Correlation of vitamin D deficiency with asthma in pediatric population in eastern India

Abstract
Novel role of Vitamin D in non-musculoskeletal health is an area of continued clinical research. Role of Vitamin D in pulmonary homeostasis have been proven beyond doubt. The present study was done in Eastern Indian pediatric population with an objective of finding a correlation between vitamin D deficiency and clinically proven asthma. The study demonstrates a strong association of asthma with vitamin D deficiency (p<0.001), however no association could be proven between severity of asthma and vitamin D deficiency. 

Background: The normal vitamin D levels for non-musculoskeletal health have not been defined. Levels less than 20ng/ml have been recently termed as vitamin D deficient state. It has been evident that vitamin D stimulates type 2 alveolar cells for synthesis of DNA, production of surfactant2 and regulates alveolarization.3 Several experimental and human studies have suggested that vitamin D protects from severe asthma by preventing viral infection and enhanced response to steroids which favors the inverse association between vitamin D status and severe asthma exacerbation in children.

Objective
a. To determine the incidence of vitamin D deficiency in Indian children with clinically proven asthma as compared to healthy controls.
b. To study the association of vitamin D deficiency with the clinical correlates of asthma.

Methods
Design: Case control prospective study
Setting: Ambulatory asthma clinic at Institute of child health
Approval: Ethical committee of Institute Child Health
Time frame: 1 year
Inclusion Criteria: Children 1 to 14 years of age with clinically proven asthma as classified according to GINA (Global Initiative for Asthma) guidelines.
Exclusion Criteria: Children with co-existing rickets, renal diseases or on Vitamin D supplements or steroids
Tools: Analysis of serum 25(OH) D (ng/ml) levels by electrochemiluminescence method
Statistical Analysis: Mann–Whitney U test, Fisher’s exact test, Spearman’s rank correlation analysis, p<0.05 considered significant

Results
Number: 100 asthma patients as cases, 36 healthy patients as controls
Age: 20 cases were between 1 to 5 years of age while the rest 80 were between 5 to 14 years of age

Vitamin D levels: Cases (16.04 ng/ml±3.2) as compared with the control group (22.67 ng/ml±8.9) (p<0.001), Figure1.

Figure 1 Comparison of Vitamin D Levels in Asthmatics and Healthy Children.

Figure 2 Prevalence of Vitamin D deficiency according to Place of Residence.
Grades of asthma: Patients were classified into Controlled, Partially controlled and uncontrolled asthma. Grade of asthma severity was compared with vitamin D levels. In the controlled asthma group, 12 out of 13 patients were vitamin D deficient. In the partially controlled group 60 out of 83 patients were vitamin D deficient. In the uncontrolled group there were only 3 out of 4 patients were deficient, Figure 3.

Sunlight exposure: Exposure to sunlight was measured as the duration of exposure between 10 A.M to 3 P.M. It was divided into three groups of 0-15 minutes, 16-60 minutes and >60 minutes. Out of 44 patients with an exposure of 0-15 mins 27 had vitamin D deficiency. In the 16-60 min group there were 48 patients out of which 41 had vitamin D deficiency. The group with >60 mins exposure had 8 patients of these 7 were deficient. There was no correlation between sun exposure and vitamin D deficiency (p value=0.316), Figure 4.

Conclusion

Apart from its musculoskeletal role vitamin D is recently becoming known as the underlying mediator in a number of immune and inflammatory disorders. There is a definite correlation between vitamin D deficiency and asthma in children. However the role of vitamin D supplementation in control and management of asthma needs further studies. The route of supplementing vitamin D in such cases and whether the dosing will be the same as used for skeletal health problems like rickets also needs investigation. To the best of author’s knowledge this is the first study available which looks at the Eastern Indian population.

Acknowledgement

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Conflict of interest

The author declares there in no conflict of interest.

References

