

## ASSOCIATION OF GASTRO-ESOPHAGEAL REFLUX (GER) WITH BRONCHIAL ASTHMA

---

**K. Chopra  
S.K. Matta  
N. Madan  
Shobha Iyer**

### ABSTRACT

*Eighty children with bronchial asthma and ten control cases underwent radionuclide gastroesophagography for the detection of gastroesophageal reflux. Thirty nine per cent asthmatic children demonstrated esophageal reflux on scintiscanning. The ten control subjects had no reflux. The presence of reflux correlated strongly with the presence of nocturnal exacerbation of symptoms. Bronchodilator therapy did not affect the prevalence of GER in asthmatic children.*

**Keywords:** *Bronchial asthma, Gastroesophageal reflux.*

---

*From the Department of Pediatrics, Maulana Azad Medical College, New Delhi 110 002.*

*Reprint requests: Dr. K. Chopra, Director Professor, Department of Pediatrics, Maulana Azad Medical College, New Delhi 110 002.*

*Received for publication: August 11, 1994;*

*Accepted: December 2, 1994*

Gastro-esophageal reflux (GER) may be defined as a dysfunction of the distal esophagus causing frequent reflux of gastric contents into the esophagus(1). The esophageal dysfunction is more common in asthmatic children than in healthy subjects(2). The role of GER in pathogenesis of bronchial asthma is intriguing. Bronchial asthma itself can promote GER. The situation is further compounded by the observation that medications used in asthma may augment GER(3,4). Despite all these controversies, there are reports that medical and surgical treatment of GER may improve bronchial asthma significantly. The paucity of studies on this subject from India, especially in children, led to the present investigation. We evaluated the association of GER with bronchial asthma and its relation with nocturnal exacerbation of symptoms and the effect of bronchodilator therapy on GER.

### Material and Methods

Eighty children with bronchial asthma were studied. Their age ranged from 9 months to 12 years with a mean of 6.55 ( $\pm$  3.65) years. Bronchial asthma was defined as 3 or more episodes of reversible bronchospasm (*i.e.*, acute onset of wheezing and airway obstruction) that lessens after therapy(5). Subjects with evidence of pulmonary tuberculosis, emphysema or other known lung or heart disease were excluded. Asthmatic patients who came with an acute exacerbation were investigated 2 weeks after the acute phase of illness had subsided. The control group consisted of 10 asymptomatic, healthy children not taking any drug, drawn from the Out Patients after due consent. Their age varied from 9 months to 8 years with a mean of

4.5 ( $\pm$  2.16) years.

After overnight fasting, the subject was given 500 micro Curie of Tc-sulphur colloid mixed with milk or fruit juice through a naso-gastric tube which was then removed. A drink of water was given to clear radiotracer from the esophagus. The younger patients were sedated, if required, with promethazine administered orally (0.25 mg/kg), which does not promote GER(6). Then the patient was placed supine under the gamma camera with the stomach in the lower part of the field of view. Dynamic images were obtained at one frame per thirty seconds for forty five minutes. Scintiscan was taken as positive for gastroesophageal reflux when tracer was seen in esophagus in more than two frames. The test was taken as negative if no reflux of tracer was seen into the esophagus from the stomach(7).

## Results

Reflux of radiotracer into the esophagus was seen in thirty one (38.75%) asthmatic children. None of the controls showed evidence of reflux (*Table I*).

Twenty five patients had symptoms suggestive of GER in form of retrosternal pain (in older children), vomiting and exacerbation of symptoms on lying down or after meals. Of 31 scintiscan positive patients, fifteen (48.39%) patients had symptoms of GER while ten out of 49 (20.4%) scintiscan negative patients gave similar symptoms. The difference in scintiscan positivity between the two groups was significant (*Table II*).

Forty three patients gave history of nocturnal exacerbation of symptoms. Three fourths of GER positive patients

TABLE I—GER in Bronchial Asthma

Age Group (Yrs)	Number of patients	Scintiscan positive for GER (%)
< 4	27	12 (44.5)
4-8	27	11 (40.7)
8-12	26	8 (30.8)
	80	31 (38.8)

TABLE II—GER and Nocturnal Exacerbation

Category	Number of patients	GER symptoms (%)	Nocturnal exacerbation (%)
Positive scintiscan	31	15 (48.4)	23 (74.2)
Negative scintiscan	49	10 (20.4)	20 (40.8)

gave history of nocturnal exacerbation of symptoms while 40.8% of scintiscan negative patients also had nocturnal exacerbation. The difference in scintiscan positivity between the two groups was statistically significant ( $P < 0.05$ ).

Fifty eight patients were on drug therapy at the time of study. Forty eight patients were on theophylline derivatives, twenty four patients were also on P-agonists and twenty patients were on steroids. Forty per cent (23/58) of patients on bronchodilator therapy had positive scintiscan as compared to 36.4% (8/22) of patients not on drug therapy. The difference was not statistically significant ( $p > 0.05$ ). On analyzing a subgroup, presence of steroid therapy did not affect scintiscan positivity. Forty five

percent (5/11) of steroid therapy patients had positive scintiscan as compared to 31.58% (18/57) of subjects not on steroid therapy ( $p > 0.05$ ).

### Discussion

The role of GER in pathogenesis of bronchial asthma is intriguing, akin to the chicken and egg controversy(8-10). The reflux of acid into the esophagus may provoke broncho-constriction by micro-aspiration(11) or through vagus mediated reflex pathways(12). Furthermore, the presence of GER may potentiate the broncho-constrictive response of adults with asthma to a variety of other stimuli(13). Bronchial asthma itself may promote GER by amplifying thoraco-abdominal pressure gradient during an acute attack and by causing incompetence, of lower esophageal sphincter due to flattening and stretching of crura subsequent to chronic hyperinflation(14). Radio-nuclide esophagography is recommended as a suitable screening test for detecting GER due to its low radiation exposure and convenience(7).

Prevalence of GER in asthmatics has been reported variably from 25-89%(8,9,15). In our study, 39% asthmatic children demonstrated reflux on scintiscan while none of the controls showed reflux. A history of nocturnal exacerbation of symptoms correlated significantly with GER as detected by scintiscanning as demonstrated earlier(5,9). This may be due to prolonged esophageal acid exposure during the night subsequent to supine position and decreased acid clearance.

All commonly used bronchodilators relax the lower esophageal sphincter and may promote reflux(3,4). In our study,

the bronchodilator or steroid therapy did not affect the occurrence of GER. This is in agreement with the results of other investigations(5,16,17). We conclude that a significant number of asthmatic children demonstrate GER which correlates strongly with nocturnal exacerbation of respiratory symptoms and that bronchodilator therapy does not affect the prevalence of GER in asthmatic children.

At the present time, the clinician should be aware of the high prevalence of reflux both in asthma and in chronic obstructive pulmonary disease. It should especially be considered in children with poorly controlled asthma who have appreciable nocturnal symptoms, recurrent changes on radiography or asthma requiring long term aggressive treatment. Worsening of asthma with the use of bronchodilators and appearance of asthma for the first time in adult life should raise suspicion of reflux disease. Complete or partial remission of pulmonary symptoms has followed control of reflux by medical therapy(8,18,19). Once detected, medical treatment is warranted in the hope that respiratory symptoms will subside but in particularly severe cases, especially with a positive history and demonstrable temporal relationship, it may be worth trying anti-reflux treatment even for "normal" amounts of GER.

### REFERENCES

1. Holloway RH, Dent J. Pathophysiology of gastroesophageal reflux : Lower esophageal dysfunction in gastroesophageal reflux disease. *Gastroenterol Clin* 1990,19: 517-536.
2. Gustafsson PM, Kjellman NI, Tibbling L. Esophageal function and symptoms

- in moderate and severe asthma. *Acta Paediatr Scand* 1986, 75: 729-736.
3. Stein MR, Towner MG, Weber RW, *et al.* The effect of theophylline on lower esophageal sphincter pressure. *Ann Allergy* 1980, 45: 238-241.
  4. Wong RK, Maydonovitch C, Garcia JE, *et al.* The effect of terbutaline sulphate, nitroglycerine and aminophylline on lower esophageal sphincter pressure and radionuclide esophageal emptying in patients with achalasia. *J Clin Gastroenterol* 1987, 9: 386-389.
  5. Skoner D, Caliguiri L. The wheezing infant. *Pediatr Clin North Am* 1988, 35: 1011-1030.
  6. Skinner DB, Roth JLA, Sullivan BH Jr, Stein GN. *In: Bockus Gastroenterology*, 4th edn, Vol 2. Ed. Reflux esophagitis. Berk JE. Philadelphia WB Saunders Co, 1985, pp 717-768.
  7. Kashyap R, Sharma R, Madan N, *et al.* Evaluation of radio-nuclide gastroesophagography as a suitable screening test for detection of gastroesophageal reflux. *Indian Pediatr* 1993, 30: 625-628.
  8. Berquist WE, Rachelefsky GS, Kadden M, *et al.* Gastroesophageal reflux associated recurrent pneumonia and chronic asthma in children. *Pediatrics* 1981, 68: 29-35.
  9. Euler AR, Byrne WJ, Ament ME, *et al.* Recurrent pulmonary disease in children: A complication of GER. *Pediatrics* 1979, 63: 47-51.
  10. Tan WC, Martin RJ, Pandey R, Ballard RD. Effects of spontaneous and simulated gastroesophageal reflux on sleeping asthmatics. *Am Rev Respir Dis* 1990, 141: 1394-1399.
  11. Boyle JT, Tuchman DN, Altschuler SM, *et al.* Mechanisms for the association of gastro-esophageal reflux and bronchospasm. *Am Rev Respir Dis* 1985, 131: S 16-29.
  12. Davis RS, Larsen GL, Grunstein MM. Respiratory response to intraesophageal acid infusion in asthmatic children during sleep. *J Allergy Clin Immunol* 1983, 72: 393-398.
  13. Herve P, Deujian A, Jian R, *et al.* Intraesophageal perfusion of acid and increased broncho motor response to methacholine and isocapnic hyperventilation in asthmatic subjects. *Am Rev Respir Dis* 1986, 134: 989-991.
  14. Mansfield LE. Gastroesophageal reflux and respiratory disorders: A review. *Ann Allergy* 1989, 62: 158-163.
  15. Goldman J, Benneth JR. Gastroesophageal reflux and respiratory disorders in adults. *Lancet* 1988, 2: 493-495.
  16. Hubert D, Gaudric M, Guerre I, Lockhart A, Marsac J. Effect of theophylline on gastroesophageal reflux in patients with asthma. *J Allergy Clin Immunol* 1988, 81: 1168-1174.
  17. Michoud MC, Leduc T, Proulx F. *et al.* Effect of salbutamol on GER in healthy volunteers and patients with asthma. *J Allergy Clin Immunol* 1991, 87: 762-767.
  18. Christie DL, O Grady LR, Mack DV. Incompetent lower esophageal sphincter and gastroesophageal reflux in recurrent acute pulmonary disease of infancy and childhood. *J Pediatr* 1978, 93: 23-27.
  19. Harper PC, Bergner A, Kaye MD. Anti reflux treatment for asthma: Improvement in patients with associated gastroesophageal reflux. *Arch Inter Med* 1987, 147: 56-60.