Original Article

Role of Antibiotic in Bronchiolitis Management

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Abstract

Background: *Bronchiolitis is mostly a viral disease in infants and young children. It is a clinical diagnosis characterized by cough and respiratory distress associated with wheeze preceded by runny nose with or without fever.* ***Objective:*** *Objective of the study was to compare the outcome of young children of months to 2 years of age with bronchiolitis, treated with or without antibiotics, along with supportive treatment.* ***Materials and Methods:*** *This was a prospective randomized control trail conducted at Ad-din Sakina Women's Medical College Hospital, Jashore from January 2020 to December 2022. Total 105 children aged 2 months to 2 years, who fulfilled the inclusion criteria (runny nose followed by respiratory distress and wheeze), were included. The study case was randomly assigned in two groups ('without antibiotic' vs 'with antibiotic'). Presenting sign and symptoms were followed thrice daily for 7 days using a structured follow up sheet.* ***Results:*** *There were 70 male (66.66%) and 35 female (33.33%), mean age of the participants were 6.2 months and 90% were under 1 year of age. 44 cases were treated without antibiotic. 32 cases received oral erythromycin and 29 received parenteral ampicillin. Social smile returned in 3 days, feeding improved in 3 days, chest in drawing improved in 5 days. Crepitation improved faster than wheeze. Children with bronchiolitis with or without antibiotic (oral or parenteral) recovered in the same fashion.* ***Conclusion:*** *Thus the dynamics of clinical outcome of bronchiolitis obviates that children not receiving antibiotics had similar clinical outcome than those who received antibiotics.*

Keywords: Bronchiolitis, Antibiotics, Runny nose, Respiratory distress, Wheeze.

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Introduction

Bronchiolitis is a clinical condition characterized by runny nose followed by respiratory distress associated with wheeze in children below 2 years of age. Respiratory Syncytial Virus (RSV), is the predominant etiologic agent for acute viral bronchiolitis.

Bronchiolitis is the leading cause of hospitalization for infants younger than one year age. Admissions with bronchiolitis have increased in the last decade and it has been associated with increasing morbidity and cost. It is the most common cause of lower respiratory tract infection (21%) as against pneumonia (8%). Important risk factors include prematurity, male sex, overcrowding, non-breast feeding etc. "WHO classified severe pneumonia" was found to be viral bronchiolitis in 65% cases in one study. Though uncomplicated bronchiolitis can be managed in the hospital settings without antibiotics, it is treated with antibiotics in 99% cases. Physicians in Bangladesh are oblivious of bronchiolitis and cases of bronchiolitis are misdiagnosed as pneumonia. Alarmingly, only 15.4% of bronchiolitis cases are reported to be diagnosed correctly at the community level.

Materials and Methods

This was a prospective randomized control trial conducted in Ad-din Sakina Women's Medical College Hospital, Jashore during January 2017 to December 2017. Total 105 cases who fulfilled the inclusion criteria (Runny nose followed by respiratory distress and wheeze) in children aged 2 months to 2 years. Exclusion criteria were atopic condition, congenital heart diseases, and/or known immunodeficiency. A structured questionnaire was filled up through face to face interview with the caregivers. Detailed history and thorough examination were done. Supportive management

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was given to all children according to the national guideline for management of bronchiolitis like, 6 hourly nebulized salbutamol at 0.15 mg/kg, 2 inhalation (if SaO2 <90%), maintenance of nutrition with 10% IV dextrose in 0.225% saline, nasogastric tube feeding or breast feeding (as require), oro-pharyngeal suction (if needed) and paracetamol suspension (if fever persisted). A group of cases got antibiotic (either oral erythromycin or parenteral ampicillin) and other cases were treated without antibiotic. Each patient was followed up 2-3 times in 24 hours for 7 days with a structured follow up sheet. Outcome variables were: Improvement of chest in drawing, feeding difficulty, respiratory rate and return of social smile, status of oxygen saturation (S02), disappearance of rhonchi and crepitation.

Results

There were 70 male (66.66%) and 35 female (33.33%) children. Mean age of the patients was 6.2 months and 91% were under 1 year of age. 44 cases were treated without antibiotics (N-Ab), 32 cases received oral erythromycin (O-Ab) 30mg/kg/day divided 8 hourly & 29 cases were given parenteral ampicillin 50mg/kg/day (P-Ab) divided 6 hourly. The course during the management was as follows in terms of symptoms and signs, such as gradual recovery of chesty features like wheeze, chest in drawing, tachypnea, crepitation and rhonchi. These findings did not differ among three intervention groups. Contrary to chesty, most non chesty features such as feeding difficulty, social smile inconsolable crying hypoxemia demonstrated rapid recovery which also showed no difference among three groups.

Table: I : Effect on work and leisure activity after becoming COVID negative (n=207)

Symptoms and signs	Day-1			Day-3			Day-5			Day-7		
	N-Ab	O-Ab	P-Ab	N-Ab	O-Ab	P-Ab	N-Ab	O-Ab	P-Ab	N-Ab	O-Ab	P-Ab
Chest in drawing	100%	100%	100%	62.8%	50%	62%	34%	25%	27%	5%	10%	8%
Feeding difficulty	58%	42%	41%	11%	9%	10%	Nil	Nil	Nil	Nil	Nil	Nil
Social smile	30%	34%	34.5%	88%	90.6%	89.7%	All	All	All	All	All	All
Respiratory rate/min (Mean)	62	61	62	43	43	49	-	-	-	-	-	-
Oxygen saturation	93%	94%	93%	97%	96%	96%	-	-	-	-	-	-
Wheeze	100%	100%	100%	60%	50%	55%	19%	22%	22%	4%	8%	7%
Crepitation	60%	56%	62%	37%	38%	38%	7%	12%	3.4%	3%	7%	6%
Runny nose	100%	100%	100%	50%	52%	55%	18%	21%	22%	5%	9%	8%
N-Ab, no antibiotic; O-Ab, oral antibiotics, P-Ab, parenteral antibiotics.												

Discussion

This study is a well-designed pragmatic trial, sufficiently large in its random control trail approach. A recovery scale in clinical improvement was graded into two logical outcomes. `Rapid' and `gradual' scales. Instead of studying only two groups, comprising either a administered antibiotics or not, in addition to supportive measures, we added a third group by splitting antibiotic group into `oral' and `parenteral'. This was carried out to ensure that as many influencing factors were addressed as possible. Additionally, the follow up conducted to document the clinical improvement for a week (or less in case of subjects who improved earlier), involving 8 hourly clinical check-up and using as much 8 symptoms/signs, signifies added strength to this study.

There are a few small-scale studies which demonstrate that antibiotics are not necessary in the management of bronchiolitis. It is worth mentioning four studies. The first study was conducted four decades ago by field et al.[1] a two-armed trial with ampicillin and placebo in one hospital with 44 children to assess the progress using eight clinical

features (pulse rate, temperature, respiratory rate, use of accessory muscles of respiration, expiratory wheeze, adventitious sounds and cyanosis).

Friis B[2] conducted a study 26 years ago, with 136 children between 1 month and 6 years of age as participants. Majumder et al.[3] recently conducted another study involving 104 children. While the study was conducted in one hospital, it was done across three groups: one received ampicillin, the other erythromycin and one group received no antibiotics. The most recent study was conducted on infants and young children with RSV lower respiratory tract disease. The study revealed that the duration of hospitalization did not differ, regardless of whether the patients were treated with azithromycin or a placebo.[4]

Antibiotics are usually prescribed in RSV bronchiolitis cases when there is: (a) a suspected secondary bacterial infection, (b) an intention to achieve anti-inflammatory or immuno-modulatory effect and (c) an intention to prevent serious bacterial infection. It has been demonstrated that RSV effect on ciliated respiratory epithelia enhances susceptibility to secondary infections. However, the risk of secondary infections in infants and children with RSV bronchiolitis is remarkably low.[5] If the intention is to reduce the inflammatory process, there would be no place for ampicillin, as there is no evidence that penicillin derivatives or ampicillin have immuno-modulatory properties.

The diagnosis of bronchiolitis is most often made on clinical grounds and the criteria may vary: very simple, the first attack of wheezing in a previously healthy child of less than two years of age[6] or for a diverse criteria with coryzal symptoms followed by rapid onset of wheeze, fever, tachypnea, chest retractions, crepitation, and rhonchi.[7] However, we adopted a midline as the diagnostic criteria for bronchiolitis (runny nose followed by breathing difficulty, chest in drawing and rhonchi on auscultation in less than two year old children).

As with the previously listed studies, findings from our research provides evidence that antibiotics do not influence the natural course of bronchiolitis in terms of recover.[1,2,4] Furthermore, children who did not receive antibiotics had a significantly shorter hospital stay. The reason might be at least two fold: firstly, the poor parents tend to continue antibiotic course like other parents having fascination with antibiotics[8] for their children even if their children fulfilled the discharge criteria, Secondly, the parents did not want to keep their children in hospital any more when their child's condition improved but not receiving any antibiotics. There remains scope to change the existing guideline for the management of bronchiolitis[9] in the light of the findings of this study. As a result, the universal practice of prescribing antibiotics in bronchiolitis may be significan tly reduced as observed in other country.[10]

The research revealed significant information regarding details on the recovery rates of the children. Chesty features had gradual recoveries, not differing among three intervention groups and. Most non-chesty features resolved rapidly and were comparable among three intervention groups, except for runny nose. Moreover, children belonging to N-Ab group stayed for fewer days in hospital than their counterparts of P-Ab or O-Ab group. Knowing the rate of recovery of different clinical features in bronchiolitis bears several important implications. For example, return of social smile, being able to take food and not requiring oxygen any longer provide opportunity of a more speedy turnover in respective hospitals, particularly in the given situation of Bangladesh where persons per hospital bed remain as much as 2732.[11] There is also scope to counsel parents that chesty features, such as cough or wheeze, are likely to persist for a longer period in spite of improvement of other symptoms and a longer hospital stay is not necessary. Limitations of the study include; not assessing the RSV status and

parental desire of not keeping their children for more than seven days in the hospital as they improved sooner.

Conflict of Interest

The authors declare no conflict of interest.

Conclusion

Managing acute bronchiolitis without antibiotics in adjunct to supportive measure remains preferable, as clinical outcomes (recovery rate) were similar to those of cases receiving antibiotics. Moreover, the recovery was 'gradual' in case of chesty features in contrast to 'rapid' recovery of most of the non-chesty features. Antibiotic use should be restricted in the treatment of bronchiolitis and further study is heeded with larger sample size to support these research findings.

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