

ROLE OF ANTIBIOTIC IN THE OUTCOME OF BRONCHIOLITIS

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ABSTRACT

Objective: To estimate the outcome of bronchiolitis with or without antibiotic to justify the avoidance of antibiotic.

Methodology: This was a prospective study done in Khulna Medical College Hospital during six months from October 06 to March 07. All the children below two years admitted in hospital with bronchiolitis were included in the study. The study cases were randomly assigned into one of the three groups - No Antibiotic, Oral Antibiotic and Parenteral Antibiotic. Presenting signs and symptoms were followed up thrice daily to determine the progress of disease. Outcome was estimated by the level of improvement.

Results: Sixty cases of bronchiolitis were included in this study. Most (80%) of them were below six months. The disease was frequently associated with similar problem in siblings (46.7%), noncompliance to exclusive breast feeding (38.3%) and family history of asthma (36.7%). Symptoms like sleeping difficulty and restlessness improved little earlier in No Antibiotic group. On the other hand, signs such as chest indrawing and hepatomegaly improved quicker in Parenteral Antibiotic group although the difference was statistically insignificant. Patchy opacities were found in chest x-ray in 45% cases. None of the study cases died but three of them needed special intervention. Hospital stay was shorter in No Antibiotic group (6.2±1.4) than Oral Antibiotic group (6.7±1.1).

Conclusion: General supportive therapy is highly effective in bronchiolitis and antibiotic does not influence the course of the disease.

KEY WORDS: Bronchiolitis, Antibiotic, Outcome.

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INTRODUCTION

Bronchiolitis is an acute lower respiratory tract infection commonly caused by virus in children below two years. It is characterized by acute inflammation, oedema, necrosis of epithelial cell lining small airways, increased mucus production and bronchospasm.¹ The common presentation is cough and respiratory distress following coryza and clinical findings are tachypnea, chest retraction, crepitation and rhonci.² It is estimated that 1,20,000 infants are

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hospitalized with bronchiolitis each year in the United States.³ The incidence peaks during winter and early spring and reaches near zero in late summer and autumn. In the majority of infants with bronchiolitis, the illness is mild but nearly 4-5% requires hospitalization among which respiratory failure develops in 5-7% and 1% dies.⁴ Breast feeding seems to protect the baby from bronchiolitis but overcrowding increases the risk of the disease. RSV accounts for 40% of bronchiolitis and other viruses are influenza, adenovirus and parainfluenza.⁵

Therapies currently in the treatment of bronchiolitis include bronchodilator, nasal clearance, ribavarine and corticosteroids.⁶ Several studies have shown a wide variation in the treatment of bronchiolitis in United States, Canada and Netherlands.⁷ This variable pattern suggests a lack of consensus among clinicians as to best practice. In a last epidemic (2002) of Bangladesh, 50% cases were positive for RSV antibody and it was found that antibiotics were used in almost all cases.⁸ Kupperman showed in a prospective study that none of the 156 patients with bronchiolitis had bacteremia.⁹ Levine concluded that antibiotic may only be necessary when bacterial pneumonia is suspected e.g. high fever, toxicity, leucocytosis and lobar infiltrate.¹⁰ It has been repeatedly shown that inappropriate use of antibiotic changes the course of the disease and promotes the development of resistant organism but very few studies have been done in developing countries. This study was conducted to estimate the outcome of bronchiolitis with supportive treatment and also to determine the difference with additional antibiotic therapy.

METHODOLOGY

This was a prospective study done in Khulna Medical College hospital (KMCH) during six months from October'06 to March'07. All the children below two years admitted in KMCH with bronchiolitis were our study population. The criteria for inclusion were: i) age up to two years ii) lower chest indrawing iii) preceding running nose / first attack of wheeze and iv)

not treated previously. The case was excluded from the study if the child had: i) atopic conditions ii) congenital heart disease and iii) known immunodeficiency

Sample size was estimated at seventy five for this study. Twenty five cards in each group were marked as NA (No Antibiotic), OA (Oral Antibiotic-Erythromycin), PA (Parenteral Antibiotic- Amoxycillin) and after repeated shuffling of the total cards each card was kept in a sealed envelop. The study cases were assigned the envelop as per their admission serial and the investigator were totally unaware of the treatment modalities before opening it. Patients with no antibiotic were regarded as the control group.

Structured questionnaire were filled up after taking a detailed history and thorough examination of the child. Supportive treatment was given according to national guideline for the management of bronchiolitis. Oxygen ($SpO_2 < 95\%$) & nebulization were given instantly for each patient after receiving the patient and were followed up three times in 24 hours by two trained investigator. Structured follow-up format included feeding difficulty, restlessness, sleeping difficulty, tachycardia, tachypnea and chest indrawing. During the hospital stay, the child was withdrawn from the study only when the child's condition deteriorated further and became life threatening. Outcome was determined by the progress of the above mentioned follow up variables. Criteria for discharging the patient were -feeding adequately, no respiratory distress and no requirement of O_2 therapy.

The study was permitted by the ethical review committee of the KMCH and written informed consent was taken from parents of each patient. All the data were recorded by the investigator, checked by the researcher and analyzed in the computer using statistical software.

RESULTS

Due to unavailability of cases after March, 07 the study ended with sixty cases in total. Most (80%) of these cases were below six

Table-I: Progress of symptoms after 72 hours of treatment

| Symptoms (No. of patients) | NA (15) | | OA (22) | | PA (23) | |
|-------------------------------|--------------|-------------------|--------------|-------------------|--------------|-------------------|
| | At Admission | 72 hour after (%) | At Admission | 72 hour after (%) | At Admission | 72 hour after (%) |
| Feeding difficulty (24) | 07 | 02 (28.6) | 09 | 03 (33.3) | 08 | 03 (33.3) |
| Restlessness (16) | 05 | 02 (40.0) | 05 | 02 (40.0) | 06 | 03 (50.0) |
| Inconsolable cry (17) | 05 | 01 (20.0) | 06 | 01 (16.7) | 06 | 02 (33.3) |
| Sleeping difficulty (18) | 06 | 01 (16.7) | 07 | 02 (28.6) | 05 | 01(20.0) |
| Cough (34) | 10 | 04 (40.0) | 11 | 05 (45.5) | 13 | 05 (38.4) |
| Fever (28) | 08 | 02 (25.0) | 09 | 02 (22.2) | 11 | 03 (27.3) |

(NA-No Antibiotic, OA-Oral Antibiotic, PA-Parenteral Antibiotic)

months. Male children (71.6%) outweighed the female in number. Contributory factors were evaluated for all cases. Bronchiolitis in sibs were noticed in 46.7% cases. Noncompliance to exclusive breast feeding (38.3%) and family history of asthma (36.7%) were found as important risk factor for bronchiolitis. Regarding symptoms, Cough and fever were the commonest presenting feature (Table-I). The improvement of symptoms after three days were noticed and analyzed. It was found that sleeping difficulty improved substantially in NA group and only in 16% cases they persisted for three days which was better than other groups. On the other hand restlessness persisted in 50% children in PA group after 72 hours which was poorer than other groups.

Cyanosis was found in no case. Six other important clinical signs have been presented in Table-II. Chest indrawing (60) and hepatomegaly (58) were the common signs but

tachycardia (>150/m) and hypoxia (<95%) were least common. Chest indrawing and hepatomegaly improved more quickly in PA group in comparison to OA group. On the other hand progress of tachypnea and crepitation-rhonci were nearly same in both groups. X-ray chest were done in all cases on admission day and 80% revealed hyperinflation of lungs. Next common in frequency was increased translucency (66.7%) and pachy opacities (45%). X-ray was repeated in those cases which were not improved by six days.

Table-III shows the outcome of bronchiolitis in different treatment group. All cases improved with time except three. Interestingly one case from each of the three groups needed intervention and was treated by broad spectrum antibiotic and one patient received steroid. No patient expired during treatment. Mean hospital stay was little longer in OA group

Table-II: Progress of signs after 72 hours of treatment

| Signs (No. of patients) | NA (15) | | OA (22) | | PA (23) | |
|------------------------------------|--------------|-------------------|--------------|-------------------|--------------|-------------------|
| | At Admission | 72 hour after (%) | At Admission | 72 hour after (%) | At Admission | 72 hour after (%) |
| Tachypnea (47) | 13 | 04 (30.8) | 16 | 05 (31.3) | 18 | 05 (27.8) |
| Chest indrawing (60) | 15 | 05 (33.3) | 22 | 07 (31.8) | 23 | 06 (26.1) |
| Tachycardia (22) | 06 | 02 (33.3) | 08 | 03 (37.5) | 08 | 03 (37.5) |
| O ₂ saturation<95% (26) | 09 | 03 (33.3) | 09 | 03 (33.3) | 08 | 02 (25.0) |
| Crep & Rhonci (49) | 14 | 04 (28.6) | 17 | 05 (29.4) | 18 | 05 (27.8) |
| Hepatomegaly (58) | 15 | 06 (40.0) | 21 | 08 (38.1) | 22 | 07 (31.8) |

(NA-No Antibiotic, OA-Oral Antibiotic, PA-Parenteral Antibiotic)

Table-III: Outcome of Bronchiolitis in different treatment group

| Outcome | NA -15 (%) | OA-22 (%) | PA-23 (%) | P value |
|---------------|------------|-----------|-----------|---------|
| Improved | 14 (92.9) | 21 (95.5) | 22 (95.5) | >0.5 |
| Deteriorated | 01 (07.1) | 01 (04.5) | 01 (04.5) | >0.1 |
| Hospital stay | 6.2 ± 1.4 | 6.7 ± 1.1 | 6.3 ± 1.5 | >0.1 |

(6.7±1.1) and shorter in NA group (6.2 ±1.4). However the difference in outcome in three groups was statistically insignificant.

DISCUSSION

In Europe, Australia and North America, about 3% of each year's birth cohort is admitted with bronchiolitis every winter in their infancy.¹¹ In this study 80% of children were aged below six months and majority of them were male which is in conformity with observations all over the world.⁸⁻¹⁰ Regarding male preponderance it can be said that male children are more vulnerable genetically and environmentally. Traditionally certain groups of infants are considered to be at high risk of developing more severe RSV bronchiolitis. These high risk groups include premature birth, lack of breast feeding, bronchiolitis in sibs, family history of asthma and smokers in family.^{12,13} In our series we found 46.7% of affected children had history of bronchiolitis in their sibs and 38.3% were not exclusively breastfed. The findings support the view that breast feeding protects the infant from RSV infection.¹⁴

Most clinicians assess bronchiolitis on the basis of history and physical examination.¹ As usual fever and cough was the most common starting symptoms in our series. Radhi et al have described fever as being very common in initial phase of illness but largely disappearing by the time of hospitalization as a characteristic feature of the disease.¹⁵ Cough & restlessness persisted for a longer time and improved slowly and it was apparently more delayed in PA group. The difference was very little and the impact of injection pain could be a possible factor. Feeding difficulty and inconsolable cry improved steadily in all the three groups. Feeding difficulty is considered as a factor of

very severe disease by Mulholland and nasogastric feeding is suggested until recovery.¹⁶

Essential clinical signs of bronchiolitis are tachypnea, wheezing and subcostal retractions.¹⁷ Hepatomegaly was present in nearly all cases which is due to push down effect of hyperinflated lung as found in other studies.^{17,18} Tachycardia was present in a small number of cases which improved slowly and steadily. None of the cases showed cyanosis but hypoxia was found in 26 cases and it improved a little faster in PA group. Pulse oxymetry is widely used since 1980 and is now widely regarded as fifth vital sign.¹⁸ American Academy of Pediatrics considers maintaining higher SpO₂ in children with risk factors such as fever, acidosis and severe anaemia.¹ However adverse cognition and behavioral outcome were reported at SpO₂ level 90-94% which supports the use of O₂ in present study in case of SpO₂ <95%.¹⁹ Approximately 25% hospitalized infants with bronchiolitis will have radiographic evidence of atelectasis or infiltrates often misinterpreted as possible bacterial infection.²⁰ Consolidation was present in only 8.3% cases but patchy infiltration in this study was much higher (45%) in contrast to other study.⁸

High incidence rate, rising admission and relatively ineffective therapies make the treatment of this common disease controversial. Currently the treatment is supportive – O₂ therapy, nasal clearance, hydration therapy and bronchodilators.^{7,21} Antibacterial medication has been advocated in children with bronchiolitis who have specific indications of the coexistence of bacterial infection.²² Regarding the outcome of this study no fatality was there which was consistent with other studies.^{2,7} Although the deterioration figures in NA

group was apparently more and the hospital stay was little shorter but statistically there was no significant difference.

Limitations of the study: Apart from shortfall in desired number of cases other limitation of the study was lack of comparison of risk factors with the control group for outcome evaluation.

CONCLUSION

Supportive therapy is highly beneficial to clinical improvement of bronchiolitis but antibiotic has no effect in the course of the disease.

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