Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page:www.jamdsr.com doi:10.21276/jamdsr Index Copernicus value [ICV] =82.06

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Salbutamol via metered- dose inhaler with spacer versus nebulizer for acute wheezing in children

[1]Rohit Jain, [2]Bajrang Singh

[1]Associate Professor, Department of General Medicine, Venkateshwara Institute of Medical Sciences, Amroha, India;
[2]Associate Professor, Department of Paediatrics, N C Medical College & Hospital, Panipat, India

ABSTRACT:
Background: Acute respiratory diseases in children are a significant cause of illness and can range from mild to severe, depending on the underlying cause and the child's overall health. The present study was conducted to compared salbutamol via metered- dose inhaler with spacer versus nebulizer for acute wheezing in children less than 2 years of age. **Materials & Methods:** 50 children presenting with "moderate to severe" wheezing, seen in the emergency department were selected. Two salbutamol treatment groups were formed. In the first hour, the group I (MDI-S group) received 2 puffs (100 µg/puff) every 10 min for 5 doses, and the group II (NEB group) received 0.25 mg/kg every 13 min for 3 doses. If the clinical score was >5 at the end of the first hour, the patients received another hour of the same treatment and also betamethasone (0.5 mg/kg intramuscular). On enrollment and after the first and the second hour of treatment each child had a validated clinical score. **Results:** The mean birth weight was 3512.5 grams and 3420 grams, age at first attack was 7.2 months and 8.4 months, previous attacks was 2.7 and 3.2, previous hospitalizations was seen in 12 and 13, asthma and atopy in first-degree relative were seen in 5 and 6, parental smoking was seen in 25 and 28 and kerosene stove were enrolled in 21 and 30 in group I and II respectively. The difference was significant (P< 0.05). Respiratory rate in admission was 56.4 min^{-1} and 55.2 min^{-1}, clinical score was 7.2 and 7.6, after 1 hour was 3.2 and 4.1 and after 2 hours was 3.5 and 4.3 respectively. The difference was significant (P< 0.05). **Conclusion:** Salbutamol administered using an MDI, spacer, and face mask was more effective than nebulizer in treating children under two years old who were treated in the emergency room using a standardized protocol for "moderate to severe" acute wheezing.
Keywords: Nebulizer, Salbutamol, spacer

Received: 13-06-2019 Accepted: 15-07-2019

Corresponding author: Bajrang Singh, Associate Professor, Department of Paediatrics, N C Medical College & Hospital, Panipat, India

This article may be cited as: Jain R, Singh B. Salbutamol via metered- dose inhaler with spacer versus nebulizer for acute wheezing in children. J Adv Med Dent Scie Res 2019;7(8):403-405.

INTRODUCTION

Acute respiratory diseases in children are a significant cause of illness and can range from mild to severe, depending on the underlying cause and the child's overall health. These diseases often affect the upper and lower respiratory tract and can be caused by viral, bacterial, or environmental factors.[1]

Common cold or upper respiratory infection is caused by viruses such as rhinovirus, respiratory syncytial virus (RSV), or coronaviruses.Symptoms are runny nose, sore throat, cough, mild fever, congestion, and sneezing.[2]Bronchiolitis is most commonly caused by RSV (respiratory syncytial virus), but other viruses like influenza can also cause it.Pneumonia can be caused by bacteria (e.g., Streptococcus pneumoniae, Haemophilus influenzae), viruses (e.g., RSV, influenza), or fungi.Symptoms are fever, cough, rapid breathing, chest pain, and difficulty breathing.Bacterial pneumonia is treated with antibiotics, while viral pneumonia may require antiviral medications or supportive care.[3]

Nearly 80% of children's wintertime health center visits are related to acute respiratory conditions. About 25% of newborns under one year old experience at least one wheezing episode year.[4] The effectiveness of beta-2-agonists given by metered-dose inhaler (MDI) with a spacer and a face mask in treating acute exacerbations of wheezing in infants and children has been shown in prior research employing a clinical score.[5]Furthermore, studies in

adults and children over 2 years of age have shown that beta-2-agonists administered by MDI with a spacer device and a face mask are as effective as nebulization in the treatment of asthma or acute exacerbations of wheezing and result in fewer adverse effects (tachycardia, vomiting, and oxygen desaturation) than when salbutamol is delivered by nebulizer.[6]The present study was conducted to compared salbutamol via metered- dose inhaler with spacer versus nebulizer for acute wheezing in children less than 2 years of age.

MATERIALS & METHODS

The study was carried out on 50 children presenting with "moderate to severe" wheezing, seen in the emergency department. All parents gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Two salbutamol treatment groups. In the first hour, the group I (MDI-S group) received 2 puffs (100 µg/puff) every 10 min for 5 doses, and the group II (NEB group) received 0.25 mg/kg every 13 min for 3 doses. If the clinical score was >5 at the end of the first hour, the patients received another hour of the same treatment and also betamethasone (0.5 mg/kg intramuscular). On enrollment and after the first and the second hour of treatment each child had a validated clinical score.Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Demographic data

Parameters	Group I	Group II	P value
Birth weight (g)	3512.5	3420.6	0.92
Age at first attack (months)	7.2	8.4	0.05
Previous attacks (no.)	2.7	3.2	0.04
Previous hospitalizations	12	13	0.90
Asthma and atopy in first-degree relative	5	6	0.81
Parental smoking	25	28	0.74
Kerosene stove	21	30	0.05

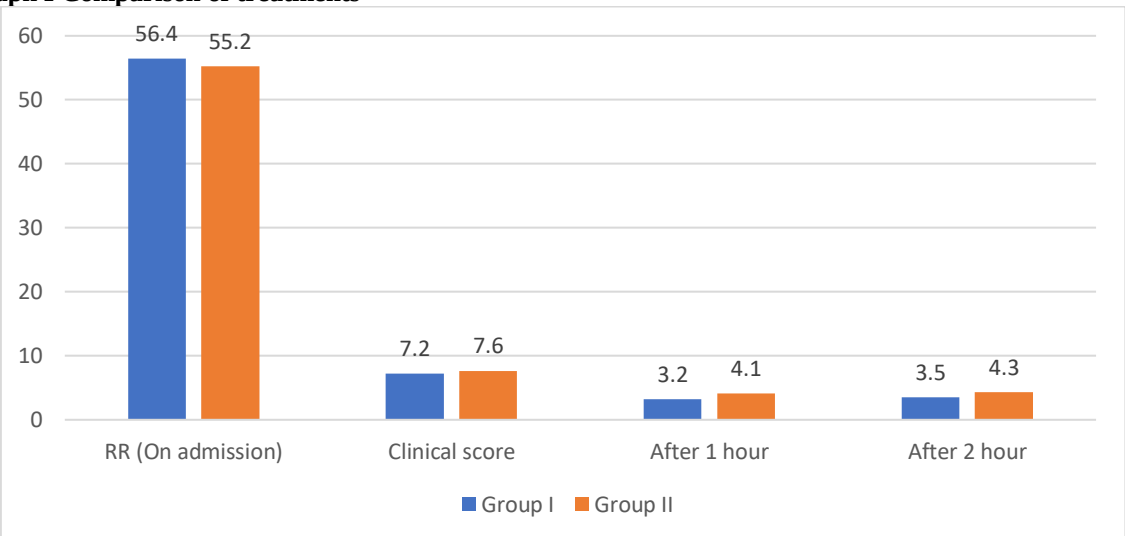
Table I shows that mean birth weight was 3512.5 grams and 3420 grams, age at first attack was 7.2monthsand 8.4months, previous attacks was 2.7 and 3.2, previous hospitalizations was seen in 12 and 13, asthma and atopy in first-degree relative were seen in 5 and 6, parental smoking was seen in 25 and 28 and kerosene stove were enrolled in 21 and 30 in group I and II respectively. The difference was significant (P< 0.05).

Table II Comparison of treatments

Variables	Group I	Group II	P value
RR (On admission)	56.4	55.2	0.82
Clinical score	7.2	7.6	0.93
After 1 hour	3.2	4.1	0.01
After 2 hour	3.5	4.3	0.04

Table II, graph I shows that respiratory rate in admission was 56.4 min^{-1} and 55.2 min^{-1}, clinical score was 7.2 and 7.6, after 1 hour was 3.2 and 4.1 and after 2 hours was 3.5 and 4.3 respectively. The difference was significant (P< 0.05).

Graph I Comparison of treatments



DISCUSSION

Salbutamol is a common bronchodilator medication used to treat conditions like asthma and chronic obstructive pulmonary disease (COPD). It helps relax the muscles around the airways, making it easier to breathe. In children, it is often administered through a metered-dose inhaler (MDI) with a spacer device to enhance its effectiveness and make it easier to use.[7]A spacer is a chamber that attaches to the inhaler. It holds the medication for a brief period before the child inhales it, ensuring that more of the medication reaches the lungs instead of getting stuck in the mouth or throat.[8]MDI- the metered-dose inhaler releases a fixed dose of medication when activated. Using it with a spacer ensures the medicine is delivered more efficiently.[9]The present study was conducted to compared salbutamol via metered- dose inhaler with spacer versus nebulizer for acute wheezing in children less than 2 years of age.

We found that mean birth weight was 3512.5 grams and 3420 grams, age at first attack was 7.2months and 8.4months, previous attacks was 2.7 and 3.2, previous hospitalizations was seen in 12 and 13, asthma and atopy in first-degree relative were seen in 5 and 6, parental smoking was seen in 25 and 28 and kerosene stove were enrolled in 21 and 30 in group I and II respectively. Kerem et al[10] demonstrated in 33 children over 6 years of age that salbutamol administered by MDI with a spacer had the same efficacy (using a clinical score and spirometry) and fewer side effects (tachycardia) than salbutamol administered by nebulizer in the treatment of acute asthma exacerbation. Similarly, Chou et al[11] in a randomized study with 152 children over 2 years of age with acute asthma exacerbation, found the same efficacy with shorter delivery time and fewer side effects from albuterol administered by MDI with a spacer and mouthpiece or face mask than salbutamol delivered by a nebulizer.

We observed that respiratory rate in admission was 56.4 min^{-1} and 55.2 min^{-1}, clinical score was 7.2 and 7.6, after 1 hour was 3.2 and 4.1 and after 2 hours was 3.5 and 4.3 respectively. Parkin et al[12] studied 60 hospitalized children under 5 years of age (mean ± SE, 35 ± 1.9 months) with moderate acute asthma and showed that salbutamol administered by MDI with a spacer device was as effective as when given by nebulizer. In that study the incidence of relapse was similar in both groups during 2 weeks of follow-up.

Rubilar et al[13] in their study children were randomly assigned to one of two salbutamol treatment groups. In the first hour, the MDI-S group received 2 puffs (100 µg/puff) every 10 min for 5 doses, and the NEB group received 0.25 mg/kg every 13 min for 3 doses. If the clinical score was >5 at the end of the first hour, the patients received another hour of the same treatment and also betamethasone (0.5 mg/kg intramuscular). There were no differences at the time of admission to the emergency department between groups in clinical score or demographic data. Success (clinical score #5) after the first hour of treatment was 90% (56/62) in the MDI-S group and 71% (43/61) in the NEB group (odds ratio 3.9, 95% confidence interval 1.5–10.4, P = 0.01). After the second hour, the success was 100% in the MDI-S and 94% in the NEB (P > 0.05).

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that Salbutamol administered using an MDI, spacer, and face mask was more effective than nebulizer in treating children under two years old who were treated in the emergency room using a standardized protocol for "moderate to severe" acute wheezing.

REFERENCES

1. Astudillo P, Girardi G, Mancilla P, Aranda C. Hospitalizacio´nabreviadaen 13,099 lactantes con sindromebronquialobstructivoagudo. Rev Chil Enf Respir 1994;10:290.
2. Tal A, Bavilski C, Yohai D, Bearman J, Gorodischer R, Moses S. Dexamethasone and salbutamol in the treatment of acute wheezing in infants. Pediatrics1983;71:13–18.
3. Webb MSC, Martin JA, Cartlidge PHT, Ng YK, Wright NA. Chest physiotherapy in acute bronchiolitis. Arch Dis Child 1985; 60:1078–1079.
4. Bentur L, Canmy G, Shields M, Kerem E, Schuh S, Reisman J, Fakhoung K, Pedder L, Levison H. Controlled trial of nebulized albuterol in children younger than 2 years of age with acute asthma. Pediatrics1992;89:133–137.
5. Closa RM, Maixe Ceballos J, Gomez-Papi A, Galiana AS, Gutierrez C, Marti-Henneber C. Efficacy of bronchodilators administered by nebulizers versus spacer devices in infants with acute wheezing. PediatrPulmonol1998;26:344–348.
6. Newman S. Aerosol deposition considerations in inhalation children. Chest 1985;88:152–160.
7. O'Doherty AJ, Miller RF. Aerosols for children and diagnosis. Eur J Nucl Med 1993;20:1201–1213.
8. Clay M, Pavia D, Newman S, Lennard-Jones T, Clarke S. Assess ment of jet nebulisers for lung aerosol therapy. Lancet 1983;2(8350): 592–594.
9. Bowton DL, Goldsmith WM, Haponik EF. Substitution of metered-dose inhalers for hand-held nebuliser: success and cost saving in a large acute-care hospital. Chest 1992;101:305–308.
10. Kerem E, Levison H, Schuh S, O'Brodovich H, Reisman J, Bentur K, Canny G. Efficacy of albuterol administered by nebuliser versus spacer device in children with acute asthma. J Pediatr 1993; 123:313–317.
11. Chou K, Cunningham S, Crain E. Metered-doses inhalers with spacers vs. nebulisers for pediatric asthma. Arch PediatrAdolesc Med 1995;149:201–205.
12. Parkin PC, Saunders NR, Diamond SA, Winders PM, Macarthur C. Randomized trial spacer vs. nebuliser for acute asthma. Arch Dis Child 1995;72:239–240.
13. Rubilar L, Castro-Rodriguez JA, Girardi G. Randomized trial of salbutamol via metered-dose inhaler with spacer versus nebulizer for acute wheezing in children less than 2 years of age. Pediatric pulmonology. 2000 Apr;29(4):264-9.