TAJ June 2014; Volume 27 Number-1
Published on 2016

ISSN 1019-8555
The Journal of
Teachers Association
RMC, Rajshahi

Original Article

Effect of Vitamin A on Lung Function Test in patient with Chronic Bronchial Asthma

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Abstract

In chronic bronchial asthma inflammation may be accompanied by intensive air flow limitation. Endogenous oxidants produced by overactive inflammatory cells destroy airway epithelium which slough into bronchial lumen and thus aggravates asthma. When oxidant overwhelm anti-oxidants, tissue injury and disease results. It is observed that decrease level of anti-oxidants in the lungs is a feature of chronic bronchial asthma and that there is a marked decrease of these levels during acute asthmatic attacks. These observations highlight the positive correlation between anti-oxidant therapy in asthmatic patients.

The study was carried out to observe the changes in lung function in patients with chronic bronchial asthma both before and after supplementation of anti-oxidant vitamin A.

Pulmonary function variables such as FVE, FEV1, FEV1/FVC%and PEFR were measured by spirometer in patients with chronic bronchial asthma both before and three month after supplementation of vitamin A 10,000 I.U orally daily. The mean FVC, FEV1, FEV1/FVC% and PEFR following vitamin A was unchanged significantly (P<0.001) than the pre supplementation values in patients with chronic bronchial asthma.

This study reveals that no improvement of pulmonary functions occur after supplementation of anti-oxidant vitamin A in chronic bronchial asthma patients.

TAJ 2014; 27: No-1: 10-13

Introduction

Respiratory disease is a major cause of death and disability in many countries.The etiology of most of non-infectious lung disease remains elusive despite a major increase in research on the respiratory system.[1] Morbidity and mortality of chronic bronchial asthma are increasing but its fundamental cause is still unknown despite intensive research. In chronic asthma inflammation may be accompanied by intensive air flow limitation.[2]

There are evidence that endogenous oxidants produced by overactive inflammatory cells destroy airway epithelium which slough into bronchial lumen and thus aggravates asthma.[3] Free radicals are always being produced in our body. However, body operates several mechanisms for termination of these free radical, which are injurious to the body. Anti-oxidants neutralizing free radicals and acting part of protective mechanism.[4]

Anti-oxidants may delay or prevent direct oxidation of oxidizeable substrates or scavenge

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oxidant free radicals and neutralize the Physiologic oxidant burden created by both exogenous and endogenous free radicals. They either block the initiation of free radical formation of inactivate (scavenge) free radicals and minimize radical induce damage. Anti-oxidants are lipid Soluble vitamin E & A, ascorbic acid, and glutathione in cytosol. Thus good antioxidant status of the body is necessary to prevent ourselves from free radical mediated tissue injury.[5]

Acute asthmatic attacks impair the anti-oxidant defense system. When oxidant overwhelm anti-oxidants, tissue injury and disease results. Erzurum (2000) observed that decrease level of anti-oxidants in the lungs is a feature of chronic bronchial asthma and that there is a marked decrease of these levels during acute asthmatic attacks. These observations highlight the positive correlation between anti-oxidant therapy in asthmatic patients. They documented that decline in the concentration of anti-oxidants super oxide dismutase and glutathione in lung fluid from asthmatic patients ten minutes after exposure to grass or ragweed allergens.[6]

Some researcher have studied lung function after supplementation of antioxidants vitamins and observed improvement of lung function following such supplementation. Very few research have been done in our country and a little published data are available about the effect of anti-oxidant vitamin A on lung function test in chronic asthmatic patients. Aim and Objectives

To study of lung function test in chronic asthmatic patients before and after supplementation of vitamin A.

Material and Methods

The study has been design to observe the lung function in patients with chronic bronchial asthma both before and three month after supplementation of vitamin A. Chronic bronchial asthma patients were selected from the Asthma centre of Rajshahi medical College Hospital. Total number of 60 apparently healthy male suffering from chronic bronchial asthma, age range from 20 to 45 years were randomly selected for the Study. Patients

having and co-existing disease were excluded from the study. All patients randomly divided in to study group consist of 30 patients Group-A, subdivided in to Group-A_1 (before supplementation of vitamin A), Group-A_2 (after Supplementation of oral vitamin A 10,000 IU daily for three months) and control group consist of 30 patients Group-B again subdivided in to Group-B_1 (before supplementation of vitamin A) Group-B_2(after supplementation of placebo), Pulmonary function variables such as FVC, FEV1, FEV1/FVC% and PEFR were measured by spirometer on standing position of all group of patients.

Results

Table 1. Measured and predicted value of FVC with percent deviation before and after supplementation with vitamin A.

Group	Measured value (L) Mean± SE	Predicted value (L) Mean ± SE	Percent deviation from predicted value (%)
Group-A n=30			
A_1	2.46 ± 0.11	4.38 ± 0.06	-43
A_2	2.46 ± 0.11	4.38 ± 0.06	-43
Group-B n=30			
B_1	2.30 ± 0.33	4.49 ± 0.08	-48
B_2	2.30 ± 0.37	4.49 ± 0.08	-38

Percentage deviation of FVC from predictive value in group B before supplementation was 48% less, Which after supplementation came down to 38% less from predicted value.

Table II. Measured and predicted value of FEV_1 before and after supplementation with vitamin A.

Group	Measured value (L) Mean± SE	Predicted value (L) Mean ± SE	Percent deviation from predicted value (%)
Group-A n=30			
A_1	1.46 ± 0.09	3.70 ± 0.05	-60
A_2	1.46 ± 0.09	3.70 ± 0.05	-60
Group-B n=30			
B_1	1.46 ± 0.04	3.72 ± 0.05	-64
B_2	1.46 ± 0.05	3.72 ± 0.05	-52

The mean measured value of group B1 (before supplementation) was 1.46 ± 0.08, which was 1.46 ± 0.06 after supplementation, percentage deviation of FEV_1 from predicted value in Group B_2 before supplementation was 66% less, which after

supplementation came down to 52% less from predicted value.

Table III. Measured and predicted value of FEV_1/FVC% with percent deviation from predicted values before and after supplementation with vitamin A.

Group	Measured value (L) Mean± SE	Predicted value (L) Mean ± SE	Percent deviation from predicted value (%)
Group-A n=30			
A_1	59 ± 0.01	84 ± 0.25	-30
A_2	59 ± 0.01	84 ± 0.25	-30
Group-B n=30			
B_1	63 ± 0.7	83 ± 0.18	-24
B_2	63 ± 0.8	83 ± 0.18	-24

The mean measured value of group B_1 (before supplementation) was 63%, which was 63% after supplementation. Percentage deviation of FEV_1/FVC% from predicted value in Group B_2 before supplementation was 22% less, which after supplementation came down to 19% less from predicted value.

Table IV. Measured and predicted value of PEER before and after supplementation with vitamin A.

Group	Measured value (L) Mean± SE	Predicted value (L) Mean ± SE	Percent deviation from predicted value (%)
Group-A n=30			
A_1	285 ± 16.72	604 ± 2.49	-52
A_2	287 ± 16.98	604 ± 2.49	-52
Group-B n=30			
B_1	242 ± 8.70	613 ± 3.14	-60
B_2	259 ± 8.70	613 ± 3.14	-58

The mean measured value of group B1 (before supplementation) was 242 ± 17.19, which increased to 259 ± 8.24 after supplementation.

Percentage deviation of PEER from predicted value in Group B_2 before supplementation was 60% less, which after supplementation came down to 58% less from predicted value.

Discussion

Present study has been done to observe the changes in lung function among patients with chronic bronchial asthma, both before and three months after supplementation of vitamin A. lung functions were assessed by measuring FVC, FEV_1, FEV_1/FVC% and PEER (Crompton GK, 1999) Spiro (1991) reported that the pulmonary variables such as FVC,FEV_1, FEV_1/FVC% and PEER in patients with chronic bronchial asthma are always lower in comparison to healthy subjects.[8]

When subjects in our study were supplemented with vit-A, no significant change in mean FVC,FEV_1 FEV_1, /FVC% & PEFR were obseved. Though mean PEFR in this group was slightly increased following vit-A supplementation, the change was not statistically significant (P=0.485). No significant change of the above parameter was seen after vit-A supplementation when compared to control subjects measured at the end of the study. Vitamin A is not supposed to have any anti-oxidant property. Rather ß- carotene (pro-vit A) has anti-oxidant property. Our findings coincide with the findings of McKeever (2002,P.1299) but not with the findings of the cornell (2004,P.2004) where he observed an inverse relationship between prevalence of asthma and serum beta-carotene level.

C. Bodner (199, p.22) also found significant correlation between the amount of dietary intake of anti-oxidant vitamins and their plasma levels. Dietary intake values were significantly correlated with plasma level for vitamin C (r=0.42,P<0.001), vitamin E (r=0.34, P<0.001 and ß-carotene (r=0.26,P,<0.01) but not for vitamin A. Findings of these studies explain why no improvement of lung function occurred in our study subjects who were supplemented only with-vitamin A.

Conclusion

The lower pulmonary volume and capacities in asthmatic subjects of the present study were most likely due to bronchoconstriction by air pollutants as most subjects of this study were from urban area, where pollution is supposed to higher than that of rural area. No improvement of pulmonary function values were significantly increase after supplementation of vitamin A.

Present study reveals that lower pulmonary functions occurs in patients with chronic bronchial asthma and no improvement of these lower

pulmonary functions occur after supplementation of anti-oxidant vitamin A.

Limitation of this is the small sample size and study was done in only northern part of Bangladesh, so it is difficult to draw a definite conclusion. Further study to be done in different areas with large sample size and follow up study with other anti-oxidant vitamin for long duration.

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