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

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Abstract

Background: Decreased antioxidant levels in the lungs is a feature of chronic bronchial asthma. Anti-oxidant therapy positively correlates with lung function in asthmatic patients. **Objective:** To observe the changes of lung function in patients with chronic bronchial asthma both before and after supplementation of vitamin A. **Methods:** This was a randomized controlled trial carried out in the department of physiology, Rajshahi Medical College, Rajshahi. Adult patients suffering from chronic bronchial asthma were the reference population. Sixty experimental subjects aged 20 to 45years were selected from the Asthma center of Rajshahi Medical College Hospital by necessary inclusion and exclusion criteria. They were divided into two equal groups, study and control by randomization. Pulmonary function parameters such as FVC, FEV1, FEV1/FVC% and PEFR were measured before and three month after supplementation of vitamin A in study subjects and placebo in controls. Paired t-test was applied to observe the difference of lung function parameters between pre and post intervention of the two groups. **Results:** The mean FVC, FEV1, FEV1/FVC% and PEFR following vitamin A were not changed significantly than the pre supplementation values in patients with chronic bronchial asthma. **Conclusion:** No significant improvement of pulmonary functions occur after supplementation of vitamin A in chronic bronchial asthma patients.

Key words: antioxidant, Pulmonary function, chronic bronchial asthma

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 evidences that endogenous oxidants produced by hypersensitive 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. Antioxidants neutralize free radicals and participate in protective mechanism.[3]

Antioxidants and vitamin A may delay or prevent direct oxidation of oxidizeable substrates or scavenge 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. Thus good antioxidant status of vitamin E, ascorbic acid, glutathions and vitamin A of the body is necessary to prevent ourselves from free radical mediated tissue injury.[4]

Acute asthmatic attacks impair the anti-oxidant defense system. When oxidant overwhelm anti-oxidants, tissue injury and disease results. Decreased 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 antioxidants super oxide dismutase and glutathione in lung fluid from asthmatic patients ten minutes after exposure to grass or ragweed allergens.[5]

Some researcher have studied lung function after supplementation of antioxidant 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 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.

Inclusions criteria

Established cases of male patients with chronic bronchial asthma were taken.

Exclusions criteria

Subject suffering from pulmonary tuberculosis, bronchial neoplasm, heart failure, diabetes mellitus and renal failure were excluded from the study.

Materials and Methods

This randomized controlled trial has been designed to observed the effect of vitamin A supplementation among the patients with chronic bronchial asthma in the department of physiology of Rajshahi Medical College between the period of July2003 to June 2004.The protocol of this study was approved by Institutional Review Board (IRB) and Ethical Review committee (ERC) of Rajshahi Medical College.

Sixty apparently healthy males suffering from chronic bronchial asthma aged 20 to 45years were selected from the Asthma center of Rajshahi Medical College Hospital with their consent after explanation in details the aim, objectives. benefit, risk and procedure of the study to them considering all inclusion and exclusion criteria. The 60 study subjects were divided into two groups, study and control groups by randomization. The study and control groups were supplemented with oral vitamin A 10,000 IU (Cap. Retenol forte, Drug International Ltd. Bangladesh) and placebo once daily for 3 months respectively.

Complete history taking and physical examination of both the groups were done and record in a preformed date sheet before and after the intervention. Pulmonary function parameters such as FVC, FEV_1, FEV, /FVC % and PEFR were measured by digital spirometer on standing position of all patients of both the groups. Collected data ware analyzed in computer by using SPSS version 16.0. Paired t-test was applied to observe the difference of lung function parameters between pre and post intervention of the two groups.

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			
BS (A_1)	2.46 ± 0.11	4.38 ± 0.06	-43
AS (A_2)	2.46 ± 0.11	4.38 ± 0.06	-43
P value	>0.05	>0.05	
Group-B n=30			
BS (B_1)	2.30 ± 0.33	4.49 ± 0.08	-48
AS (B_2)	2.30 ± 0.37	4.49 ± 0.08	-38
P value	>0.05	>0.05	

BF = Before supplementation, AF = After supplementation

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 1).

Table 2. 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			
BS (A_1)	1.46 ± 0.09	3.70 ± 0.05	-60
AS (A_2)	1.46 ± 0.09	3.70 ± 0.05	-60
P value	>0.05	>0.05	
Group-B n=30			
BS (B_1)	1.46 ± 0.04	3.72 ± 0.05	-64
AS (B_2)	1.46 ± 0.05	3.72 ± 0.05	-52
P value	>0.05	>0.05	

BF = Before supplementation, AF = After supplementation

The mean measured value of group B (before supplementation) was 1.46 ± 0.04, which was 1.46 ± 0.05 after supplementation, percentage deviation of FEV_1 from predicted value in Group B before supplementation was 64% less, which after supplementation came down to 52% less from predicted value (Table 2).

Table 3. 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			
BS (A_1)	59 ± 0.01	84 ± 0.25	-30
AS (A_2)	59 ± 0.01	84 ± 0.25	-30
P value	>0.05	>0.05	
Group-B n=30			
BS (B_1)	63 ± 0.7	83 ± 0.18	-22
AS (B_2)	63 ± 0.8	83 ± 0.18	-19
P value	>0.05	>0.05	

BF = Before supplementation, AF = After supplementation

The mean measured value of group B (before supplementation) was 63%, which was 63% after supplementation. Percentage deviation of FEV_1/FVC% from predicted value in Group B before supplementation was 22% less, which after supplementation came down to 19% less from predicted value (Table 3).

Table 4. 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			
BS (A_1)	285 ± 16.72	604 ± 2.49	-52
AS (A_2)	287 ± 16.98	604 ± 2.49	-52
P value	>0.05	>0.05	
Group-B n=30			
BS (B_1)	242 ± 17.19	613 ± 3.14	-60
AS (B_2)	259 ± 8.24	613 ± 3.14	-58
P value	>0.05	>0.05	

BF = Before supplementation, AF = After supplementation

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

Percentage deviation of PEER from predicted value in Group B before supplementation was 60% less, which after supplementation came down to 58% less from predicted value (Table 4).

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. Previous studies reported that the pulmonary function parameters such as FVC, FEV_1, FEV_1/FVC% and PEER in patients with chronic bronchial asthma are always lower in comparison to healthy subjects.[6,7]

When subjects in this 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. 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. It is consistent with the findings of McKeever et al.[8]

C.Bodner *et. al.* (1999)[9] also found significant correlation between the amount of dietary intake of antioxidant 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_s<0.01) but not for vitamin A. Findings of this study explain why no improvement of lung function occurred in this study subjects who were supplemented only with-vitamin A.

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. So improvement of pulmonary function values were not 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 vitamin A.

Limitation of this study 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 antioxidants and vitamin for long duration.

References

1. Menzel DB. Antioxidant in lung Disease, Deprtment of Community and Environmental Medicine, University of California lvine, College of Medicine, Irvine, California, 1998; 323-36.
2. Holgate ST, Frew A. Respiratory Disease. In: Parveen K, Michael C, editors. Kumar & Clark Clinical Medicine, 5th edition. Edinburgh London: Saunders, 2002; 874.
3. Hatch GE. U.S. Environmental Protection Agency, Asthma, Inhaled oxidant and antioxidants. American Journal of Clinical Nutrition 1995; 61(suppl): 625s-30s.
4. Chaudhury Sk. Concise Medical Physiology 4th edition New Central Book Agancy (P) Ltd. Calcatta, 2002; 349.
5. Kumar V, Abbas AK, Fausto N (editors): Robbins and Corton Pathologic Basis of Disease 7th edition Saunders. Thomas Press India Ltd. 2004;17.
6. Crompton GK, Haslett C, Chilvers ER. Disease of the respiratory system. In; Haslett C et al. (editors): Davidson's Proncipal and Practice of Medicine. 18th edition Churchill Livingstone, Edinburgh London New York 1999;326-34.
7. Spiro SG, Roberts GM. Lung function test. Medicine International 1991;4(14):3661-8.
8. McKeever TM, Scrivener S, Broadfield E, Jones j, Britton j, Lewis SA. American journal of Respiratory and Critical care Medicine 2002;165(9): 1299-1303.
9. C Bodner, D Godden, K Brown et al. Antioxidant intake and adult-onset wheeze: a case–control study. Aberdeen WHEASE Study Group. Eur Respir J, 13 (1999), 22–30