

# A Cross-Sectional Study to Determine the Prevalence of Gastroesophageal Reflux in Children with Persistent Cough and Wheezing

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## Abstract

**Background:** Gastroesophageal reflux (GER) occurs in more than two-thirds of otherwise healthy infants and is the topic of discussion with pediatricians at one-quarter of all routine 6-month infant visits. GER is considered a normal physiologic process that occurs several times a day in healthy infants, children, and adults. GER is generally associated with transient relaxations of the lower esophageal sphincter independent of swallowing, which permits gastric contents to enter the esophagus. The Objective to find out the prevalence of GER in children with cough and wheezing and its associated factors. **Subjects and Methods:** A cross-sectional study was done at A tertiary care hospital at the Institute of Naval Medicine, INHS, Mumbai from August 2016 to December 2017. A total of 30 study subjects Aged between the age of one to twelve years with persistent cough and wheezing lasting for more than three months despite treatment were included for the study. **Results:** The prevalence of gastroesophageal reflux (GER) in our study was 63.3%. The logistic regression analysis showed that Age, Height, Weight, BMI, duration of cough, Duration of asthma were not significantly associated with Gastroesophageal reflux (GER) ( $p > 0.05$ ). **Conclusion:** GER seems to have a high prevalence in children with chronic cough. However, no definite recommendations can be made regarding the management of such cases from our study.

**Keywords:** Gastric Reflux, Cough, Asthma, Heart Burn

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## Introduction

In approximately more than two-thirds of children gastroesophageal reflux is seen and one of the major conditions seen by pediatrician especially among the 6-month infant visit<sup>[1,2]</sup> Apart from seeking guidance from the pediatrician about this condition parents also want to be evaluated by Pediatrician Medical Subspecialists.<sup>[3]</sup> The state-of-the-art approaches to the evaluation and management based on evidence-based guidelines for pediatric GER have been welcomed by both general pediatricians and pediatric medical subspecialists and surgical specialists. Gastroesophageal reflux is said when the gastric contents pass on to the esophagus and it can be distinguished from gastroesophageal reflux disease where it also includes troublesome symptoms or complications along with GER.<sup>[4]</sup> Differentiating between GER and GERD lies at the crux of the guidelines jointly developed by the North American Society for Pediatric Gastroenterology, Hepatology,

and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition.<sup>[4]</sup> These definitions have further been recognized as representing a global consensus.<sup>[5]</sup>

GER is a normal physiological phenomenon that can be seen many times in a 24-hour cycle among healthy infants, children and even among adults. GER is often presented with intermittent relaxation in the lower esophageal sphincter irrespective of swallowing which permits gastric contents to enter the esophagus. Among adults, it usually occurs after the meals and will be for 3 minutes duration and can cause symptoms sometimes.<sup>[4,6,7]</sup> Whereas the Physiological GER with regurgitation or spitting up among infants and children occurs very often in more than 50 % of the individuals and very less information is available.<sup>[7,8]</sup> Hence the present study was done at our tertiary care center to the prevalence of GER in children with cough and wheezing for a period of three months or more using precise diagnostic tools like Gastroesophageal scintigraphy.

## Objective

To find out the prevalence of GER in children with cough and wheezing and its associated factors.

## Subjects and Methods

A Cross-Sectional study was conducted in a tertiary care hospital at the Institute of Naval Medicine, INHS, and Mumbai from August 2016 to December 2017.

The sample size was calculated using the form from Standard Normal Distribution table (1.96) with the Power (p) = 80% and Precision error of estimation (d) = 0.07  $n = [1.96 \times 1.96 \times 0.8 (0.2)] / 0.7 \times 0.7 = 29.46$ .

Hence a sample size of 30 cases was considered adequate for our study.

A total of 30 Children of age 1 - 12 years with cough and wheezing presenting to the Pediatric OPD were included in the study.

### Inclusion criteria

Children between the age of one to twelve years with persistent cough and wheezing lasting for more than three months despite treatment. 71

### Exclusion criteria

- Children with known neurological co-morbidity associated with increased incidence GER
- Children with known congenital gastrointestinal, esophageal and pulmonary anomalies
- Children who have undergone surgical or endoscopic intervention involving the esophagus

All children who met the inclusion criteria during the study period after due consent from parents underwent the following:

- Demographic evaluation,
- History related to gastroesophageal reflux (GER) symptoms
- Milk scan/RA scans studies at the nuclear medicine department.

Quantitative variables were analyzed by unpaired 't' test and qualitative variables were analyzed using the Chi-square test and Logistic regression. SPSS (Ver 22) and Epi info 7 were used for statistic analysis.

Data were analyzed and quantitative variables were analyzed using unpaired t-test and chi square was used for Qualitative Variables. A p-value of less than 0.05 was considered to be significant.

## Results

Total of 30 Children were included in the study and analyzed

**Table 1: Socio-Demographic Profile of the Study Subjects**

Demographic	Age Group		
	< 5 years	> 5 Years	
Gender	Male	11 (36.6%)	10 (33.3%)
	Female	3 (10%)	6 (20%)
Mean Weight in Kg	16.2 + 2.77	31.3 + 7.05	
Mean Height in Cm	97.7 + 7.8	131.3 + 11.72	
Mean BMI	16.97 + 2.12	18.15 + 3.13	

The Mean Height, Weight and BMI among the study subjects were found to be within the normal range.

**Table 2: Distribution of Symptoms among the Study Group**

Symptoms	Age groups		
	< 5 years	5-10 years	>10 Years
Vomiting	8 (57%)	8 (72%)	2(40%)
Excessive Crying	5(35.7%)	3(27.2%)	1(20%)
Wakes up at night	8(57%)	10(91%)	3(60%)
Heart Burns/Chest Pain	1(7.1%)	2(18%)	4(80%)
Abdomen Pain	7(50%)	3(27.2%)	2(40%)
Arching back in pain	1(7.1%)		
Refuses to eat	13(92.8%)	5(45.5%)	2(40%)
Hoarse Voice		1(9%)	2(40%)
Weight Loss	3(21.4%)	1(9%)	1(20%)
Asthma	5(35.7%)	7(63.6%)	1(20%)

In the age group, less than 5 years most common symptom was a refusal to eat (92.8%), the second common symptom was vomiting and waking up at night due to cough (57%). In the age group between 5 years to 10 years most common symptom was waking up at night due to cough (91%), the second common symptom was vomiting (72%). In the age group, more than 10 years most common symptom was heartburn/ chest pain (80%), the second common symptom was waking up at night due to cough (60%).

**Table 3: Prevalence of Gastro-Esophageal Reflux (GER) on Scintigraphy**

Prevalence of GER	N	%
Positive	19	63.3%
Negative	11	36.7%
Total	30	100 %

**Table 4: Association of Demographic Factors and Symptoms and the GER among Study Subjects**

		Positive		Negative		P-value
		N	%	N	%	
Age Group	< 5 years	12	40	6	20	0.642
	>5Years	7	23.3	5	16.7	
Gender	Male	12	63.15	9	81.8	0.29
	Female	7	36.85	2	18.18	
Duration of Cough	< 5Months	13	68.42	7	63.63	0.78
	>5Months	6	31.58	4	36.37	
Asthma	Yes	9	30	4	13.3	0.557
	No	10	33.3	7	23.4	
Vomiting		11	61.1	7	38.9	0.75
Heart Burns/Chest Pain		4	57.1	3	42.9	0.69
Weight Loss		3	60	2	40	0.86

The prevalence of gastroesophageal reflux (GER) in our study was 63.3%.

The majority of cases with Gastroesophageal reflux (GER) (12 out of 19; 40%) were in the age group of fewer than 5 years than more than 5 years (5 out of 19; 23.3%). It was observed that 12 (63%) male and 7 (36.85%) female cases had GER. The majority of cases with Gastroesophageal reflux (GER) (15 out of 19; 50%) had coughs for less than 5 months. It was observed that 47.3% of cases with Gastroesophageal reflux (GER) (9 out of 19%) had asthma. There is no significant association between symptoms and gastroesophageal reflux.

The logistic regression analysis showed that Age, Height, Weight, BMI, duration of cough, Duration of asthma were not significantly associated with Gastroesophageal reflux (GER) (p>0.05).

## Discussion

Gastroesophageal reflux (GER), defined as the passage of gastric contents into the esophagus, is distinguished from gastroesophageal reflux disease (GERD), which includes troublesome symptoms or complications associated with GER. [4] Children with gastro-oesophageal reflux (GER) present with oesophageal and extra-oesophageal symptoms. Chronic cough and recurrent wheezing are the common extra oesophageal respiratory symptoms of GER. Children with GER have a very wide spectrum varying in infants as a physiological process and in children and adolescents as pathological sequelae comprising the well-known entity Gastro-Esophageal Reflux Disease. [1] In a study from Australia, by Shepherd et al, [9] the most common symptom was vomiting (98.4%) followed by a refusal to eat (51.6%). The least symptom was 'arching back in pain' (7.9%). In our study, the most common symptom was

waking up at night due to cough (70%) followed by a refusal to eat (66.6%). The least symptom was 'arching back in pain' (3.3%). The difference in symptom percentage of Shepherd Locke et al, [9] from the present study may be due to the difference in the age group of the study population (included infants in the study group). In a study from Philadelphia, by Linda deal et al, [10] the most common symptom was waking up at night due to cough (67.16%) similar to the present study (70%). The second most common symptom was a refusal to eat (47.7%). The least common symptom was 'arching back in pain' (4.4%) similar to the present study (4.4%). In a study from India, by Bhatia et al, [11] heart burns/chest pain symptom was present in 12.72 % and abdominal pain in 10% of the population. In the present study heart, burns/chest pain symptoms were present in 23.3% and abdominal pain in 40% of the study population (Table 16). The difference in the percentage of symptoms may be due to the fact that Bhatia et al's, [11] study involves the adult age group. In a study from Norway, by Ketil Stordal et al, [12] heartburns/chest pain symptom was present in 22.2% population and abdominal pain in 75.75% population. The difference in the percentage of symptoms of heartburn/chest pain was negligible and the difference in the percentage of symptom abdominal pain may be due to the fact that in Ketil Stordal et al, [12] study, the numbers were more compared to the present study and study population also involved the adolescents (10-17 years). In a study from the USA, by Poe et al, [13] 35% of the study population were asthmatic in chronic cough. The difference in the percentage of the asthmatic population may be due to Poe et al's, [13] study includes the adolescent age group. In studies done, by Irwin RS et al, [14] and Shirahata K et al, [15] 43% and 42% of the study population were asthmatic in chronic cough. The asthmatic population in the chronic cough of the present study was comparable with the mentioned studies. In a study from Boston,

Table 5: Association of Factors with Gastro-Esophageal Reflux (GER)

Parameters	p-Value (Logistic regression)	Exp ( $\beta$ )	95% C.I. for Exp ( $\beta$ )	
			Lower	Upper
Age	0.096	0.255	0.051	1.272
Height	0.082	1.475	0.952	2.285
Weight	0.444	0.741	0.344	1.595
BMI	0.421	1.571	0.523	4.723
Duration of Cough	0.204	0.700	0.405	1.213
Duration of Asthma	0.216	0.899	0.759	1.064

by Irwin et al,<sup>[14]</sup> prevalence of gastroesophageal reflux in chronic cough was 100%. In the present study prevalence of gastroesophageal reflux was 63.3%. The difference in prevalence may be due to the study population in Irwin et al,<sup>[14]</sup> was less and the cut-off duration for chronic cough was taken only three weeks as compared to the present study. In a study from Saudi Arabia, by Saleh Othman et al,<sup>[16]</sup> prevalence of gastroesophageal reflux in chronic cough was 43.8%. Studies done by, Khoshoo et al,<sup>[17]</sup> and Mardjanis Said et al<sup>[18]</sup> showed no significant association between age and gastroesophageal reflux similar to the present study. Studies were done by, Khoshoo et al,<sup>[17]</sup> and Mardjanis Said et al,<sup>[18]</sup> showed no significant association between gender and gastroesophageal reflux as similar to the present study. Studies were done by Irwin RS et al,<sup>[14]</sup> and Shirahata K et al,<sup>[15]</sup> showed no significant association between asthma and gastroesophageal reflux similar to the present study.

## Conclusion

The strength of the present study is that it was conducted in a tertiary care set-up with in-house availability of required investigations where there was a high number of chronic cough cases being managed. This can explain the exceptionally high prevalence of GER (63.3%) in our study. Scintigraphy is often used to rule out GER in chronic cough in children before doing an invasive, extensive and expensive investigation to avoid psychological and financial burden on parents. In summary, GER seems to have a high prevalence in children with chronic cough. However, no definite recommendations can be made regarding the management of such cases from our study.

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