

# Comparison of Conventional Treatment Along With Prednisolone and Conventional Treatment Alone in Bronchiolitis

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## ABSTRACT

**Objective:** To compare the efficacy of prednisolone as an adjunct to conventional treatment or conventional treatment alone in patients of bronchiolitis. **Study Design:** Randomized controlled trial. **Place and Duration of Study:** Pediatric medicine department Allied Hospital Faisalabad, six months from August 2013 to January 2014. **Methodology:** Eighty patients of acute bronchiolitis, aged 3 months to 2 years presenting in pediatric emergency were enrolled for study. Patients were divided into groups A and B each consisting of 40 patients. Group A received oral prednisolone 2mg/kg/day in three divided doses with conventional treatment while group B was given conventional therapy only. Frequency and percentages were calculated for gender while mean and standard deviation was calculated for age and days of hospitalization.

Efficacy was measured after 72hr of treatment by observing persistence of rhonchi in both groups. Chi-square test was applied with significance at  $<0.05$  to compare the efficacy. **Results:** The mean age of patients in group A was  $13.78 \pm 6.53$  months and in group B it was  $14.8 \pm 5.19$  months. There were 46(57.5%) male and 34 (33.5%) female patients. In group B, 27(67.5%) patients were having rhonchi on third day of admission as compared to only 9 (22.5%) patients in group A who were having rhonchi. Hospital stay was more than 3 days in both groups. Mean hospital stay in experimental group was  $4.72 \pm 1.17$  days while in control group it was  $5.72 \pm 1.5$  days. **Conclusion:** In acute bronchiolitis use of oral prednisolone with conventional therapy reduces rhonchi and decreases days of hospitalization as well. **Key words:** Bronchiolitis, Corticosteroids, Anti-inflammatory agents, Infants.

## INTRODUCTION

Bronchiolitis is the most common lower respiratory tract infection in infants.<sup>1</sup> It involves small air ways (alveoli and bronchioles) and characterized by rhinorrhea, cough, expiratory wheezing or rhonchi, and respiratory distress.<sup>2</sup> Worldwide more than 80% hospitalization in children occurs in the first 12 months of life. In Pakistan, 20-30% of all child death under 5yr age is caused by acute respiratory illness.<sup>3</sup>

In United Kingdom during the winter months 2% of all pediatric admission are due to acute viral bronchiolitis.<sup>4</sup> while in United states ~120 000 infants are hospitalized annually with this ailment.<sup>5</sup>

Peak incidence of bronchiolitis is observed in the winter and spring seasons.<sup>6</sup> Risk factors associated are low socioeconomic status, crowded living, prematurity and low birth weight.<sup>7</sup> In some infants bronchial hyperresponsiveness precedes acute severe bronchiolitis in response to infection with respiratory tract viruses.<sup>8</sup> Its outbreaks occur parallel to the epidemics of respiratory syncytial virus (RSV) that is causative agent for 85% of bronchiolitis cases.<sup>9</sup> Clinically identical disease can occur with infectious agents like parainfluenza virus, adenovirus, rhinovirus, influenza and

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mycoplasma pneumoniae.<sup>10</sup>

Direct viral injury to respiratory mucous membrane causes increase in mucous production from goblet cells, and subsequent necrosis and desquamation of ciliated respiratory epithelium. The cellular debris plugs the bronchioles and results in obstruction. Thus airway edema, necrosis and plugging of bronchioles are the predominant features of bronchiolitis.<sup>11</sup>

Acute bronchiolitis is commonly treated with supportive care (oxygen, frequent nasal suctioning and supplemental fluids), bronchodilators and corticosteroids. The treatment effect of bronchodilators has been well studied. For last many years, such patients have been treated with corticosteroids as they have potent anti-inflammatory action.<sup>12</sup>

Theoretically, anti-inflammatory drugs should help to reduce the early inflammation and necrosis of tissue in acute bronchiolitis.<sup>13</sup> Therefore, early administration of steroids in the treatment could avoid the expenses and inconvenience of continuing unnecessary treatment. In various trials in past both nebulized and systemic administration of corticosteroids have revealed controversial role in treating such cases.<sup>14</sup>

The aim of the study was to investigate whether the use of systemic corticosteroid treatment improved the short term clinical profile of infants and young children with acute viral bronchiolitis, as compared to those who received no corticosteroids.

## **MATERIALS AND METHODS**

The study was conducted in department of Pediatric Medicine, Allied Hospital, Faisalabad, over 6 months of study period from August 2013 to January 2014. Patients were admitted through both out-patient and emergency department and were assessed clinically. Chest X-ray, TLC and DLC were done in all patients to rule out cases of bacterial pneumonia.

All children of both genders with acute bronchiolitis between 3 months to 2 years were included. Acute bronchiolitis was labeled as entity with first episode of wheezing or rhonchi cough and tachypnea, low grade fever [ $<101^{\circ}\text{F}$ ] with hyper inflated chest on X-Ray.

Children with previous history of recurrent

wheezing or rhonchi, gastroesophageal reflux disease and family history of asthma or have used corticosteroid were excluded. A total of 80 patients fulfilling our criteria were registered for study. Purpose, procedure and risk factors were discussed with parents. The study protocol was reviewed by ethical committee. Informed written consent was taken from parents.

Conventional treatment [oxygen (2 L/min), hydration, intravenous fluids (70-100ml/kg/day) and bronchodilation with salbutamol (0.04ml/kg every 6hr)] was given to all patients according to department protocol.

Patients were randomly divided in to two groups; Group A and B, experimental group and control group respectively. There were 40 patients in each group. Patients in Group A received oral prednisolone 2mg/kg/day in three divided doses for three days in addition to conventional treatment.

Patients were evaluated after 72 hours by some other physicians for persistence of rhonchi. Duration of hospitalization was also calculated. Variables were recorded on pre-designed research proforma. Statistical Package for Social Sciences (SPSS-17) was used to analyze data. Means and standard deviations were calculated for quantitative data like age and days for hospital stay. Percentages were calculated for categorical variable like gender and persistence of rhonchi. Chi-square test was applied to compare rhonchi and t-test was applied to compare hospital stay taking p-value as  $<0.05$  as significance level.

## **RESULTS**

There were 40 patients in each of group A and B, experimental and control respectively. The mean age of patients enrolled was  $14.29 \text{ month} \pm 5.89$ . In experimental group mean age was  $13.78 \pm 6.53$  months and in control group it was  $14.8 \pm 5.19$  months. After 72 hours of admission, rhonchi were present only in 22.5% of patients in group A and 67.5% of patients in group B as shown in Table I. None of the patients was discharged during first three days of admission. Mean hospital stay in group A was  $4.72 \pm 1.17$  days while in group B; it was  $5.72 \pm 1.5$  days taking p-value as 0.0014 at  $t=3.3246$  by using t-test. Significant difference was seen between the use of

prednisolone in patients with acute bronchiolitis when used with conventional therapy for early recovery and reduction in days in hospital stay.

**Table I: Persistence of rhonchi in Group A & B**

| Persistence of rhonchi | Group       |             | Total |
|------------------------|-------------|-------------|-------|
|                        | A           | B           |       |
| Yes                    | 9<br>22.5%  | 27<br>67.5% | 36    |
| No                     | 31<br>77.5% | 13<br>32.5% | 44    |
| Total                  | 40          | 40          | 80    |

chi-square value = 16.364, df = 1, p-value = <0.0001

## DISCUSSION

Although viral bronchiolitis is the most common lower respiratory tract infection in infants and frequent reason for children to present for care, there is little consensus and much controversy regarding treatment strategies for this common problem.<sup>15</sup>

Studies evaluating efficacy of corticosteroid are significantly heterogeneous and both positive and negative results have been obtained in different studies. In present study though limited number of patients is included but statistically significant results are obtained. After 72 hours of admission, ronchi were present in only 22.5% of patients treated with steroids as compared to 67% of patients in placebo group ( $p = <0.0001$ ) who had ronchi. Mean hospital stay in steroid group was 4.72 days while it was 5.72 days in placebo group ( $p = 0.0014$ ,  $t = 3.324$ ).

The results of our study match with the work done by Van Woensel and his colleagues in which it was found that steroids decreased symptoms score faster when compared with placebo (-1.2 points/day versus -0.6 points/day). Mean length of hospital stay was 7.3 days in steroid group and 8.3 days in placebo group (95% CI for difference -4.1 to 2.2,  $p = 0.54$ ).<sup>16</sup> Similarly, meta-analysis done by Michelle et al has shown that infants who received corticosteroids had a mean length of stay at hospital (LOS) and duration of symptoms (DOS) 0.43 days less than those who received placebo treatment (95% CI : -0.81 - 0.05 days).<sup>2</sup> In a systemic review, Hartling and co-workers

analyzed 48 trials of bronchiolitis patients and found that steroids when given with other bronchodilators are much effective than other therapies.<sup>17</sup>

Placebo controlled trial by Jartti and co-workers revealed that steroids have no effect on duration of hospital stay but prevent subsequent attack of bronchiolitis.<sup>18</sup> On the other hand a trial conducted by Roosevelt and his colleagues has provided strong evidence against systemic use of corticosteroids. In this project, systemic steroids were compared with placebo and they were unable to show any beneficial effect on improvement of symptoms.<sup>19</sup>

Kellner et al also observed that bronchodilator therapy when compared with steroids have shown short term improvement in clinical signs but no effect over the clinical outcome.<sup>20</sup>

Our study has many limitations in terms of sampling and correct etiological diagnosis for bronchiolitis. The present data suggest a need for additional research involving the host and virological factors as well as outcome measures to highlight the role of steroids in bronchiolitis.

The recent trial also raises new questions for potentially novel approach to the acute management of bronchiolitis and warrants closer investigations. Although combined and interactive effect of both drugs (steroids and salbutamol) has emerged as potential treatment option but further information is needed regarding the use of steroids alone or in combination with other supportive measures with the help of larger trials.

## CONCLUSION

Prednisolone is useful in reducing hospital stay and improving ronchi in patients of bronchiolitis when used in combination with conventional therapy. However further trials should be done highlighting the role of prednisolone alone or in combination with other drugs like adrenaline, salbutamol or ipratropium.

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Submitted for Publication: 03-11-2014

Accepted for Publication: 17-12-2014