BRONCHIAL ASThma;
DURATION OF ASThmA IS NOT CORRELATED WITH TOTAL ANti OXIDANT CAPACITY AND LUNG FUNCTION PARAMETERS

Dr Syed Hafeezul Hassan¹, Dr Javeria Rehman², Dr Ahsan Ashfaq³

ABSTRACT... Asthma is a chronic inflammatory disorder of the airways, which is associated with excessive airway narrowing in response to stimuli that have little or no effect on healthy subjects. Airway hyper-responsiveness with a short duration of asthma is coupled with airway inflammation which may or may not be associated with lung impairment. Objectives: To study correlation of asthma duration with total antioxidant capacity and lung function parameters. Design: Cross sectional study. Period: June 2013 to Dec 2013. Setting: Baqai Medical University and Hospital. Methodology: A total of 92 known and diagnosed cases of asthma meeting the inclusion criteria were recruited in the study. The subjects included both male and female with age ranging from 16-70 years. Portable handheld electronic Spirometer was used for performing spirometry. FRAP assay was done to measure TAC according to the method of Benzie and Strai. Results: The mean age of patients (n-92) was 34.88±12.14 SD. The mean duration of asthma was 11.57 ± 11.30 SD years. Mean value of TAC was found to be 11.46 ± 4.34SD. Mean FEV₁ was 1.90±0.82SD, mean FVC was 2.17±0.88 SD, mean PEFR was 247.8±122.7 SD and mean FEV₁/FVC was 86.21±16.58 SD. Paired sample t – test was applied to compare the spirometric values which were found highly significant. Pearson correlation was applied and showed negative but insignificant correlation of asthma duration with patients’ FEV1, FEV1/FVC and PEFR as well as insignificant correlation with other spirometric parameters and TAC. Conclusion: Our study showed that duration of asthma has no significant correlation with lung function parameters and antioxidant capacity.

Key words: asthma duration, TAC, lung function parameters.

INTRODUCTION
Asthma is characterized by chronic inflammation of the airways, associated with excessive narrowing and airway hyper responsiveness (AHR) to a stimulus that has little or no effect on otherwise healthy subjects.¹ This particular pattern of airway inflammation induces airway smooth muscle (ASM) hypertrophy as well as hyperplasia due to its increased sensitivity to bronchoconstrictor stimuli along with increased production and secretion of mucous.² Recurrent episodes of breathlessness, cough and wheeze especially at night and in early morning are the major symptoms of AHR.³ These symptoms are usually associated with increased obstruction to airflow within the lung but with treatment can be reversible.⁴

Asthma is usually diagnosed on the basis of its typical symptoms. The reversal in the abnormali-
um in patients with asthma is meant to be restored by antioxidants that are lower in asthmatics.7

The exact and actual assessment of oxidative stress is still considered as a problem by the investigators involved in determining the role of free radical damage in disease. Low total antioxidant capacity could be a sign of oxidative stress, thereby paring the cell vulnerable to oxidative damage. The idea of one such investigation that might reveal total antioxidant capacity (TAC) is appreciated.8 Due to interactions that occur in vivo among different antioxidant compounds, the protective efficiency of blood cannot be reflected by any one component of antioxidant complex. Total antioxidant capacity (TAC) considers the cumulative effect of all antioxidants present in blood and body fluids and can, therefore, reflect the accurate antioxidant capacity.9,10

Asthma duration is associated with lower lung function, increased asthma symptoms and amplified use of as-needed bronchodilators. These are all measures of asthma severity. It was shown that associations between asthma duration and the spirometric measurements were stronger before as compared to after bronchodilator use.11 Airway hyper-responsiveness with a shorter duration of asthma is coupled with airway inflammation which may or may not be associated with lung impairment, whereas with a longer duration, it is suggested to be associated with impaired lung function.12 Therefore it was proposed to study the correlation of asthma duration with the lung function parameters and TAC in a set of patients from local population.

MATERIALS AND METHODS
A total of 92 cases of both genders with age range between 16-70 years who presented as known asthmatics with dyspnoea or subsequently diagnosed on spirometry, without any co-morbidity, were evaluated and included in the study. Other causes of dyspnoea including cardiac failure, pulmonary fibrosis, anemia, pleural effusion, pneumonia, pneumothorax, and patients with functional cause were excluded from the study based on history, clinical examination and relevant investigations such as complete blood count, arterial blood gases, blood urea nitrogen, electrocardiogram, chest x-ray.

MATERIALS
Portable handheld electronic Spirometer was used for performing spirometry. 5 ml of blood was drawn and transferred in heparin tube, mixed and centrifuged and frozen at -20 Celsius for estimation of total antioxidant capacity. FRAP assay was done to measure TAC according to the method of Benzie and Strain.

Statistical analysis was done by using SPSS 21. Descriptive values were analyzed for mean and standard deviations and Pearson correlation was applied to determine the effect of duration of asthma on outcomes assessed by spirometry and measurement of TAC. P value of <0.05 was considered significant.

RESULTS
The mean age of patients (N-92) was 34.88±12.14 SD. The mean duration of asthma was 11.57 ± 11.30 SD years. All patients (N=92) were analyzed for TAC that was found to be ranging from 6.40 to 24.80 m mol/dl with the mean value of 11.46 ± 4.34SD. (Table-I)

<table>
<thead>
<tr>
<th>Patient</th>
<th>Range</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(years)</td>
<td>16-67</td>
<td>34.88±12.14</td>
</tr>
<tr>
<td>Duration of asthma (years)</td>
<td>1-48</td>
<td>11.57±11.30</td>
</tr>
<tr>
<td>TAC (m mol/dl)</td>
<td>6.40-24.80</td>
<td>11.46±4.34</td>
</tr>
</tbody>
</table>

Table-I. Age, duration of asthma, TAC

Predicted Spirometric values were calculated for each individual using spirometry calculator. Mean predicted FEV1 was 3.01 ± 0.63 SD, mean predicted FVC was 3.54 ± 0.78 SD, mean predicted PEFR was 435.54 ± 79.75 SD and mean predicted FEV1/FVC was 81.69 ± 2.39 SD.

The patients were subjected to spirometry. Mean FEV1 was 1.90±0.82SD, mean FVC was 2.17±0.88 SD, mean PEFR was 247.8±122.7 SD and mean FEV1/FVC was 86.21±16.58 SD. Paired sample t – test was applied to compare the spirometric values which were found highly significant (Table-II)
Pearson correlation was applied and showed negative but insignificant correlation of asthma duration with patients’ FEV1, FEV1/FVC and PEFR as well as insignificant correlation with other spirometric parameters and TAC. (Table-III)

### Table-III. Pearson correlation of asthma duration with TAC and lung function parameters

<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlation coefficient (r)</th>
<th>P-value (&lt;0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAC (m mol/dl)</td>
<td>0.125</td>
<td>0.233</td>
</tr>
<tr>
<td>FEV1 (L)</td>
<td>-0.005</td>
<td>0.961</td>
</tr>
<tr>
<td>FVC (L)</td>
<td>0.027</td>
<td>0.800</td>
</tr>
<tr>
<td>FEV1/FVC (%)</td>
<td>-0.063</td>
<td>0.550</td>
</tr>
<tr>
<td>PEFR (L/m)</td>
<td>-0.090</td>
<td>0.393</td>
</tr>
</tbody>
</table>

DISCUSSIONS

Asthma is a chronic disorder that has no permanent cure. Spirometry is the gold standard in diagnosis and management of asthma.

Air-way injury and repair is a major feature of chronic inflammation occurring in asthma and is proposed to be the main target of asthma treatments. The remodeling process is also affected by the treatment particularly if prescribed in therapeutic doses and for a sufficient duration of time. In our study the possible explanation for duration not significantly affecting the oxidative stress and lung function is the implication of recent and advance treatment modalities directed towards asthma control in patients with spirometry proven mild to moderate asthma.

In contrast to our study, a considerable association between alterations in pulmonary function and the duration of asthma was suggested by some studies. Furthermore, the patients with asthma of short duration were able to achieve normal airflow after bronchodilator administration as compared to those elderly subjects with longstanding asthma. Also study by Cassino et al confirms and extends previous observations suggesting that distal airways or parenchymal remodeling are involved in irreversible airway changes caused by longstanding asthma. It also

According to Taylor et al the achievement of control of the disease manifestation and its progression usually affects the treatment decisions. Similarly, the extent to which the manifestations of asthma have been removed or reduced with treatment is referred as “Asthma control”. The status of current clinical control as well as potential risk assessment is the main determinant of disease progression and patient’s assessment. In our study the possible explanation for duration not significantly affecting the oxidative stress and lung function is the implication of recent and advance treatment modalities directed towards asthma control in patients with spirometry proven mild to moderate asthma.
suggested that the severe alterations in pulmonary function may become irreversible with long-term asthma. A number of cross-sectional studies have shown association between duration of asthma with poor levels of lung function. Some other workers found that reduced lung function may be associated with childhood asthma, and decline in lung function may also develop in adult asthmatics during their life. In agreement to our observation yet another study suggested that in asthma ASM layer thickness is increased and is related to the severity of the disease but not its duration.

Jenkins and Henry in their study showed that the specific airway conductance (sGaw) percent predicted, FEV₁ percent predicted and FEV₁/FVC ratio are the measures of association between duration of asthma and airflow limitation. Several parameters of disease severity are associated with duration of disease in adults with childhood-onset asthma. sGaw, FEV₁, and FEV₁/FVC ratio were specifically found to be inversely proportional to asthma duration. Hence for children and adults with childhood onset asthma, the duration of asthma remained considerably associated with changes in lung function. This was in contradiction to our study. However, the same study suggested that at the time or very soon after the preliminary diagnosis of asthma is made, significant compromise in lung function occurred in patients with onset of asthma in adult hood. It also stated that adults with childhood-onset asthma, who have the longest duration of asthma, did not display the greatest impairment in lung function suggesting that disease duration should not be an important contributor to disease severity in all adults with asthma. Our study results are consistent with this study to an extent that in adults the duration of asthma is associated inversely with FEV₁/FVC and PEFR but is not significant. This observation is in agreement with Burrows et al who stated a decline in lung function, soon after the diagnosis, is demonstrated in patients with adult-onset asthma which is later followed by comparatively stable lung function with subsequent treatment.

**CONCLUSIONS**

In our study it was found that duration of asthma has no significant correlation with lung function parameters and total antioxidant capacity.

**REFERENCES**


11. Relationships between duration of asthma and asthma severity among children in the Childhood Asthma Management Program (CAMP)Zeiger, Robert S. et al. Journal of Allergy and Clinical Immunology, Volume
103, Issue 3, 376-386.


---

**AUTHORSHIP AND CONTRIBUTION DECLARATION**

<table>
<thead>
<tr>
<th>Sr. #</th>
<th>Author(s) Full Name</th>
<th>Contribution to the paper</th>
<th>Author(s) Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Syed Hafeezul Hassan</td>
<td>Principal author</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Javeria Rehman</td>
<td>Data analysis, Interpretation and manuscript writing</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ahsan Ashfaq</td>
<td>Proof reading and manuscript writing</td>
<td></td>
</tr>
</tbody>
</table>