Original Article

COMPARISON OF MEAN DURATION OF BRONCHIOLITIS IN CHILDREN RECEIVING STANDARD TREATMENT WITH AND WITHOUT INTRAVENOUS STEROIDS

Aamer Naseer Qureshi, Humayun Iqbal Khan and Afsheen Mahboob

Objective: To compare mean duration of bronchiolitis in children receiving standard treatment with and without intravenous steroids.

Material and Methods: The study was conducted at the department of Pediatrics Services Hospital Lahore. The duration of the study was six months from 1st July 2013 to 31st December 2013. After informed consent and ethical approval, 140 children aged 2-24 months presenting with bronchiolitis i.e. complaints of fever > 38ºC, coryza, wheezing and tachypnea were included by non-probability consecutive sampling. Seventy cases were assigned randomly to either intravenous steroids or placebo group by using random number table. Children having history of prematurity and mechanical ventilation in newborn period, more than one episode of respiratory distress in past, family history of asthma or chronic cardiovascular conditions like congenital heart diseases were excluded. Duration of hospital stay was measured in days starting from the day of admission till the resolution of wheezing and tachypnea. Data was documented on structured proforma and analyzed using SPSS 21. Difference in mean duration of wheezing, tachypnea and bronchiolitis in treatment and placebo groups was compared using independent sample t test. A p - value <0.05 was considered as significant

Results: One hundred forty children (53% male with mean age 8.9 ± 6.4 months) were included. Age and sex distribution was similar in both treatment and placebo groups. When mean duration of bronchiolitis / hospital stay was compared between treatment and placebo group the result was in-significant. (P value= 0.104).

Conclusion: It is concluded that there is no difference in mean duration of bronchiolitis in children receiving intravenous steroids and those not receiving steroids.

Keywords: Bronchiolitis, Intravenous steroids, Hospital stay, Duration of Bronchiolitis

Introduction

The definition for bronchiolitis in most clinical studies is the first episode of wheezing in a child younger than 24 months who has physical findings of a viral respiratory infection and has no other explanation for the wheezing, such as pneumonia or atopy.[1,2]

It is estimated that each year as many as 1, 26,000 infants are hospitalized in the US due to bronchiolitis.[3] Worldwide, as many as 1/200 infants are hospitalized annually for treatment of LRTI, with a mortality rate as high as 5%.[4]

In Pakistan acute respiratory illness (ARI) is the leading cause of death accounting for 20% - 30% of all deaths under 5 years.[5]

Bronchiolitis is an infection typically caused by virus. The disease caused by specific viruses varies depending upon the season and the year.[6] Respiratory syncytial virus (RSV) is the most common cause, followed by rhinovirus. Less common causes include parainfluenza virus, human metapneumovirus, influenza virus, adenovirus, coronavirus, and human Boca virus (discovered in 2005).[7] With molecular diagnosis, co-viral infections may occur in approximately one-third of young children hospitalized with bronchiolitis.[8] In addition, LRTI and wheezing episodes in infants occasionally are associated with Mycoplasma pneumonia.

Bronchiolitis typically affects infants younger than two years, mainly during the winter months[9]

Corticosteroids are used to treat bronchiolitis as an anti-inflammatory therapy. In some places their use may be as high as 60 %, in inpatient departments. Theory suggests that steroids have a role in reducing inflammations in the lower airway passages caused by viral agents, for this reason they are widely prescribed by the physicians.[10]

The pathological theory suggests that the anti-inflammatory action of corticosteroids might relieve the severity of bronchiolitis and its duration but the majority of clinical studies have failed to prove this.[11]

Since no such work have been performed

In Pakistan, so we conducted this study to compare mean duration of bronchiolitis in children receiving standard treatment with and withoutIntravenous steroids.

Material And Methods

It was a randomized controlled clinical trial which was conducted in the department of Paediatrics, Services Hospital, Lahore. The duration of study was 6 months i.e from 1st July to 31st December 2013. One hundred forty subjects (70 cases and control each selected at 95% confidence interval and 80% power of test and taking magnitude (mean± SD) of duration of bronchiolitis with intravenous steroids supplemented group and placebo group 4.7 ± 1.97 and 4.97 ± 2.43 respectively. The inclusion criteria included children aged 2-24 months, both genders, clinical diagnosis of bronchiolitis as evident by fever>38ºC, coryza, wheezing and tachypnea. Exclusion criteria included history of more than one episode of respiratory distress in past, presence of chronic cardiovascular conditions like congenital heart diseases diagnosed on chest X-ray and echocardiography, history of prematurity and mechanical ventilation at the time of birth and family history of asthma. One hundred forty cases of bronchiolitis meeting the inclusion criteria were selected. Informed consent was taken from parents/attendants. Approval was taken by ethical committee of the hospital. Cases were registered for study and demographic information of patients (name, age, sex, address) was obtained on a structured proforma. Detailed history was taken from patient/guardian along with a complete physical examination.

Cases were randomly assigned to either treatment group by using random number table. The patients were divided into 2 groups "A" and "B". The groups "A" and "B" received either intravenous hydrocortisone (10mg/kg/day) or placebo in thrice daily doses for 7 days. The study was double blind i.e. neither the patient nor the assessor knew about treatment. Both solutions were packed in identical looking bottles. Standard conventional treatment of bronchiolitis was provided to both groups including oxygen inhalation and supportive therapy. Cases were assessed for wheezing and tachypnea and the findings were recorded daily till the resolution of bronchiolitis. At the end of study, codes were decoded. All the information i.e. duration of wheezing, tachypnea and bronchiolitis was recorded on the structured proforma.

The collected data was analyzed by using SPSS 21. Frequency and percentages were calculated for the qualitative variables like gender and mean and standard deviation was calculated for quantitative variables like age and duration of symptoms. Difference in mean duration of wheezing, tachypnea and bronchiolitis in treatment and placebo groups was compared using independent sample t test. A p value < 0.05 was considered as significant. To determine the effect of age and gender in both groups, the data was stratified and cross tabulated for age groups and gender against duration groups for symptoms.

Results

One hundred forty children were included in the study with mean age 8.9 ± 6.4 months ranging from 2 to 23 months. Seventy four children (53%) were male (Fig-1). Average duration of wheeze was 4.2 ± 1.9 days almost having a normal distribution. Similarly tachypnea remained in all patients for 4.6 ±1.4 days with normal distribution. The average duration of hospital stay i.e. duration of bronchiolitis in all admitted patients was 4.9 ± 1.5 days ranging from 2 to 9 day**s (Table-1**).

When mean duration of hospital stay was compared between treatment and placebo groups the difference was statistically non-significant (P value = 0.104) while using independent samples t test. Similarly when mean duration of tachypnea and wheezing was compared in both groups, the difference was statistically non-significant (P = 0.471) **(Table-2).**

To determine the effect of age and gender on duration of wheeze, tachypnea and bronchiolitis in both groups, data was grouped analyzed. Forty eight percent children were below 6 months. Fifty six percent children developed wheeze for less than 4 days. Similarly 54% patients suffered from tachypnea for less than 4 days. Fifty six percent children stayed in the hospital for more than 4 days.

When duration of wheeze and treatment groups were cross tabulated results were non-significant (p value = 0.73). However there was significant relation between age and duration of wheeze. (P = 0.003).

Gender had non-significant role in duration of wheezing (p value = 0.938) and tachypnea (p value = 0.654) among 140 patients. But age groups has significant relation with duration of tachypnea showing increased duration in older age groups (P = 0.06) and duration of hospital stay/bronchiolitis (p value=0.001) showing the older children are more prone to have longer duration of disease **(Table-3).**

Table-1: Summary statistics of all variables.

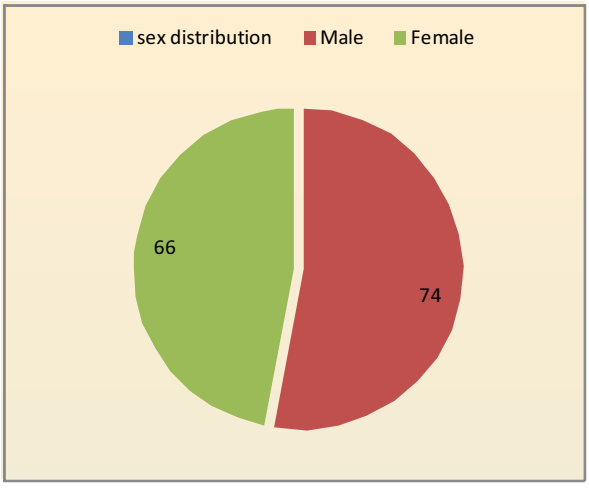
		IV Steroid group	Place be group	Significant difference
Mean age in months		8.3±6.1	9.5±6.6	P value=0.263
Gender	Male:	39 (55.7%)	35 (50%)	P value= 0.498
	Female:	31 (44.3%)	35 (50%)	
Lenght of stay		5±1.58	4.87±1.34	P value=0.604
Dur. of Wheeze		4.07±2.1	4.26±1.8	P value=0.535
Dur. Of Tachypnea		4.7±1.4	4.5±1.3	P value=0.471

Table-2: Comparison of treatment and placebo groups .

		More than 4 days	Less than days	P value
Duration of Hospital Stay	Treatment Group	39 (54.6%)	39 (54.6%)	1.00 Non-significant
	Placebo group	31(45.4%)	31 (45.4%)	
Duration of Tachypnea	Treatment Group	35 (50%)	30 (42%)	0.397 Non-Significant
	Placebo group	35 (50%)	40 (58%)	
Duration of Wheeze	Treatment Group	30 (42%)	32 (44.8%)	0.73 Non-Significant
	Placebo group	40 (58%)	38 (55.2%)	

Table-3: Comparison of age with treatment and placebo groups.

	Age	More than 4 days	Less than days	Total	P value
Duration of Hospital Stay	Less than 6 months	28 (41.8%)	39 (58.2%)	67	0.001 Significant
	More than 6 month	50 (68.%)	23 (31.5%)	73	
Duration of Tachypnea	Less than 6 months	23 (34.3%)	44 (65.7%)	67	0.006 Significant
	More than 6 months	42 (57.5%)	31 (42.5%)	73	
Duration of Wheeze	Less than 6 months	21 (31.4%)	46 (68.6%)	67	0.008 Significant
	More than 6 months	41 (56.1%)	32 (43.9%)	32	



Discussion

Bronchiolitis is considered a serious disease having fatal complications in early childhood. Our study population depicts that it is much more prevalent in first 6 months of life as the mean age in our study population came out about 9 months.

Average duration of wheeze and tachypnea was normally distributed showing the disease is self-limiting. It also explains that the most common causes of bronchiolitis are viral which settles over time. Average duration of bronchiolitis and hospital stay was about 5 days showing a heavy burden and cost in underdeveloped countries like ours. As the population was randomly assigned to intravenous steroid and placebo groups, age distribution remain

same in both groups.

We usually over prescribe patients presenting with bronchiolitis because of the fear of complications. Intravenous steroids are lifesaving drugs which should be used with great caution to reduce the complications. The available evidences shows controversy in the use of steroids in bronchiolitis.[12]

In this study we use the length of hospital stay as a parameter to determine the efficacy of the steroids in bronchiolitis. When randomly assigned patients were evaluated the difference in mean duration in both groups was not statistically significant showing no added benefit of steroids on the duration of bronchiolitis/hospital stay.

Additionally we calculated the effect of steroid on two leading diagnostic symptoms i.e. wheezing and tachypnea. The mean duration of these symptoms was same in steroid versus placebo group

We came across that only age groups have some significant effect on duration of symptoms. According to our study, in patients older than 6 months of age there is increase in the duration of hospital stay ($p = 0.001$), duration of tachapnea ($p = 0.006$) and duration of wheeze ($p = 0.008$) as compared to patients younger than 6 months of age. These results are consistent to the study performed by Alansari et al [13] which shows that there is 31% reduction in the duration of symptoms in the children having median age of 3.5 months. It means that older patients are more prone to prolongation of wheezing and tachypnea as compared to younger age group. Our study shows that there no reduction in hospital stay in the babies receiving steroids (5 ± 1.5 days) as compared to placebo group (4.87 ± 1.3 days). Teeratakulpisarn et al[14] reported that there is decrease in the mean length of hospital stay of 13.4 hr ($P = 0.02$) in patients receiving steroids as compared to placebo group. This difference may be due to the fact that in the said study dexamethasone was used, which is more potent steroid than hydrocortisone, used in our study.

Conclusion

It is concluded that there is no difference in mean duration of bronchiolitis and length of hospital stay in children receiving intravenous steroids than those not receiving it along with standard therapy. Hence the use of intravenous steroid is not evidence based and should be discouraged. Many confounding factors like non availability of high technology laboratory hindered our work in knowing the levels of steroids to make our evidence more recommendable.

Department of Paediatric Medicine
SIMS/Services Hospital, Lahore

www.esculapio.pk

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Picture Quiz

WHAT IS THE DIAGONOSIS?

50 years old unconscious patient collapsed with GCS 3 in Emergency department where he presented with history of abdominal pain and vomiting. What has happened to the below?

See answer at page # 15