

Evaluation of Chronic Cough in Children: A Prospective Study in a Tertiary Care Hospital

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Abstract

Background : Chronic cough is a common complaint in children which causes distress, and affects the quality of life of parents and children. While cough may be seen as a common condition of childhood without serious consequences, ignoring a cough that may be the sole presenting symptom of an underlying illness can lead to delayed diagnosis and progression to a chronic respiratory morbidity.

Objective : To evaluate the specific diagnosis and prognosis of chronic cough in children.

Methods : A prospective study was done on children with chronic cough (history of cough > 8 weeks) referred to Dhaka Shishu (Children) Hospital, a tertiary hospital. Children aged 2 to 8 years with chronic cough referred by the general physicians, pediatricians and other peripheral hospitals were the study subjects. Exclusion criteria were children with immune-deficiency, congenital anomalies of lung, congenital heart disease, gastro-intestinal disorders (e.g. gastro-esophageal reflux, peptic ulcer disease), in born error of metabolism (e.g. cystic fibrosis) and other chronic conditions (e.g. gross neurodevelopmental delay).

The evaluation of chronic cough was based on simple principles: careful history-taking concerning the characteristics of the cough, full clinical examination to look for any associated symptoms and relevant investigations done. Underlying diagnoses and outcomes were ascertained after follow-up for a period of six months and treatment was given as per the management protocol of the hospital.

Results : The most common final diagnosis was allergic rhinitis (31%), followed by asthma (28.6%), rhinitis co-existing with asthma (23.8%), post viral cough (16.6). Cough resolved in 54.8%, partially improved in 40.5% and persisted in 4.7% of patients.

Conclusion : Allergic rhinitis with or without co-existing asthma was the commonest cause of chronic cough in children referred to this hospital.

Keywords : Chronic cough, Allergic rhinitis; Asthma.

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Introduction

Chronic cough is typically defined as a cough that persists for longer than 8 weeks; this is the most common presenting symptom of children for which parents seek medical treatment in an ambulatory setting.^{1,2} Prevalence of chronic cough in children has been reported as being as high as 5-10%.³⁻⁵ It is a common problem that can cause anxiety in parents for which they typically seek five or more medical consultations prior to referral to respiratory specialists. Despite chronic cough in children accounting for substantial direct and indirect costs for health service providers, patients and their families, it remains an under-recognized and inadequately

researched cause of morbidity in children. Inaccurate diagnosis and in appropriate investigation and management of chronic cough in children are not uncommon⁶, thus presents a challenge for the pediatricians which necessitates a clear need to improve chronic cough management in children.⁷

Chronic cough in children is a common presenting symptom, and the evaluation still contains a major challenge for pediatricians due to the scarcity of data. There are few prospective cohort studies addressing the causes of chronic cough. Thus, we conducted a prospective study to evaluate chronic cough in children.

Materials and Methods

A prospective study on children aged between 2 and 8 years with chronic cough attending the out-patient department of Dhaka Shishu (Children) Hospital, a tertiary care hospital was performed from July to December 2016.

Total 60 children referred from other peripheral hospitals, pediatricians and general physicians were included consecutively for the study. Exclusion criteria were children with immune-deficiency, congenital anomalies of lung, congenital heart disease, gastro-intestinal disorders (e.g. gastro-esophageal reflux disease, peptic ulcer disease), in born error of metabolism (e.g. cystic fibrosis) and other chronic conditions (e.g. gross neuro developmental delay).

After inclusion data were collected on detailed medical history and physical examination. The history included the duration and character of the cough, family history of atopy and asthma, history of dyspnea or wheeze, allergies, sinusitis and respiratory tract infections, and smoke exposure. The physical examination included complete ear, nose, and throat, respiratory and cardiovascular examinations looking particularly for clubbing, chest deformity, cardiac abnormality or auscultatory abnormality. Investigations and treatment were at the discretion of the attending pediatricians as per the hospital protocol. For this study results were counted as abnormal if present- **abnormal lung auscultatory finding** (mainly obstructive), **blood eosinophil count** $>0.3 \times 10^9 /L$, **blood IgE level** > 100 IU/L, or **CXR** shows any abnormal findings.

Total number of follow-up visit were varied according to the need of the individual patient. At least 6 visits and maximum 12 or more whatever needed. But underlying diagnoses and outcomes were ascertained after follow-up for a period of six months of all study patients. Final diagnoses was made by the pediatricians who was attending the patient.

In this study outcome of chronic cough was recorded as **completely resolved**, i.e. no or little cough present; **partially resolved**, i.e. some cough; or **persistent**, i.e. no resolution of cough upto 6 months follow up. Appropriate statistical analysis was done with SPSS version 20.

Results

Total 60 children with chronic cough were enrolled in the study. During 6 months follow-up period 18 patients were dropped out from the study (7 diagnosed as such diseases that they were excluded, 11 missed regular follow up to 6 months). Finally, 42 children with chronic cough were completed the follow up until 6 months. Therefore, these 18 dropped out children were excluded from the analysis.

Forty-two children were completed the follow up period of 6 months. Among them mean age was 5.0 ± 2.9 years. Twenty-

seven patients (64%) were male. The median cough duration was 15.12 weeks (quartile range: 8.12-52 week).

The sources of cases were referral by general physicians (47.6%), followed by pediatricians (26.2%) and peripheral hospitals (26.19%) shown in Table-I.

Table I : Sources of referral

General physicians	Pediatricians	Peripheral Hospitals
20(47.6%)	11(26.2%)	11(26.19%)

The primary diagnosis with which the children were referred to our hospital for further evaluation and management. The most common reasons for referral were non-specific chronic cough (52.4%), followed by asthma (38.1%), allergic rhinitis (7.1%), asthma and allergic rhinitis co-existing together (2.4%) and none with post-viral cough (Table-II).

Table II: Referral diagnosis

Referral diagnosis	No. of patients
Non-specific chronic cough	22(52.4%)
Asthma	16(38.1%)
Allergic rhinitis	3(7.1%)
Asthma + allergic rhinitis	1(2.4%)
Post viral cough	0(0%)

Most of the chronic cough patients (54.76%) were found to have persistent nasal symptoms (e.g. runny nose, nasal blockage, polyp, septal deviation etc.) Family history of atopy was found in 19.04% children. Physical examination showed that 14.28% of patients had pale and swollen nasal mucosa and 11.9% had eczema; no other major anomalies were identified on physical examination. None of the patients had serious underlying lung disease (Table-III).

Table III: Family history of atopy and related clinical features

Features	No. of patients
Family history of atopy	8(19.04%)
Persistent nasal symptoms	23(54.76%)
Pale, swollen nasal mucosa	6(14.28%)
Eczema	5(11.9%)

During evaluation 5(19.04%) children had abnormal (high) eosinophil count and serum IgE level was high in 4(9.5%) cases. No child had abnormal chest and nasal sinus x-ray (Table IV).

Table IV: Investigations for final diagnosis

Investigations done	Numbers	Abnormal results
Blood eosinophil count	8	5(19.04%)
Blood IgE level	7	4(9.5%)
Chest X-ray	18	0(0%)
X-ray nasal sinus	2	0(0%)

In the present study most common final diagnosis was allergic rhinitis (31%) followed by asthma (28.6%), co-existing asthma and allergic rhinitis (23.8%) and post viral cough (16.6%) shown in Table-V.

Table V : Final diagnosis

Final Diagnosis	No. of patients
Allergic rhinitis	13(31%)
Asthma	12(28.6%)
Asthma + allergic rhinitis	10(23.8%)
Post viral cough	7(16.6)
Non-specific chronic cough	0(0%)

After complete evaluation, the children were treated as per the final diagnoses according to our hospital's management protocol. The patients were followed up by a study Pediatrician for a period of 6 months by regular periodic visit (when ever necessary) and thereby final outcome was studied. Among the studied children, 54.8% had complete resolution of cough, 40.5% partially resolved and 4.7% had persistent cough. Table-VI shows the diagnosis wise prognosis.

Table VII: Outcome at the end of follow up

Diagnosis	Complete Resolution 23(54.8%)	Partially improved 17(40.5%)	Persistent 2(4.7%)
Allergic rhinitis	8	6	1
Asthma	2	4	1
Asthma and allergic rhinitis	4	6	0
Post viral cough	9	1	0
Non-specific chronic cough	0	0	0

Discussion

A prospective study was done to evaluate chronic cough in children between age group 2-8 years (mean 5.0±2.9). Marchant et al.⁹ found children with a mean age of 4.5 ± 3.7-years in their study which is comparable to our study. The different ages of children studied may play an important role in the causes of chronic cough. In addition to the differences in practice settings, the etiologies and burden of chronic cough are also potentially influenced by age.¹⁰

The present study showed that majority of the cases were labeled as non-specific chronic cough on referral. Lahiri et al found cough variant asthma as the most referral cause of chronic cough in children in their study, which is different from our study.¹¹

Our study found 19.04% of the children with a family history of atopy. In a study Sears et al described family history of atopy in 41% patients. Family history of asthma, rhinitis and skin atopy reflects the same pattern and such a history helps in alerting the physician, though it may not always be present.¹²

In the present study, we have found that the diagnostic categories for chronic cough in children are heterogeneous and the final diagnoses were allergic rhinitis, asthma, asthma with

allergic rhinitis and post viral cough. In contrast to our study, published prospective studies showed in affluent countries asthma as being the most common cause of chronic cough.^{13,14}

There were several limitations in our study regarding duration, sample size, single center and most importantly scarcity of comparison with other studies. We also could not compare the prognosis of the children in our study with other studies specially of Bangladesh due to lack of similar type of study. A prospective multi-center study for longer duration with regular, longer follow up period and a universal evaluation protocol would help us in further understanding the etiologies and outcome of chronic cough in children.

Conclusion

Chronic cough is an under-recognized and inadequately researched cause of morbidity in children. This study found that allergic rhinitis with or without co-existing asthma is the commonest cause of chronic cough in children observed in this hospital.

References

- Palombini BC, Villanova CA, Araújo E, et al. A pathogenic triad in chronic cough: Asthma, postnasal drip syndrome, and gastroesophageal reflux disease. *Chest*. 1999;116(2):279-84.
- Song WJ, Chang YS, Faruqi S, et al. Defining Chronic Cough: A Systematic Review of the Epidemiological Literature. *Allergy Asthma Immunol Res*. 2016;8(2):146-55.
- Mullins RJ, Katelaris C, Rimmer J. CICADA: Cough in Children and Adults: Diagnosis and Assessment. Australian Cough Guidelines Summary Statement, Comment. *Med J Aust*. 2010; 192(11):671
- Carter ER, Debley JS, Redding GR. Chronic productive cough in school children: prevalence and associations with asthma and environmental tobacco smoke exposure. *Cough*. 2006; 2:11
- Leconte S, Paulus D, Deqryse J. Prolonged cough in children: a summary of the Belgian primary care. *Clinical Prim Care Respir J*. 2008; 17(4):206-11.
- Thomson F, Masters IB, Chang AB. Persistent cough in children and the overuse of medications. *J Paediatr Child Health*. 2002;38(6):578-581.
- Marchant JM, Newcombe PA, Juniper EF, et al. What is the burden of chronic cough for families? *Chest*. 2008;134(2):303-309.
- Chang AB, Robertson CF, Van Asperen PP, et al. Can a management pathway for chronic cough in children improve clinical outcomes: protocol for a multicentre evaluation. *Trials*. 2010; 11:103
- Marchant JM, Masters IB, Taylor SM, et al. Evaluation and outcome of young children with chronic cough. *Chest*. 2006; 129:1132-41.
- Chang AB, Robertson CF, Van Asperen PP, et al. A multicenter study on chronic cough in children: burden and etiologies based on a standardized management pathway. *Chest*. 2012; 142: 943-50.
- Lahiri K. Chronic cough in children: Evaluation and management. *Asian Pediatr Prac* 1997; 1: 85-88.
- Sears MR, Holdaway MD, Flannery EM, et al. Parental and neo-natal risk factors for atopy, airway hyper-responsiveness and asthma. *Arch Dis Child* 1996; 75:392-398.
- Callahan CW. Etiology of chronic cough in a population of children referred to a Pediatric pulmonologist. *J Am Board Fam Pract* 1996; 9:324-327
- Karabel M, Kelekci S, Karabel D, et al. The evaluation of children with prolonged cough accompanied by American College of Chest Physicians guidelines. *Clin Respir J*. 2014; 8:152-9