SUMMARY AND CONCLUSIONS

Gastroesophageal reflux disease (GERD) is commonly associated with asthma, but there is little or no information on the nature of any associated airway inflammation. The results of the medical antireflux therapy in BA with GERD studies appear to be conflicting.

This work was planned to:

1) This study was undertaken to determine the prevalence of esophageal motor abnormalities.
2) The incidence of gastroesophageal reflux, and the coexistence of gastro esophageal with esophageal dysmotility in patients with asthma.
3) The relationship between gastroesophageal reflux and bronchial hyperresponsiveness and to investigate the effects of antireflux treatment on bronchial hyperresponsiveness and lung function in asthmatic patients with gastroesophageal reflux disease (GERD).

This study was performed on 200 subjects divided into the following groups:

1- 60 asthmatic patients only with mean age 46.40 ± 12.53.
2- 40 patients diagnosed as bronchial asthma with GERD mean age 39.40 ± 9.83.
3- 64 patients diagnosed as gastroesophageal reflux disease mean age 35.96 ± 8.46.
4- 36 patients with GERD with bronchial hyperresponsiveness mean age 40.10 ± 6.69.

Study subjects were both age- and sex-matched.

All patients of bronchial asthma and GERD were subjected to the following:

Clinical assessment including: thorough history taking, upper gastrointestinal symptoms evaluation and physical examination. Pulmonary function testing chest x-ray, ECG and ultrasonography on abdomen were done.

Laboratory investigations include: urine and stool analysis, complete blood count, Liver and kidney function tests, fasting and postprandial blood sugar.

Specific tests that my help to establish the association between asthma and GERD, i.e., upper GIT endoscope, esophageal manometry and methachaline bronchial challenge tests (provocation test).

Results:

There is no statistically significant difference in mean age, sex, residence and smoking according to study groups.

There is highly significant difference between the different study groups as regard to heartburn, regurgitation, dysphagia and relation to meals.

There are highly significant differences between the four study groups as regard wheeze**,** cough, dyspnea and nocturnal asthma**.**

BA group comprised 36 (60%) intermittent asthmatic patients, 14 (23.3%) mild persistent asthmatic patients and 10 (16.7%) moderate persistent asthmatic patients. While BA with GERD group comprised 20 (50%) intermittent asthmatic patients, 15 (37.5%) mild persistent asthmatic patients, 5 (12.5%) moderate persistent asthmatic patients. Difference

between these two groups as regard classification of asthma severity by clinical and functional features is not statistically significant.

Gastrosopic grading of esophagitis in the different study groups, there is highly statistically significant difference as regard gastroscopic grading of esophagitis in the different study groups.

In the manometry study of esophagus in different study groups, there are high significant differences regarding LESP, while there are no significant differences as regard percent of relaxation, UES pressure and uncoordinated movements of body of esophagus. Before conducting this work, 55 (91.7%) of BA patients received xanthenes treatment and 5 (8.3%) of patients did not receive it. While 37 (92.5%) patients of BA with GERD group were receiving xanthenes treatment and 3 (7.5%) patients did not receive it. While there were 50 (83.3%)of BA patients received B2-agonist treatment and10 (16.7%) patients did not receive it. In other hand, 36 (90%) patients of BA+GERD group were receiving B2-agonist, while 4 (10%) patients did not receive it. Also there were 45 (75%) of asthmatic patients received oral corticosteroids treatment and15 (25%) patients did not receive it. While 23 (57.5%) of patients of BA with GERD group received oral corticosteroids, and 17 (42.5%) patients did not receive it. There is no statistically significant difference between the two study groups (P>0.05).

***Predictors of asthma improvement were as follows*:**

There are improvement in 32 patients (80%), those had more than 20% increase in FEV1, While there are 8 patients (20%) did not improve (increase in FEV1 < 20 %).

In BA with GERD patients, there are significantly improvement of respiratory symptoms (wheeze, dyspnea, cough, and nocturnal asthma) after treatment of GERD by PPIs (omeprazole 20 mg b.i.d.) for 3- months .

All components of pulmonary function tests of air flow improved significantly i.e., FEV_1, FEV_1%, FVC, FEV_I/FVC.

There is statistically significant improvement regarding GERD symptoms as heart burn, regurgitation dysphagia, relation to meals and Gastroscoping grading of esophagitis.

In the manometry study of esophagus in BA with GERD group, there are high significant predictors of improvement regarding LESP, percent relaxation, UES pressure and uncoordinated movements of body of esophagus.

Predictors of GERD with bronchial hyperresponsiveness improvement were as follows:

After GERD treatment by PPI for 3 months in GERD with bronchial hyperreactivity group, there are 20 (56%) patients improved (the methacholine concentration that caused a 20% fall in the FEV1 became more than 8 mg/ml), while 16 (44%) patients did not improve (PC20) methacholine are still equal to or less than 8 mg/ml.

There is statistically significant difference between before treatment of GERD in bronchial hyperresponsiveness patients (+ ve provocation test) and after treatment of these patients ($P < 0.05$).

There is statistically significant improvement regarding GERD symptoms as heart burn, regurgitation, dysphagia, relation to meals and gastroscoping grading of esophagitis

The percent relaxation and UES pressure showed significantly differences between improved and non improved patients in the GERD with BHR group). On the other hand, LESP and Uncoordinated movements are not statistically significant in both groups.

In GERD with bronchial hyperresponsiveness patients, there is significantly improvement of respiratory symptoms (wheeze, dyspnea, cough, and nocturnal asthma) after treatment of GERD by PPIs (omeprazole 20 mg b.I.d.) for 3 months ($P < 0.05$).

There are significantly improvements of pulmonary function tests of airflow limitations after treatment of GERD by PPIs (omeprazole 20 mg b.i.d.) for 3 months, i.e., FEV_1, FEV_I%, FVC and FEV_1/FVC ($P< 0.05$).

Conclusions:

- Asthma symptoms (e.g., cough, dyspnea, or wheezing) may be noticed and its relation to reflux episodes. A positive relation between both documents GERD as a trigger factor in asthma.
- Gastroscopy is a helpful tool for diagnosis in addition to grading of esophagitis in GERD patients.
- GERD cannot be ruled out as a cause for some respiratory symptoms (cough and dyspnea).
- Potential mechanisms, whereby asthma may predispose to development of GER, may include:

a) Premeditation (systemic B2 agonist, thiophylline and corticosteroid treatment).

b) Alterations in crural diaphragm function (during hyper inflation).

c) A high prevalence of hiatal hernia.

d) Vagal reflex affects airflow and airway resistance.

e) Vagal reflex increases minute ventilation leading to dyspnea.

f) Autonomic dysregulation could result in decreased LES pressure and more frequent transient relaxations of the LES.

When asthma is associated with GERD, then adequate control of reflux for at least 3 months duration would improve asthma outcome (>20 % improvement of FEV1.) for most asthma patients, especially when significant predictors for improvement arc followed to increase the probability of improvement.

- Treatment with omeprazole 40 mg/day for 3 months significantly improves pulmonary function in BA with GERD patients. So, there is no paradox of asthma outcome when GERD is properly treated for sufficient time.

- Significant predictors of improvement in pulmonary functions in BA+GERD patients include: improve respiratory symptoms (sustained reduction in acute nocturnal exacerbations of wheezing, coughing, and dyspnea), decrease use of asthma medications, reduce requirement for systemic corticosteroids or improve pulmonary function (more than 20% increase in FEV_1) decreased frequency of asthma/day, increased % of lower esophageal sphincter relaxation, gastroscopic grading, and positive relation of nocturnal asthma with respiratory symptoms.

- Treatment with omeprazole 40 mg/day for 3 months significantly improves pulmonary functions and decrease bronchial hyper responsiveness in GERD with BHR patients.