl's health history, allergic reactions, and other factors are taken into account.

2. Data Collection

– Blood samples are taken from each participant, and the laboratory tests mentioned above are carried out.

– Spirometry results are recorded, and asthma symptoms are assessed.

3. Analysis of Results

– Statistical analyses (e.g., correlation and regression analyses) are conducted to determine the relationship between vitamin D levels and asthma symptoms and levels of inflammation.

– Multivariate regression analyses may be performed to account for the influence of potential factors (e.g., age, weight, allergic history).

The following are methods for treating vitamin D deficiency and asthma:

1. Vitamin D Supplements

Vitamin D preparations: To compensate for vitamin D deficiency, supplements in the form of D3 (cholecalciferol) or D2 (ergocalciferol) may be administered based on a doctor's recommendation. When determining the vitamin D dosage, the child's age, weight, and blood test results must be considered.

2. Diet

- Vitamin D-rich foods: It is important to include vitamin D-rich foods in the child's diet. These include:
  - Fatty fish (salmon, mackerel)
  - Egg yolk
  - Milk and dairy products fortified with vitamin D
  - Bread and other grain products fortified with vitamin D

3. Sunlight
   - Utilizing sunlight: Vitamin D is synthesized in the body under the influence of sunlight. It is important to encourage children to be in the sun at certain times of the day (e.g., morning or late afternoon). However, prolonged sun exposure should be avoided as it can increase the risk of skin cancer.
4. Astma Management
   - Asthma medications: Inhalers prescribed by a doctor (e.g., bronchodilators and anti-inflammatory drugs) should be taken regularly to manage asthma symptoms.
   - Anti-inflammatory methods: Medications that help reduce inflammation (e.g., inhaled corticosteroids) play an important role in asthma management.
5. Monitoring and Medical Supervision
   - Blood tests: Vitamin D levels should be regularly monitored, and the dosage of supplements adjusted as needed.
   - Monitoring asthma symptoms: It is important to regularly assess asthma symptoms (e.g., shortness of breath, lung function) and consult with a doctor.

Vitamin D deficiency in prepubertal girls with asthma is a widespread condition with significant clinical importance. Timely detection, proper treatment, and effective prophylaxis are key factors in controlling asthma and improving the child's overall health. A multidisciplinary approach (pulmonologist, endocrinologist, immunologist, and dietitian) allows for effective resolution of this problem.

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