The Professional Medical Journal
www.theprofesional.com
DOI: 10.17957/TPMJ/15.2811

ORIGINAL PROF-2811

TREATMENT OF BRONCHIOLITIS;
ROLE OF INHALED β-AGONISTS IN INFANTS AND CHILDREN

1. MBBS,FCPS
Assistant Professor
Department of Pediatrics
Independent Medical College,
Faisalabad
2. MBBS, FCPS
Assistant Professor
Department of Pediatrics, Unit II
Punjab Medical College/
DHQ, Hospital Faisalabad
3. MBBS,FCPS
Senior Registrar
Department of Pediatrics, Unit II
Punjab Medical College/
DHQ, Hospital Faisalabad
4. MBBS,FCPS
Professor of Pediatrics
Department of Pediatrics, Unit II
Punjab Medical College/
DHQ, Hospital Faisalabad

Correspondence Address:
Dr. Zahid Mahmood Anjum
6-B Staff Colony
Punjab Medical College, Faisalabad.
zmahmoodch@yahoo.com

Article received on:
12/02/2015
Accepted for publication:
28/08/2015
Received after proof reading:
09/09/2015

Dr. Jawaria Masood[1], Dr. Zahid Mahmood Anjum[2], Dr. Ali Asgher Taseer[3], Prof. Dr. Hina Ayesha[4]

ABSTRACT…**Objective:** To compare the efficacy of normal saline and inhaled β-agonist in the treatment of bronchiolitis. **Study design:** Randomized clinical trial. **Settings:** The study was conducted in Paediatric Medicine Department, DHQ hospital/Punjab Medical College Faisalabad. **Period:** 06 months from 1st October 2013 to 31st march 2014. **Results:** In this study, 58.33%(n=21) in Group-A and 66.67%(n=24) in Group-B were between 0-9 months of age, mean and sd was calculated as 11.43±3.87 months in Group-A and 10.52±3.32 months in Group-B, 52.78%(n=19) in Group-A and 61.11%(n=22) in Group-B were male while 47.22%(n=17) in Group-A and 38.89%(n=14) were females, mean clinical score in both groups was recorded as 4.11+1.32 in Group-A and 5.65+1.89 in Group-B, comparison of efficacy in both groups was recorded which shows 58.33%(n=21) in Group-A and 25%(n=9) in Group-B were treated effectively while rest of 41.67%(n=15) in Group-A and 75%(n=27) in Group-B were not treated effectively, p value was calculated as 0.008, which is statistically significant. **Conclusions:** The results of this study reveal that inhaled β-agonists are more effective than normal saline.

Key words: Bronchiolitis, children, treatment, inhaled β-agonist, normal saline, efficacy

Article Citation: Masood J, Anjum ZM, Taseer AA, Ayesha H. Treatment of bronchiolitis; role of inhaled β-agonists in infants and children. Professional Med J 2015;22(9):1126-1131. **DOI:** 10.17957/TPMJ/15.2811

INTRODUCTION

Bronchiolitis is very common and potentially serious respiratory disease of young children. It is a leading cause of acute illness and hospitalization of young children. It is a common problem in children less than 2 years of age with a peak incidence in 2-5 months of age. It is found to be 11.4% in all children suffering from lower respiratory tract infection less than two year and it is 8% in children up to age of 2 years.

Bronchiolitis is predominantly a viral illness. In more than 50% of cases the causative agent is Respiratory syncitial Virus. The other agents include Para-influenza virus, Adeno-virus, Influenza type A & B. Clinical symptoms include wheezing, tachypnea, increased expiratory efforts, inter and sub costal retractions. Evidence based reviews have suggested a limited role for diagnostic laboratory or radiographic test in typical cases of bronchiolitis and as viral cultures are difficult to do.[1,2]

To date there is not a single widely practiced evidence driven treatment approach for bronchiolitis. Medical therapies used to treat bronchiolitis are Beta agonists, normal saline, epinehrine and corticosteroids. It is said that typical bronchiolitis course is modified by aggressive evaluation, use of antibiotics and other inhalational therapies.[3] Some studies showed that normal saline inhalation is as effective as other inhalational therapies.[4] The concept behind the use of normal saline is that, it plays an important role in maintaining hydration of air-way surface liquid (as there is airway liquid dehydration in bronchiolitis) and so is the mucus clearance. Thus normal saline is not a placebo now.[5] In different studies[6,7] it is mentioned that Beta agonists have better results in bronchiolitis. In another study Beta agonists were compared with normal saline and there was 64% improvement in clinical scoring in beta agonists as compared to 27% in normal saline group.[8]

Criterion		0	1	2	3
General Appearance		Active and alert	Irritable but responds to comfort, interested in feeds	Unsettled, no interest in toys/ environment	Unresponsive to environment, focused on breathing
Respiratory Rate	<6 months	<40	40-55	56-70	>70
	6 months	<30	30-45	46-60	>60
Retractions		None	Intercostal only	Trachosturnal	Severe with nasal flaring
Wheezing		None	Terminal expratory only with stethoscope	Entire expression or audible on expiration without stethoscope	Inspiration and expiration without stethoscope

Normal saline is cheaper, easily accessible even at home without being hospitalized and effective in treatment of bronchiolitis as compared to other inhalation therapies including beta-agonists. So the results of this study will help to choose the better treatment option for bronchiolitis.

OBJECTIVE

The objective of the study was to:

- compare the efficacy of normal saline and inhaled β-agonist in the treatment of bronchiolitis

OPERATIONAL DEFINITIONS

Bronchiolitis:

- A child was said to have bronchiolitis when there is history of preceding upper respiratory illness or exposure to persons with viral upper respiratory infections and on examination there are signs of respiratory illness like tachypnea, retractions, nasal flaring and wheezing.

Efficacy:

- Efficacy was measured in terms of overall improvement in clinical scoring including respiratory rate, retraction wheezing and general condition up till 72 hours of starting the treatment.

Bronchiolitis Clinical Scoring

Patient having total of 0-4 score was categorized as mild bronchiolitis 5-8 moderate and 9-12 severe. Therapy is considered effective if there is decrease of $\geq$ 3 from pre to post therapy score. In our study we considered patients with moderate bronchiolitis.

HYPOTHESIS

Null hypothesis

- There is no difference between the efficacy of noramal saline and beta-agonists in treatment of bronchiolitis.

Alternative hypothesis

- There is some difference between the efficacy of normal saline and beta-agonists in treatment of bronchiolitis.

MATERIAL AND METHODS

Study design

- Randomized clinical trial

Settings

- The study was conducted in Paediatric Medicine Department DHQ hospital/ Punjab Medical College Faisalabad.

Duration of study

- 06 months from 1st october2013 to31st march2014

Sample size

- By using WHO sample size calculator for 2 proportions (2-sided):
  P1 = 64%[8]
  P2 = 27%[8]
  Level of significance = 5%

Power of study =90%
Sample size = 72 (36 in each group).

Sample technique

- Non-probability consecutive sampling.

INCLUSION CRITERIA

- Intended primarily for use in children: Age < 2 years and presenting first time with moderate bronchiolitis.

EXCLUSION CRITERIA

1. Who had received steroid or bronchodilators within last month
2. Had under lying lung / cardiac disease.
3. Patients of bronchopneumonia / lobar pneumonia.
4. Admitted to an ICU.
5. With other severe comorbid complications requiring ventilator care.
6. Patients with immuno deficiencies.

DATA COLLECTION PROCEDURE

Ethical committee approval was taken. 60 Children of either sex fulfilling inclusion criteria either through OPD or emergency. Exclusion criteria was strictly followed. The purpose, procedure, risks and benefits were explained to the parents of children and informed consent was taken. Chest X-ray was done in every case from hospital Radiology Department.

After this I randomly made two groups A and B by using computer generated random number table. Both groups were scored before giving any therapy Group A received inhaled salbutamol nebulzation (0.2mg/kg diluted in 2cc normal saline) 4 hourly and group B received normal saline (8cc) nebulization 4 hourly. Then both groups were observed. Respiratory rate was counted by me at intervals. General appearance and retraction was noticed and scored at interval of 24hr, 48hr and 72hr. Wheezing was assessed with stethoscope at same time interval. No other drug like antibiotics and steroids were given during this period except oxygen inhalation. In febrile children temperature was brought down by hydrotherapy alone or by using antipyretics. All the information was recorded on proforma by myself.

DATA ANALYSIS

At the end of study results were entered and analyzed by using SPSS V-10. Descriptive statistics were calculated for all variables. Mean and standard deviation was calculated for all quantitative variables like age, clinical score. Frequency and percentages were calculated. Qualitative variables like gender, category of disease and efficacy in both groups. Chi-square test was used for qualitative variables like efficacy in two groups. P-value $\leq$0.05 was taken as significant.

RESULTS

A total of 72 cases fulfilling the inclusion/exclusion criteria were enrolled to compare the efficacy of normal saline and inhaled β-agonist in the treatment of bronchiolitis.

Age distribution

Age distribution of the patients was done which shows 58.33%(n=21) in Group-A and 66.67%(n=24) in Group-B were between 0-9 months while 41.67%(n=15) in Group-A and 33.33%(n=12) in Group-B were between 10-20 months of age, mean and sd was calculated as 11.43$\pm$3.87 months in Group-A and 10.52$\pm$3.32 months in Group-B. (Table No. I)

Gender distribution

Gender distribution of the patients was done in Table No. 2, where 52.78%(n=19) in Group-A and 61.11%(n=22) in Group-B were male while 47.22%(n=17) in Group-A and 38.89%(n=14) were females. (Table No. II)

Mean clinical score

Mean clinical score in both groups was recorded as 4.11+1.32 in Group-A and 5.65+1.89 in Group-B. (Table No. III)

COMPARISON OF EFFICACY IN BOTH GROUPS

Comparison of efficacy in both groups was

recorded which shows 58.33%(n=21) in Group-A and 25%(n=9) in Group-B were treated effectively while rest of 41.67%(n=15) in Group-A and 75%(n=27) in Group-B were not treated effectively, p value was calculated as 0.008, which is statistically significant. (Table No. IV)

Age (in months)	Group-A (n=36)		Group-B (n=36)	
	No. of patients	%	No. of patients	%
0-9	21	58.33	24	66.67
10-20	15	41.67	12	33.33
Total	**36**	**100**	**36**	**100**
Mean ± SD	**11.43±3.87**		**10.52±3.32**	

Table-I. Age distribution (n=72)

Gender	Group-A (n=36)		Group-B (n=36)	
	No. of patients	%	No. of patients	%
Male	19	52.78	22	61.11
Female	17	47.22	14	38.89
Total	**36**	**100**	**36**	**100**

Table-II. Gender distribution (n=72)

Clinical score	Group-A	Group-B
	4.11±1.32	5.65±1.89

Table-III. Mean clinical score in both groups (n=72)

Efficacy	Group-A (n=36)		Group-B (n=36)	
	No. of patients	%	No. of patients	%
Yes	21	58.33	9	25
No	15	41.67	27	75
Total	**36**	**100**	**36**	**100**

Table-IV. Comparison of efficacy in both groups (n=72)

DISCUSSION

Acute bronchiolitis is an important lower respiratory tract infection, especially in children with younger age. Its clinical picture resembles asthma because of rhinorhoea, wheezing and tachypnoea. This similarity has affected the treatment modalities of acute bronchiolitis, and has caused bronchodilators and corticosteroids to be used commonly in its management.[9,13]

Many aspects of the management of bronchiolitis remain controversial as reflected in use of specific therapies among clinicians, both at different institutions and in disparate geographical regions.[14-17]

Normal saline is cheaper, easily accessible even at home without being hospitalized and effective in treatment of bronchiolitis as compared to other inhalation therapies including beta-agonists. However, we intend to conduct this study to choose the better treatment option for bronchiolitis.

Base line characteristics of the children i.e. age and gender in both groups were insignificant while comparison of efficacy in both groups was recorded which shows 58.33%(n=21) in Group-A and 25%(n=9) in Group-B were treated effectively while rest of 41.67%(n=15) in Group-A and 75%(n=27) in Group-B were not treated effectively, p value was calculated as 0.008, which is statistically significant.

Similar findings are recorded in a study by Gadomski AM and co-workers who recorded that beta agonists were compared with normal saline and there was 64% improvement in clinical scoring in beta agonists as compared to 27% in normal saline group.[8]

Our results are further compared with another study by Klassen TP and co-workers[18] who determined that whether nebulized salbutamol (albuterol) is safe and efficacious for the treatment of young children with acute bronchiolitis, they enrolled 83 children (median age 6 months, range 1 to 21 months) in a randomized, double-blind clinical trial. Participants received two treatments at 30-minute intervals of either nebulized salbutamol (0.10 mg/kg in 2 ml 0.9% saline solution) or a similar volume of 0.9% saline solution placebo. Outcome measures were the respiratory rate, pulse oximetry, and a clinical score based on the degree of wheezing and retractions. Patients in the salbutamol arm had significantly greater improvement in clinical scores after the initial treatment ($p = 0.04$). There was no difference between the groups in oxygen saturation ($p = 0.74$); patients treated with salbutamol had a small increase in heart rate after two treatments (159 +/- 16 vs 151 +/- 16; $p = 0.03$). They concluded that salbutamol is safe and effective for the initial treatment of young children with acute bronchiolitis.

Khashabi J and colleagues[19] in their study compared the efficacy of salbutamol and normal saline and concluded that salbutamol is more effective than normal saline.

However, the results of the study justifies the hypothesis of the study that "there is some difference between the efficacy of normal saline and beta-agonists in treatment of bronchiolitis".

Through normal saline is cheaper, easily accessible even at home without being hospitalized and effective in treatment of bronchiolitis as compared to other inhalation therapies including beta-agonists but the efficacy is significantly higher in Beta agonist group.

The limitation of the study was that we did not recorded any complications of the drugs during the trial but no significant complications were recorded in the study and salbutamol may be confidently used for the management of the bronchiolitis in the children.

CONCLUSION

The results of the study reveal that on comparison of efficacy of normal saline and inhaled β-agonist in the treatment of bronchiolitis, β-agonists are more effective than normal saline.

References

1. Joseph.J, Zorc, Hal BC. **Recent evidence on diagnosis and management of bronchiolitis.** Med J Philidelphia. 2010;125(2):342-9.
2. Watts KD, GoodmanM.**Wheezing Brochiolitis and Bronchitis.** In: Behrman R Jenson. Nelson text book of Pediatric.18th ed.Philadilphia:saunders;2007;1773-75.
3. Sieden AJ, Scarfone JR. **An evidence based approach to management of Bronchiolitis.**2009;10:75-81.
4. Anil AP, Anil M, Saglam BA, Cetin N, Aksu N. **High volume normal saline alone is as effective as neubilzed salbutamol normal saline, epinephrine.** Normal saline & 3% saline in bronchiolitis: Pediatr Palmonology. 2010;45(1):41-7.
5. Mandelberg A, Amirav I. **Hypertonic saline or high volume saline for viral bronchiolitis: Mechanism and rationale:** Pediator Pulmonology 2010;45:36-40.
6. Gupta P, Aggarwal A, Sharma KK. **Oral salbitamol for symptomatic relief in mild bronchiolitis.** Indian Pediatr. 2008;45:547-53.
7. **Bronchiolitis guideline team, Clincinnati Children's Hospital Medical Centre.** Evidence_based care guidelines for management of bronchiolitis in infants 1 year of age or less with the first time episode: Revised on August 15, 2005, November 28, 2001, November 16, 2010 (Internet. Cincinnati: Cincinnati Children's Hosital Medical Centre.
8. Gadomski AM, Brower M. **Bronchodilators for bronchiolitis.** Cochrane Database Syst Rev. 2010;12:1266.
9. Sammartino LP, Lines D. **Efficacy of ipratropium bromide by metered dose aerosol and aerochamber in acute paediatric bronchiolitis.** J Paediatr Child Health 1997;33:459.

10. Canny GJ. **Acute bronchiolitis-recent advances in treatment.** Indian J Pediatr 1996;63:45-51.

11. Dobson JV, Stephens-Groff SM, McMahon SR, Stemmler MM, Brallier SL, Bay C. **The use of albuterol in hospitalized infants with bronchiolitis.** Pediatrics 1998;101:361-8.

12. Renzi PM, Turgeon JP, Marcotte JE, et al. **Reduced interferon-gama production in infants with bronchiolitis and asthma.** Am J Respir Crit Care Med 1999;159:1417-22.

13. Brand PLP, Vaessen-Verbenne APHA. **Differences in management of bronchiolitis between hospitals in the Netherlands.** Eur J Pediatr 2000;159:343-7.

14. Behrendt CE, Decker MD, Burch DJ, et al: **International variation in the management of infants hospitalized with respiratory syncytial virus.** Eur J Pediatr 1998;157:215-20.

15. McConnochie KM, Roghmann KJ, Liptak GS: **Hospitalization for lower respiratory tract illness in infants: Variation in rates among counties in New York State and areas within Monroe County.** J Pediatr 1995;126:220-9.

16. Johnson DW, Adair C, Brant R. **Differences in admission rates of children with bronchiolitis by pediatric and general emergency departments.** Pediatrics 2002;110:e49.

17. Mallory MD, Shay DK, Garrett J. **Bronchiolitis management preferences and the influence of pulse oximetry and respiratory rate on the decision to admit.** Pediatrics 2003;111:e45.

18. Klassen TP, Rowe PC, Sutcliffe T, Ropp LJ, McDowell IW, Li MM. **Randomized trial of salbutamol in acute bronchiolitis.** J Pediatr. 1991;118(5):807-11.

19. Khashabi J, Salari LAK S, Karamiyar M, Mussavi H. **Comparison of the efficacy of nebulized L-Epinephrine, salbutamol and normal saline in acute bronchiolitis: a randomized controlled trial.** MJIRI 2005;19:119-25.

"Forget what HURT you,
but never forget what it taught you."

Unknown

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Jaweeria Masood	Data Collection	
2	Zahid Mahmood Anjum	Discussion writing	
3	Ali Asghar Taseer	References collection	
4	Prof. Hina Ayesha	Reviewed and supervision whole study	