European Journal of Molecular & Clinical Medicine

ISSN: 2515-8260, Volume 09, Issue 07, 2022

ORIGINAL RESEARCH

Assessment of Efficacy of Nebulized Magnesium Sulphate in Bronchiolitis

Deepa S N[1], Shajahan R A[2], Vidhya Shankari[3], Ebin Roshan Paul[4*], Anjali Ann Chocko[5], R.C. Krishna Kumar[6]

[1]Associate Professor, PK Das Institute of Medical Sciences, Vaniamkulam, Ottapalam, Kerala, India.
[2]Associate Professor, PK Das Institute of Medical Sciences, Vaniamkulam, Ottapalam, Kerala, India.
[3]Associate Professor, PK Das Institute of Medical Sciences, Vaniamkulam, Ottapalam, Kerala, India.
[*4]Assistant Professor, PK Das Institute of Medical Sciences, Vaniamkulam, Ottapalam, Kerala, India.
[5]Assistant Professor, PK Das Institute of Medical Sciences, Vaniamkulam, Ottapalam, Kerala, India.
[6]Medical Director, PK Das Institute of Medical Sciences, Vaniamkulam, Ottapalam, Kerala, India.

Corresponding Author: Ebin Roshan Paul, Assistant Professor, PK Das Institute of Medical Sciences, Vaniamkulam, Ottapalam, Kerala, India.

Email ID: ebinroshan@gmail.com

ABSTRACT

Background: To assess efficacy of nebulized magnesium sulphate in Bronchiolitis.

Materials and Methods: Seventy- two patients age ranged 1 month to 24 months of acute bronchiolitis were divided into 2 groups of 36 each. Group I received nebulization with 3 mL of 3.2% magnesium sulphate (MgSO4) every 4 hourly for 24 hours and group I received standard care alone. Parameters such as BSS, respiratory rate (RR), peripheral capillary oxygen saturation (SpO2), heart rate (HR) were recorded before treatment and at 1, 2, 4, 8, 12, 16, and 24 hours post- operatively. The need for noninvasive ventilation, need for admission to intensive care unit (ICU) were also recorded**.**

Results: Group I had 20 males and 16 females and group II had 18 males and 18 females. Duration of illness (days) was 4.6 and 3.4, heart rate (beats/min) was 172.4 and 150.2, respiratory rate (breaths/min) was 56.2 and 54.8, oxygen saturation (%) was 95.2 and 96.4, temperature (degree F) was 98.2 and 99.0, oxygen requirement (L/min) was 1.54 and 1.20 and BSS was 6.72 and 6.24 in group I and II respectively. The difference was non-significant (P> 0.05). BASS at 1 hour was 6.4 and 5.6, at 2 hours was 5.2 and 5.4, at 4 hours was 4.1 and 4.3, at 8 hours was 3.6 and 3.2, at 12 hours was 3.4 and 3.1, at 16 hours was 3.1 and 2.5 and at 24 hours was 2.5 and 2.2. Length of hospital stay was 2.87 days and 2.91 days and duration of oxygen requirement was 25.7 hours and 21.3 hours in group I and II respectively. ICU admission was among 2 in group I and 1 in group II and NIV requirement was seen in 3 in group I and 2 in group II. The difference was non- significant (P> 0.05).

Conclusion: Nebulized magnesium sulfate was comparable with standard care. However nebulized magnesium sulfate can improve the clinical score so it may have additive effect to reduce symptoms during hospitalization.

Keywords: Nebulized magnesium sulfate, Bronchiolitis, Children.

INTRODUCTION

Bronchiolitis as defined by the American Academy of Pediatrics is constellation of clinical signs and symptoms including a viral upper respiratory prodrome followed by increased respiratory effort and wheeze in children less than 2 years. It accounts for up to 60% cases of lower respiratory infections and 32% of hospitalizations in the first year of life. Respiratory syncytial virus (RSV) is the leading cause of acute bronchiolitis and manifests clinically as coryza, mild cough, low grade fever, tachypnoea, wheezing, and signs of respiratory distress.[1] Half to 90% of all cases are caused by the respiratory syncytial virus (RSV). It gets more difficult to breathe as a consequence of these factors. Neonatals with acute respiratory failure are the most common patients in paediatric intensive care units in the United Kingdom.[2]

Stipulated role of magnesium sulphate in effecting bronchodilation forms the rationale for its use in bronchial asthma. In fact, some reports indicate a superior effect even in those who are unresponsive to β-agonist treatments. The clinical and pathological semblance between asthma and bronchiolitis has drawn several therapeutic analogies.[3]

In severe cases, prostration and respiratory failure occurs which leads to repeated episodes of apnea, seizures and death.[4] The risk of severe disease and hospitalization is high among children with the risk factors which include prematurity, low birth weight, hemodynamically significant congenital heart disease, chronic lung disease (Broncho pulmonary dysplasia, cystic fibrosis, congenital pulmonary malformations, primary immunodeficiency, children of less than 2 months of age, neuromuscular disorders, poor socioeconomic status and malnutrition.[5] Considering this, we performed present study to assess efficacy of nebulized magnesium sulphate in Bronchiolitis.

MATERIALS & METHODS

A sum total of seventy- two patients age ranged 1 month to 24 months of acute bronchiolitis with bronchiolitis severity score (BSS) ≥ 4 at admission (moderate to severe bronchiolitis) of both genders were included. Parental consent was obtained before starting the study.

Demographic data such as name, age, gender etc. was recorded. Clinical symptoms such as wheezing, rhinorrhea, cough, and low-grade fever were recorded. All patients received standard care including hydration and humidified oxygen administration. Patients were divided into 2 groups of 36 each. Group I received nebulization with 3 mL of 3.2% magnesium sulphate (MgSO4) every 4 hourly for 24 hours and group I received standard care alone. Parameters such as BSS, respiratory rate (RR), peripheral capillary oxygen saturation (SpO2), heart rate (HR) were recorded before treatment and at 1, 2, 4, 8, 12, 16, and 24 hours post- operatively. The need for noninvasive ventilation, need for admission to intensive care unit (ICU) in the initial visit were also recorded. Results of the study were compiled and evaluated statistically. P value less than 0.05 was considered significant.

RESULTS

Table I: Distribution of patients

Groups	Group I	Group II
Method	nebulization with 3 mL of 3.2% MgSO4	Control
M:F	20:16	18:18

Group I had 20 males and 16 females and group II had 18 males and 18 females (Table I).

Table II: Baseline characteristics

Parameters	Group I	Group II	P value
Duration of illness (days)	4.6	3.4	0.15
Heart rate (beats/min)	172.4	150.2	0.08
Respiratory rate (breaths/min)	56.2	54.8	0.92
Oxygen saturation (%)	95.2	96.4	0.95
Temperature (degree F)	98.2	99.0	0.12
Oxygen requirement (L/min)	1.54	1.20	0.25
BSS	6.72	6.24	0.81

Duration of illness (days) was 4.6 and 3.4, heart rate (beats/min) was 172.4 and 150.2, respiratory rate (breaths/min) was 56.2 and 54.8, oxygen saturation (%) was 95.2 and 96.4, temperature (degree F) was 98.2 and 99.0, oxygen requirement (L/min) was 1.54 and 1.20 and BSS was 6.72 and 6.24 in group I and II respectively. The difference was non-significant (P> 0.05) (Table II).

Table III: Comparison of parameters

Parameters	Variables	Group I	Group II	P value
BSS	1 hour	6.4	5.6	0.09
	2 hours	5.2	5.4	0.12
	4 hours	4.1	4.3	0.97
	8 hours	3.6	3.2	0.95
	12 hours	3.4	3.1	0.87
	16 hours	3.1	2.5	0.51
	24 hours	2.5	2.2	0.84
Length of hospital stay (d)		2.87	2.91	0.92
Duration of oxygen requirement (h)		25.7	21.3	0.94
ICU admission		2	1	0.16
NIV requirement		3	2	0.19

BASS at 1 hour was 6.4 and 5.6, at 2 hours was 5.2 and 5.4, at 4 hours was 4.1 and 4.3, at 8 hours was 3.6 and 3.2, at 12 hours was 3.4 and 3.1, at 16 hours was 3.1 and 2.5 and at 24 hours was 2.5 and 2.2. Length of hospital stay was 2.87 days and 2.91 days and duration of oxygen requirement was 25.7 hours and 21.3 hours in group I and II respectively. ICU admission was among 2 in group I and 1 in group II and NIV requirement was seen in 3 in group I and 2 in group II. The difference was non- significant (P> 0.05) (Table III).

DISCUSSION

Bronchiolitis is an important cause of morbidity and mortality in young infants. Hence detailed history and complete physical examination is important in the management and prevention of acute bronchiolitis.[6] The virus replication initially occurs in the epithelium of the upper respiratory tract causing the prodromal symptoms.[7] The infection then spreads to the epithelium of lower airways resulting in peribronchial infiltrates, sub mucosal edema, necrosis and sloughing of the infected epithelial cells and increased mucus production resulting in subsequent bronchiolar obstruction.[8,9] We performed present study to assess nebulized magnesium sulphate in Bronchiolitis.

Our results showed that Group I had 20 males and 16 females and group II had 18 males and 18 females. Modaresi et al[10] assessed the efficacy of nebulized magnesium sulfate as a

bronchodilator in 120 infants hospitalized with moderate to severe bronchiolitis. They were randomly assigned into two groups: the first group was treated with nebulized magnesium sulfate (40 mg/kg) and nebulized epinephrine (0.1 ml/kg) and the second group (control) was treated with nebulized epinephrine (0.1 ml/kg). The primary outcome was the length of hospital stay. The use of oxygen, temperature, oxygen saturation (SPO2), pulse rate (PR), respiratory rate (RR) and respiratory distress assessment instrument (RDAI) score were measured in the beginning of the study and during hospitalization. The mean (SD) age of 120 infants was 5.1 (± 2.6) months and 60% were boys. The length of hospital stay was not different between the two groups (P > 0.01). Use of oxygen supplementation, SPO2 and vital signs were similar in the two groups. Improvement in RDAI score was significantly better in infants treated with nebulized magnesium sulfate than in the other group (P- 0.01).

Our results showed duration of illness (days) was 4.6 and 3.4, heart rate (beats/min) was 172.4 and 150.2, respiratory rate (breaths/min) was 56.2 and 54.8, oxygen saturation (%) was 95.2 and 96.4, temperature (degree F) was 98.2 and 99.0, oxygen requirement (L/min) was 1.54 and 1.20 and BSS was 6.72 and 6.24 in group I and II respectively. Debbarma et al[11] assessed efficacy and safety of nebulized magnesium sulphate in young children aged 1–24 months who were divided into 2 groups. One group received nebulization with 3 mL of 3.2% magnesium sulphate and the control group received standard care alone. The mean age of children allocated in the control group was 7.4 ± 5.1 months and 7.7 ± 4.5 months in the intervention group. There was no significant difference with respect to improvement of BSS or reduced length of hospitalization in both the groups (p > 0.05). BSS monitored sequentially after enrollment at 1, 2, 4, 8, 12, 16, and 24 h did not show statistically significant differences between the groups. Mean length of hospital stay was 2.89 ± 2.25 days in treatment group and 2.96 ± 1.86 days in control group (p = 0.902). No adverse events were observed in both the groups

Our results showed BASS at 1 hour was 6.4 and 5.6, at 2 hours was 5.2 and 5.4, at 4 hours was 4.1 and 4.3, at 8 hours was 3.6 and 3.2, at 12 hours was 3.4 and 3.1, at 16 hours was 3.1 and 2.5 and at 24 hours was 2.5 and 2.2. Length of hospital stay was 2.87 days and 2.91 days and duration of oxygen requirement was 25.7 hours and 21.3 hours in group I and II respectively. ICU admission was among 2 in group I and 1 in group II and NIV requirement was seen in 3 in group I and 2 in group II. Ghaiaty et al[12] included 60 children with moderate to severe Bronchiolitis. One group received magnesium sulphate, second group received B-2 agonists and third group received both. When it came to the most common complaint, prior history, family history, and length of sickness, there were no significant differences among the three groups (p-values of 0.891, 0.934, 0.926, and 0.998, respectively). However, following treatment group B exhibited a much better improvement than the other two treatment groups when it came to respiratory rate on admission. Heart rate differences between the three groups on admission (p-value 0.952) were minor but following therapy, group B exhibited a notable improvement over the other two groups. Patients in group B showed the greatest increase in O2 saturation and the highest reduction in respiratory distress. In infants with acute bronchiolitis, nebulized magnesium sulphate seems to be superior than nebulized budesonide in terms of efficacy.

CONCLUSION

Nebulized magnesium sulfate was comparable with standard care. However nebulized magnesium sulfate can improve the clinical score so it may have additive effect to reduce symptoms during hospitalization.

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