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Vitamin D Levels in Children with Bronchial Asthma

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Editorial

Bronchial Asthma is a common chronic inflammatory disorder of the airways in childhood. The prevalence of asthma is increasing with a global burden of 300 million people of whom a tenth live in India and 3% to 38% is children [1]. It is characterized by increased airway inflammation, airway hyper responsiveness and airflow obstruction in response to specific triggers leading to repeated episodes of wheezing, dyspnea, a feeling of tightness in the chest and cough. Various etiological factors such as atmospheric pollution, dietary changes, allergens and lifestyle changes may be responsible for the rising prevalence of asthma [1-4]. The rising prevalence of asthma and other allergic diseases has been accompanied by a rising prevalence in the deficiency of the fat-soluble Vitamin D. While the classical actions of Vitamin D regulate calcium absorption and neuromuscular function, the immune system regulator function plays a role in the pathogenesis of a wide range of pulmonary diseases including asthma. The present study seeks to determine the difference in serum levels of Vitamin-D in asthmatic children and controls and to determine the association between vitamin-D and asthma in children. A cross sectional study was conducted in our institute with the approval of the ethical committee. The study subjects were 88 in number aged between five and thirteen years. About 44 were healthy controls and 44 were diagnosed as asthmatic by clinical evaluation as per GINA guidelines. Data was collected on demographic variables (age, gender, height, weight, place of residence) and details of daily sun exposure during effective period (10 am to 3 pm) and its average duration in hours per day during the last one-month. Serum levels of 25 hydroxycholecalciferol, calcium, and phosphorus were assessed by colorimetry. Study subjects were categorized based on their vitamin D levels as severely deficient (≤ 5 ng/mL), deficient (≤ 15 ng/mL), insufficient (>15 ng/mL to <20 ng/mL) and sufficient (≥ 20 ng/mL to 100 ng/mL). FEV1, FEV1/FVC were assessed by spirometry (as per ATS guidelines). The results of this study were analyzed and presented as numbers, percentage or mean ± Standard Deviation (SD). Student t-test, Analysis of Variance (ANOVA) and Chi-square were used for comparison between groups. The correlations were analyzed by Pearson correlation coefficients. A p-value less than 0.05 were considered to be significant for statistical hypothesis. Serum Vitamin-D levels was significantly lower in asthmatic children (12.88 ± 1.79 ng/mL) than in control group (16.49 ± 1.13 ng/mL). Vitamin-D levels had a significant positive correlation with FEV1% and FEV1/FVC%. This finding agrees with that of other studies who reported that in patients with asthma, higher serum 25(OH) D concentrations were associated with higher FEV1% [5,6]. Hypovitaminosis D is associated with increased asthma severity, Emergency Department (ED) visit, and impaired pulmonary function in asthmatic patients [7]. Vitamin D deficiency is believed to contribute to asthma pathogenesis by promoting steroid resistance, AHR and airway remodeling. A recent meta-analysis study indicated that vitamin D deficiency and insufficiency were associated with an increased risk of childhood asthma. Vitamin D deficiency was noted in 68.18% of the asthmatic children and the remainder had insufficient vitamin D levels. No subject had sufficient levels of vitamin D. Indian children are increasingly predisposed to vitamin-D deficiency as they are entirely breast fed or not exposed to sunlight for prolonged periods and the lack of food fortified with vitamin-D [8,9]. An Indian is also likely to require three times as much UV-B exposure as a light-skinned person to achieve equivalent vitamin-D concentrations [10]. The pathogenic mechanism suggests that vitamin D deficiency leads to a pro-inflammatory state in response to inhalational insults with up-regulation of inflammatory cytokines, humoral and cellular factors such as CD-4 cells and macrophages [11,12]. This contributes to airway remodeling/adaptation, the hallmark of asthma. Vitamin D deficiency was also found to intensify oxidative stress, evidenced by increased Reactive Oxygen Species (ROS) and DNA damage, in Peripheral Blood Mononuclear Cells (PMBCs) obtained from patients with severe asthma. This was associated with lower FEV1 compared to vitamin D sufficient patients. Oxidative stress promotes airway inflammation by inducing the activation of pro-inflammatory genes which result in the release of mediators that enhance airway hyper responsiveness, ultimately leading to reduced lung function and increased disease severity. It is clear that vitamin D plays a role

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in airway diseases like asthma since lower levels are often associated with more severe disease presentation and supplementation tends to improve these outcomes. More research is, however, needed to conclusively determine if vitamin D supplementation as an adjunct therapy is a viable option for asthmatic patients.

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