ISSN: 0975-1556

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2021; 13(2); 23-31

Original Research Article

A Cross Sectional Questionnaire Based Survey to Determine the Cough Profile and Patterns in Cough Management Among Children.

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Received: 11-01-2021 / Revised: 06-02-2021 / Accepted: 22-03-2021
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Conflict of interest: Nil

Abstract

Aim: The aim of the present study to assess the cough profile and trends in cough management in children across Bihar. **Methods:** This cross-sectional questionnaire based survey was conducted in the Upgraded Department of Paediatrics, Patna Medical College and Hospital, Patna, Bihar, India for 1 year. 200 children aged 1 to 12 years, with cough as the chief complaints were included in this study. Demographic details, duration of cough, history of similar episodes in past 12 months, nature, intensity and frequency of cough, associated symptoms, co-morbid conditions, concomitant medications, history of self-medication, adverse effects due to self-medications, classes and duration of drugs prescribed for cough and patient preference for treatment. **Results:** A total of 200 children 57.5% males; 42.5% females. Majority (40.5 %) of children enrolled in this survey belonged to 4-8 years of age.While 1-8 years old comprised 74% of children surveyed. 70% children had cough symptoms below 5 days prior to OPD visit while 3.5%children had symptoms above 10 days.A total of 47.5% of the children had 4-6 similar episodes of cough symptom in thepreceding 12 months.A total of 62% of the children had productive cough while 25.5 % had dry coughwith no or minimal sputum.70% of the children had fairly intense symptoms but were able to continue their routine activities while 21% had cough symptoms severe enough to affect their routine life and low in intensity and 9 % high in intensity symptoms.5% children reported 0-1 cough bouts per day, 35% children reported 2-6 cough bouts per day , 38% the children had more than 6 bouts and 22% reported more than 20 cough bouts per day. Fever (63.5%) was the most commonly reported associated symptom with their current cough episode. Other reported symptoms included running nose (54.5%), sore throat or throat pain (46%), nasal stuffiness (44.5%), sneezing (41%), headache (39%), sleep disturbance (including snoring) (37.5%), breathlessness (32.5%), hoarseness of voice (30%) and nasal irritation or itching (23%). 3.5% of the children also had fatigue, body ache and skin rashes during the cough episodes. **Conclusion:** Acute onset and recurrent cough is common in children. Exposures to modifiable risk factors such as environmental pollutants are commonly seen to be associated with pediatric cough.

Keywords: cough, children, survey

Introduction

Cough, one of the most common reasons for primary healthcare attendances in the community1 (1), is a key symptom of acute respiratory illnesses (ARIs). ARIs impose a substantial health burden on children, their families and the healthcare sector.[1-3] When cough persists for ≥4-weeks, it is defined as chronic cough.[4] While chronic cough may reflect uneventful delayed resolution, it may also signal an underlying chronic respiratory disorder.[4,5] A recent study reported that amongst Australian children who presented to an emergency department (ED) with ARI with cough, one in five developed chronic cough and, of those reviewed by a respiratory physician, 31% were diagnosed with a previously undetected chronic respiratory disorder (e.g., asthma, tracheobronchomalacia, aspiration disorder, or asthma).[6] Thus, chronic cough post ARI is important and knowing, at the point of the acute presentation, who are at risk of developing chronic cough will be clinically useful to clinicians and parents. Intervening early in the transitional stage from acute to chronic cough improves cough outcomes[7] , and may reduce the burden on families[8] and the healthcare sector.[2] However, although primary-care studies have reported 10% of children with an ARI are still coughing after day25[9] , there are little data on the predictors of chronic cough in children. In our previous study, restricted to a single low-socioeconomic site, predictors of chronic cough were age <12-months, eczema, childcare attendance, previous history of chronic cough, parental Indigenous status, and low income.[10] However, generalizability of these data is limited. Risk factors for childhood ARIs include childcare attendance, now common in the modern era.[10-12] In 2017, >40% of Australian children aged<5-years attended childcare on a daily basis. However, specific risk factors for ARI with cough amongst childcare attendees remain poorly defined, including whether childcare attendees are at higher risk of developing chronic cough. A Finnish cohort study of 894 children identified those attending day care facilities had higher mean days per month of ARI symptoms compared to children attending home care and family day care (5.5, 4.9, and 4.8 days, respectively, p=0.03).[11] A United States cross-sectional study involving 3,000 children[12] reported the odds of ARI symptoms correlated with time spent in day care; children who attended ≥20-h/weeks had higher odds for a range of ARI symptoms than those who attended<20-h/weeks [adjusted odds ratios (a OR) ranged from 1.50 to 1.88].[12]

Material and methods

This cross sectional questionnaire based survey was conducted in the Upgraded Department of Paediatrics, Patna Medical College and Hospital, Patna, Bihar, India for 1 year, after taking the approval of the protocol review committee and institutional ethics committee.

Methodology

200 children aged 1 to 12 years, with cough as the chief complaints were included in this study. Demographic details, duration of cough, history of similar episodes in past 12 months, nature, intensity and frequency of cough, associated symptoms, co-morbid conditions, concomitant medications, history of self-medication, adverse effects due to self-medications, classes and duration of drugs prescribed for cough and patient preference for treatment. Intensity of cough was categorized into 3 types; fairly intense (Tiresome, but is able to continue routine), low in intensity (Comfortably carries out routine) and high intensity (Routine life interrupted).

Statistical analysis

Only standard descriptive statistics is reported in the results. No comparative statistical analysis is performed. Categorical data are presented as percentages.

Results:

A total of 200 children 57.5% males; 42.5% females. Majority (40.5 %) of children enrolled in this survey belonged to 4-8 years of age. While 1-8 years old comprised 74% of children surveyed.

Table 1: Gender and demographic profile of patients

Gender	Number of patients	Percentage
Male	115	57.5
Female	85	42.5
Age		
Below 4 years	68	34
4-8	81	40.5
8-12	51	25.5

Table 2: Distribution of children based on duration of presentingsymptom (cough)

Below 5 days	140	70
5-10	53	26.5
Above 10	7	3.5

70% children had cough symptoms below 5 days prior to OPD visit while 3.5% children had symptoms above 10 days.

A total of 47.5% of the children had 4-6 similar episodes of cough symptom in the preceding 12 months.

A total of 62% of the children had productive cough while 25.5 % had dry coughwith no or minimal sputum.

Table 3: Types of cough

Parameter	Number	%
Broncho-spastic cough (with wheezing or breathlessness)	25	12.5
Dry cough with no or minimal sputum	51	25.5
Productive cough (with expectoration)	124	62

70% of the children had fairly intense symptoms but were able to continue their routine activities while 21% had cough symptoms severe enough to affect their routine life and low in intensity and 9 % high in intensity symptoms.

5% children reported 0-1 cough bouts per day, 35% children reported 2-6 cough bouts per day , 38% the children had more than 6 bouts and 22% reported more than 20 cough bouts per day.

Fever (63.5%) was the most commonly reported associated symptom with their current cough episode. Other reported symptoms included running nose (54.5%), sore throat or throat pain (46%), nasal stuffiness (44.5%), sneezing (41%), headache (39%), sleep disturbance (including snoring) (37.5%), breathlessness (32.5%), hoarseness of voice (30%) and nasal irritation or itching (23%). 3.5% of the children also had fatigue, body ache and skin rashes during the cough episodes

Table 4: Associated symptom

Associated symptom	Number of patients	Percentage
Fever	127	63.5
Runny nose	109	54.5
Sore throat	92	46
Nasal stuffiness	89	44.5
Sneezing	82	41
Headache	78	39
Sleep disturbances	75	37.5
Breathlessness	65	32.5
Hoarseness of voice	60	30
Nasal irritation or itching	46	23
Ear pain	41	20.5
Post nasal drip	16	8
Lack of appetite	11	5.5
Fatigue or body ache	7	3.5
Skin rashes	4	2
Diarrhea	2	1
Other	1	0.5

Although majority (75%) of children had no history of self-medication reported, 25% children were self-medicated for present or in past cough episode.

80% children received first generation sedative antihistamines while 75% were prescribed second generation non-sedative antihistamines. Antibiotics (50.5%) and nutritional supplements (11%) were prescribed besides mucolytics (68%) and expectorants (60%) (Table 5). 82% of these children were prescribed for just 1-3 days while rest were advised up to 6 days.

Table 5: Classes of drugs with duration prescribed to the patient for the current cough episode

	Total (n=200) N (%)	**Syrup (n=200) N (%)**	**Tablets (n=200) N (%)**	**1-3 days (n=200) N (%)**	**Up to 6 days (n=200) N (%)**	**Up to 8 days (n=200) N (%)**
First generation antihistamines	160(80%)	150 (75%)	51 (25.5%)	24 (12%)	140 (70%)	40 (20%)
Second generation non sedative antihistamines	150 (75%)	130 (65%)	70 (35%)	110 (55%)	71(35.5%)	21 (10.5%)
Mucolytics	136(68%)	140(70%)	60 (30%)	43(21.5%)	144 (72%)	23(11.5
Expectorants	50 (25%)	110 (55%)	91(45.5%)	105(52.5%)	90 (45%)	9(4.5%)
Antipyretics/NSAIDs	20 (10%)	73(36.5%)	131 (65.5%)	62(31%)	131 (65.5%)	9(4.5%)
Antibiotics	101 (50.5%)	21(10.5%)	180 (90%)	40 (20%)	133(66.5%)	20 (10%)
Nutritional supplements	22 (11%)	99(49.5%)	100(50%)	34(17%)	60 (30%)	100 (50%)
Dextromethorphan/codeine containing antitussives (Preference for dextromethorphan 80%; codeine 20%)	161(80.5%)	NA	NA	80 (40%)	110 (55%)	16 (8%)
Decongestants (preference for syrup 40%; tablets 10% and nasal 50%)	182 (91%)	NA	NA	111(55.5%)	60 (30%)	21(10.5%)

Table 6: Route of administration for corticosteroids

Parameter	Number of patients	Percentage
Oral	**160**	**80**
No preference	**28**	**14**
Inhaler	**10**	**5**
Nasal spray	**2**	**1**

Just 5% of children were prescribed with corticosteroids in the form of nasalspray. Oral route was preferred in majority (80%) of cases.

Discussion

In this cross sectional questionnaire based survey across the country, children presenting with cough were screened and evaluated for different parameters. The survey provides information on important aspects like duration and type of cough, presence of risk factors, self-medication if any and associated adverse effects of drugs on children. Childhood acute respiratory infection (ARI) is a significant public health problem, especially in developing countries. In an Indian study.[13] on 397 school children in age group of 5-14 years, 52% of children presenting with acute respiratory infection (ARI) belonged to 5-9 years age group. In our survey, 40.5 %children belonged to 4-8 years age group. An observational study by De Blasio et al.[14] also reported almost half of the children presenting acute cough in 1-5 year age-group. Children in this age group have various habits that promote easy transmission of infections. As such this is the age when children are introduced to out-of-home care and thus susceptible to infections because of lack of previous exposure to common infective organisms. Besides, there are physiological reasons like the immature immune system and dysfunctional eustachian tube predisposing them to upper airway infections.[15] Our present study affirms the fact that preschool and nursery age group children are more prone to infections than others.

Classification of cough based on the duration relies on available data related to URTI in children. Cough may continue for 10-25 days in children with common cold or viral respiratory tract infections[2]. British Thoracic Society (BTS) guidelines defined acute cough as a recent onset of cough lasting less than 3 weeks.[16] Different guidelines label chronic cough as ranging from 3-12 weeks. 68% children in this survey had cough up to 5 days prior to their presentation to the OPD. 70% children had cough symptoms below 5 days prior to OPD visit while 3.5% children had symptoms above 10 days. Children in an observational study[14] showed mean duration of acute cough to be around 4-5 days, ranging from 2 to 21 days.

Acute respiratory infections usually produce 5 to 8 episodes of cough in a year in children; each lasting for 7 to 9 days. A total of 47.5% of the children had 4-6 similar episodes of cough symptom in the preceding 12 months, suggesting underlying asthma or virus induced tracheo-bronchial hyper-reactivity states, more in winter months during which the study was conducted, that too, in the metropolitan cities where the pollution level is much higher.

Cough is usually categorised based on duration of cough rather than frequency. As such, two or more episodes of cough, without any history of viral URI (Coryxa, cough and cold) in past one year considered as recurrent cough.

However, recurrent cough in short intervals, even with resolutions, cannot be easily differentiated from persistent chronic cough.[17] Thus, recurrent coughepisodes seem to be quite prevalent in children in our country.

Children with cough are usually hetero genous, with varied risk factors and comorbid conditions[3]. Our study population was hetero genous in terms of age group and type of cough. Contrary to usual belief, wet and productive cough was commonly observed in our survey (62%) than dry 25.5% and bronchospastic cough (12.5%). Previous survey

conducted by Narayanan et al[18] reported dry cough (57%) more commonly than productive (40%) and bronchospastic (3%) cough. De Blasio et al reported dry cough as more common in their observational study in 433 children.[14] While the Indian study study[18] included majorly adult population, our survey was pediatric age specific under 12 years of age. However, there could be other factors in operation, leading to such differences. Environmental factors are supposed to affect the transmission of viral respiratory infections.[19] The survey by Narayanan[16] was conducted in two different seasons, our present survey was mostly limited to winter season only when viral (RSV and others) infections are so common, with immune mediated cough. These aspects can be the reason for the observed variation. Despite these findings, the use of antitussives such as - dextromethorphan and codeine was found to be more prevalent (80.5%)in our study. There is a need to understand that viral ARI always not confined to dry cough. Very often thannot, the involvement of tracheo bronchial tree with immune mediated mucosal oedema, sticky secretions result in spasmodic and paroxysmal cough in a vicious cycle of vagal stimulation, not amounting to active bronchospasm as in asthma. Higher incidence of wet and productive cough in our study conducted during inter months, may be attributable for this patho-physiology. Antitussives, particularly opioids are certainly not desirable. Plenty of fluid intake, frequent saline nose drops, a mild second generation decongestant are good enough with or without a short course of bronchodilator if at all, in moderate to severe extent of cough. Steroids have no role to play. De Blasio et al[14] assessed the intensity of cough as mild, moderate and severe. Wide variation in intensity of cough from low to fairly intense severity was seen in our study, 70% of the children had fairly intense symptoms but were able to continue their routine activities while 21% had cough symptoms severe enough to affect their routine life and low in intensity and 9 % high in intensity symptoms. Althoughmild to moderate cough or low to fairly intense cough may not interfere with daily routine, parents might refrain from sending these kids to school, especially if associated with fever, to avoid increase in severity of symptoms as well as prevent spread of infection to other classmates. Cough and cold lead to missed school days for children which ultimately force missed office days for working parents who need to stay at home to care for children.[20]

5% children reported 0-1 cough bouts per day, 35% children reported 2-6 cough bouts per day, 38% the children had more than 6 bouts and 22% reported more than 20 cough bouts per day. This can be the reason for early consultation with pediatricians seen in the survey. The previous survey[16] also reported similar results (More than 6 bouts-56%; More than 20 bouts-17%).

Children in our study reported different symptoms including fever, running nose, sore throat or throat pain, nasal stuffiness, sneezing, headache, sleep disturbance(including snoring), breathlessness, hoarseness of voice and nasal irritation or itching. Most of these symptoms are commonly seen with viral respiratory illnesses. Fever (63.5%) was the most commonly reported associated symptom with their current cough episode. Other reported symptoms included running nose (54.5%), sore throat or throat pain (46%), nasal stuffiness (44.5%), sneezing (41%), headache (39%), sleep disturbance (including snoring) (37.5%), breathlessness (32.5%), hoarseness of voice (30%) and nasal irritation or itching (23%). 3.5% of the children also had fatigue, body ache and skin rashes during the cough episodes.[21] There are several risk factors known to precipitate cough. Potts et al[22] assessed indoor risk factors for cough and found that tobacco smoke, poor ventilation, coal as cooking fuel, mold and dampness as important contributors. Association of malnutrition, younger age, low coverage of immunization, early childhood mismanagement and respiratory damage has been found to be significant risk factors in development of respiratory illness like pneumonia.[23] In the 5-9 years age group, family history of allergic disorder and asthma, presence of smoke outlet

in kitchen, absence of windows in sleeping room are also found to have an independent association with the ARI. In our survey, exposure to smoking or pollution at home or school, known or suspected immune-deficiency and allergic rhinitis were identified as associated risk factors for cough in many children.

Although the effects of cough and cold are temporary, its high prevalence has remarkable bearing on quality of life and economic burden. The typical common cold management is usually through use of antihistamines, antitussives, mucolytics and decongestants. Many consumers are aware of risk of drug interactions of prescribed drug for other comorbid conditions and OTC cough and cold medicines.[24] A study conducted by Ahmad et al to evaluate self-medication practice in India found that 11.7% of the study population was taking self-medication for respiratory disease. Among the self- medications, use of cough syrup containing antihistamines was common in our study. 80% children received first generation sedative antihistamines while 75% were prescribed second generation non-sedative antihistamines. Antibiotics (50.5%) and nutritional supplements (11%) were prescribed besides mucolytics (68%) and expectorants (60%). The data also reflects that some of the children were given both generation antihistaminic drugs together. Although, both first- and second-generation antihistamines are blockers of H1-receptor sites, there is an additional pharmacological activity of the first-generation antihistamines as the competitive antagonism of acetylcholine at neuronal and neuromuscular muscarinic receptors. The effectiveness of first-generation antihistamines in reducing sneezing in colds is supposed to be due to neuro-pharmacological manipulation of histaminic and muscarinic receptors in the medulla.[25] That is why, the first-generation antihistamines are commonly used in cough formulations for prompt relief. But the resulting drowsiness, sticky secretions on bronchial mucosa are counterproductive. As the individual tries to dislodge these dried secretion induced cough, the reound vagus stimulation induces a vicious cycle of more and more cough and bronchospasm. The American Academy of Paediatrics stated that OTC medicines are generally safe only if used as per product labelling. AAP raised concerns on chances of increased risk of adverse effects due to usage of multiple multi-ingredient preparations having same active ingredient. Inappropriate dosing of cough and cold medications is another important concern.[26] The cross sectional study reported 37% prevalence of multiple anti-histamines use for upper respiratory infection in children less than 6 years of age. Practice of prescribing multiple histamines as reported in that study as well seen in the current survey poses a risk of increased adverse effects on children.

Acute respiratory infections are commonly associated with low-grade fever. The symptoms and signs of the common cold start with nasal stuffiness and throat irritation, usually accompanied by low-grade fever, anorexia and myalgia. Sneezing is associated with a watery nasal discharge, which becomes mucopurulent in 1 to 3 days; can persist for up to 10 days in many. Cough

occurs probably due to inflammation of the lower respiratory tract.[27] Antibiotic use in childhood URTIs has always been an issue since more than 90% of such infections are of viral aetiology.[27] The same is highlighted in our study with half of the children being prescribed antibiotics albeit for short duration (3 to 6 days) in the majority prescribed. Short courses of decongestants were also commonly seen in 43% of children. Despite greater number of children reported with wet and productive cough, albeit with scanty expectoration, use of anti-tussives was paradoxically higher (75%) in our study. This shows wide variation from management protocols and guidelines in clinical practice. Use of dextromethorphan was found to be more common as compared to codeine which is in line with its expected advantages.[14]

More than half of our children preferred syrup over tablet which was quite obvious considering the surveyed age group. The

preference can be attributed toswallowing ease and soothing effect of syrups in younger children.

Conclusion

Acute onset and recurrent nature of cough is a common observation in pediatric age group. Exposure to environmental pollutants both at home and school seems to bean important risk factor.Cough in children is often associated with expectoration or sputum production, albeit scanty, contrary to our belief. Grown-up children are able to bring out sputum better while younger ones usually swallow it down, Fever, runny nose and sore throat are the most commonly associated symptoms along with pediatric cough. Decongestants, antitussives, opioids, antihistamines, expectorants and mucolytics are commonly prescribed by pediatricians for management of cough in children, notalways as per guidelines.

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