

Original Research Article

Effect of nasal suction on reliving feeding difficulty in children affected with bronchiolitis

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ABSTRACT

Background: Bronchiolitis is the most common disease of the lower respiratory tract during the first year of life. Although bronchiolitis is a prevalent illness in India, very few studies are performed in India regarding management of bronchiolitis. Supportive care is the mainstay of treatment concentrating on fluid replacement and gentle suctioning of nasal secretions, oxygen therapy, and respiratory support if necessary. Infants affected with bronchiolitis also have feeding difficulty which will lead to dehydration and also increase the severity of disease.

Methods: A prospective randomized control study was performed in the department of Pediatrics SSMC Rewa. Nasal suction was performed in 75 patients classified under the case group. Feeding difficulty was assessed before and after the suction for 24 hours.

Results: We noted that after the first episode of nasal suction which is at 0th hour feeding difficulty was persisted in most of the patients. The p-value was 0.1148 which is not significant. But from 4th hour till the 16th hour the difficulty in feeding decreased after the nasal suction, and by Chi-square test this improvement was statistically. From 20th hour difficulty in feeding still improved after nasal suction but this change was not statistically significant.

Conclusions: Nasal suction is an effective supportive treatment in the patients with bronchiolitis and by its use it improves the feeding in the infants suffering from bronchiolitis.

Keywords: Acute bronchiolitis severity score, Bronchiolitis, Feeding difficulty, Nasal suction

INTRODUCTION

Bronchiolitis is the most common disease of the lower respiratory tract during the first year of life.¹ American Academy of Pediatrics subcommittee defines bronchiolitis as “a disorder most commonly caused in infants by viral LRTI; it is the most common lower respiratory infection in this age group and is characterized by acute inflammation, edema and necrosis of epithelial cells lining small airways, increased mucus production and bronchospasm”.² Smoking, overcrowding and low socioeconomic status are all associated with increased incidence of bronchiolitis related hospital admissions.³ Infants with co-morbidities including

premature birth, immunodeficiency, left to right shunt congenital heart disease or interstitial lung diseases are more prone to develop severe disease.⁴ The diagnosis of bronchiolitis is clinical and is based on history and physical findings.⁵ Although bronchiolitis is a prevalent illness in India, very few studies are performed in India regarding management of bronchiolitis. Supportive care is the mainstay of treatment concentrating on fluid replacement and gentle suctioning of nasal secretions, oxygen therapy, and respiratory support if necessary. Infants affected with bronchiolitis also have feeding difficulty which will lead to dehydration and also increase the severity of disease. Most of the hospitals and pediatricians use nasal suction as a mode of supportive

therapy in bronchiolitis, but no study is available to document the effectiveness of nasal suction in the management of infants with bronchiolitis. In the study done by Casati et al, they found that quality of feeding improved by 36% in children after using the nasal aspirator similar results were obtained from this study.⁶

METHODS

This study was a prospective randomized control study, conducted at the department of Pediatrics Shyam Shah Medical College and Gandhi Memorial Hospital Rewa from January 2016 to March 2017 over a period of 15 months. Ethical clearance was obtained from institutional ethics committee. The study was conducted after determining strict inclusion and exclusion criteria.

Inclusion criteria

- Patient diagnosed with bronchiolitis by attending pediatrician
- Age <2 years
- First episode of respiratory illness
- Symptoms associated with increased work of breathing and lower respiratory tract symptoms that may include increased work of breathing, persistent cough, feeding difficulty, rapid shallow respiration, ± fever, wheeze.

Exclusion criteria

- Cardiac disease requiring baseline medication
- History of recurrent respiratory illness
- Anatomic airway defect
- Neurologic disease
- Immunodeficiency (thrush, long term steroids, measles, patient on ART)
- Chronic lung disease or other significant lung diseases.
- Patients diagnosed with severe acute malnutrition or moderate acute malnutrition.
- Patients who were diagnosed as bronchopneumonia during the study were also excluded from the study.
- Patients in control arm in whom nasal suction was performed due to any reason.

A structured Proforma was filled for every child enrolled in the study. The parents of children of both study group and control group were informed about the purpose of research, and proper consent was taken. In this study total, 227 patients were enrolled. Out of these patients, 108 patients were in the control group and remaining 119 patients were classified under the study group. During the study, 33 patients from the control group and 44 patients from the study group dropped out; some due to change in their diagnosis, patients discharged before the fulfilment of discharge criteria and in some cases consent not given by their parents for study. So, this study was conducted on 150 patients in total, out of which 75 were in control

group and 75 were in the study group (Figure1). The diagnosis of Bronchiolitis was made by attending pediatrician which was based on the guidelines given by the American Academy of Pediatrics which includes children up to 2 years of age with the first episode of multi-trigger wheeze. The patients were selected from those admitted in the department of Pediatrics G.M.H Rewa with the provisional diagnosis of Bronchiolitis every day by 7 P.M. By using a table of random numbers patients were divided into study group and control group. In control group, all the treatment remained same as was followed previously at this institute. But in the study group, we performed nasal suction, in addition to the treatment which was already given to control group. Nasal suction was carried out as soon as the patients were included in the study. The interval between 2 suction episodes was 4 hours and was performed till patient was discharged from the hospital. Mucus extractor was used for performing nasal suction. Suction was performed 30 seconds after putting 2 drops of normal saline in each nostril. The patient's end of mucus extractor was inserted 2- 3 cm inside the nasal cavity from nostrils. Suction was performed under observation of pediatrician, but patient's attendants were also trained for performing suction. We used acute bronchiolitis severity score (Table 1) given by Fernández et al, to measure the severity of bronchiolitis in this patient objectively.⁷

This score was observed every 4 hourly in the control group and in study group score was observed before performing nasal suction and after the nasal suction. The patients were monitored and followed till the time they fulfilled the criteria for discharge which are as follows:

- No retractions: subcostal, intercostal, suprasternal, and supraclavicular
- Average respiratory rate for last 24 hours: 0-2 months - ≤60/min, 2-12 months-≤50/min, 12-24 months-≤40/min
- SPO2 at room air for last 24 hours at quiet awake state: ≥95%
- Not receiving Intra Venous Fluids.
- Taking adequate oral intake which is about 75% of patient's usual intake.

Statistical analysis

Data were entered using Microsoft® Excel 2010 and data was analyzed using Microsoft® Excel 2010 and GraphPad InStat®, for the statistical analysis we used paired t-test, unpaired t-test, and chi-square test.

RESULTS

In this study, 73% patients were males and all the patients diagnosed with bronchiolitis were less than 12 months of age, with a mean age of 4.61±3.01 months and the median age of 4 months. In this study author did not find any patient who was more than 12 months old. 34% patients were less than 2 months old and 22% patients

were between 6 to 12 months of age. Most of the patients were of age group 2 months to 6 months (44%). Rapid breathing was present in all the patients followed by runny nose 68% (n=102). Cough was present in 67% (n=101) children, fever was present in 57% (n=85) of infant and most of the time it was of mild grade in intensity, 48% children presented with refusal to feed (Table 2).

After the first episode of nasal suction at hour 0 feeding difficulty persisted in most of the patients (p-value 0.1148 not significant). But from 4th hour till the 16th hour continuous improvement in feeding was observed after the nasal suction, and by Chi-square test this improvement was statistically significant. From 20th hour difficulty in feeding still improved after nasal suction but

this change was not statistically significant (Figure 2) which is reflected in the p-value of 0.4887.

Author assessed for the feeding difficulty in children with bronchiolitis by observing for refusal to feed, severe respiratory distress and excessive crying. During the study, author noted that after the first episode of nasal suction which is at 0th hour feeding difficulty was persisted in most of the patients. The p-value was 0.1148 which is not significant (Table 3). But from 4th hour till the 16th hour the difficulty in feeding decreased after the nasal suction, and by Chi-square test this improvement was statistically significant (Tables 4-7). From 20th hour difficulty in feeding still improved after nasal suction but this change was not statistically significant (Tables 8,9).

Table: 1 Acute bronchiolitis severity score tool.

Point	0	1	2	3	4
Wheezing	No	At the end of expiration	Throughout expiration	Inspiration and expiration both	Hypoventilation
Crackles	No	In 1 field	In 2 fields	In 3 fields	In 4 fields
Efforts	No effort	Subcostal or lower intercostal	Subcostal or lower intercostal + retraction or nasal flaring	Subcostal or lower intercostal + retraction + nasal flaring + suprasternal (universal)	
Inspiration/expiration time ratio	I>E	I=E	I<E		
Respiratory rate <2 months	<57	57-66	>66		
Respiratory rate 2-6 months	<53	53-62	>62		
Respiratory rate 6-12 months	<47	47-55	>55		
Heart rate 7 days-2 months	125-152	153-180	>180		
Heart rate 2-12 months	120-140	140-160	>160		

INTERPRETATION: 0-4: Mild, 5-9: Moderate, 10-17: Severe

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Table 2: Distribution of patients.

	Characteristics	Frequency	%
Gender	Male	109	72.67
	Female	41	27.33
Age	0-2 Months	51	34
	2-6 Months	66	44
	6-12 Months	33	22
	Fever	85	56.67
Presenting complaint	Cough	101	67.33
	Cold (runny nose)	102	68
	Rapid breathing	150	100
	Refusal to feed	72	48

Table 3: comparison of feeding difficulty at 0 hour before and after suction.

Feeding difficulty	Before suction	After suction
Yes	63	54
No	12	21
		p-value=0.1148 Not significant
Feeding difficulty	Before suction	After suction
Yes	58	42
No	17	33
		p-value=0.0094 Very significant

Table 4: Comparison of feeding difficulty at 4 hours before and after suction.

Feeding difficulty	Before suction	After suction
Yes	58	42
No	17	33
p-value=0.0094 Very significant		

Table 5: Comparison of feeding difficulty at 8 hours before and after suction.

Feeding difficulty	Before suction	After suction
Yes	47	34
No	28	41
p-value=0.0494 significant		

Table 6: Comparison of feeding difficulty at 12 hours before and after suction.

Feeding difficulty	Before suction	After suction
Yes	35	21
No	40	54
p-value=0.0282 significant		

Table 7: Comparison of feeding difficulty at 16 hours before and after suction.

Feeding difficulty	Before suction	After suction
Yes	24	13
No	51	62
p-value=0.0582 not quite significant		

Table 8: Comparison of feeding difficulty at 20 hours before and after suction.

Feeding difficulty	Before suction	After suction
Yes	13	9
No	62	66
p-value= 0.4887 Not significant		

Table 9: Comparison of feeding difficulty at 24 hours before and after suction.

Feeding difficulty	Before suction	After suction
Yes	10	9
No	65	66
p-value= 0.8061 Not significant		

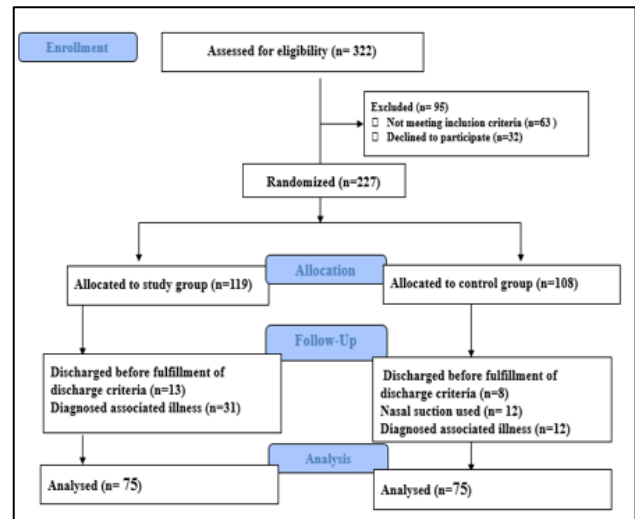


Figure 1: Consort flow diagram.

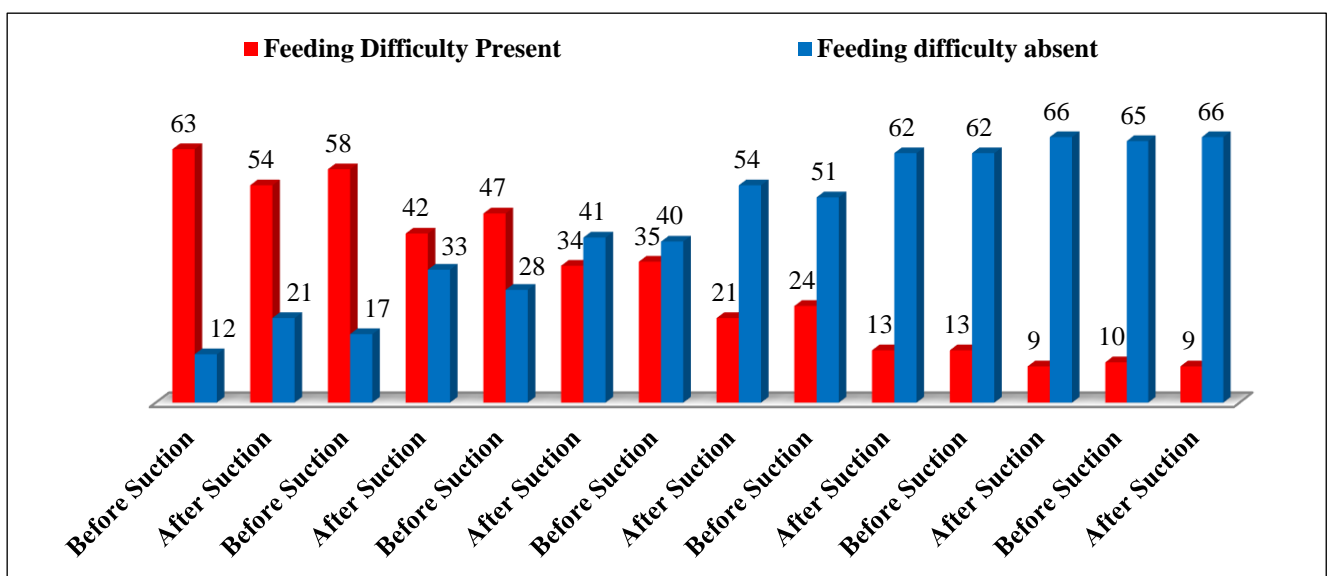


Figure 2: Comparison of feeding difficulty before and after nasal suction.

DISCUSSION

Bronchiolitis mostly affects infants, which is also reflected in this study where all the children affected by bronchiolitis were less than 12 months old. This finding may suggest that a chance of getting affected from bronchiolitis is more during the first year of age.

Authors have 78% patients who were up to 6 months old. In a prospective hospital-based study from Southern India, of 114 children with bronchiolitis, 87(76%) were less than 1 year, and 107(94%) were less than 2 years of age.⁸ Author found that there is a significant decrease in the Acute Bronchiolitis Severity Score after the nasal suction. The reason behind this could be that nasal suction clears the secretion from upper respiratory airway which increases the air flow in the respiratory tract which can be observed in the form of decreased respiratory effort and decreased expiratory time.

Authors also observed that after starting nasal suction there is alleviation in feeding difficulty in the study group as compared to control group. This effect starts after 2 suction episodes but after sometime this change does not remain statistically significant. This can be due to the reason that bronchiolitis is a self-limiting illness and patient starts improving after supportive care so initially nasal suction significantly decrease feeding difficulties. So nasal suction is helpful in the initial phase of illness as an aid to improve feeding, and by this, it also helps in improving hydration status of the infant.

The probable explanation for these findings is that nasal suction improves the aeration and ease in the breathing. Which leads to the improvement in the symptoms like refusal to feed, respiratory distress and fatigue in the infant and improves the feeding but after some time these changes will not remain statistically significant because as time passes symptoms of bronchiolitis started subsiding due to supportive treatment we were giving. So nasal suction in initial phase significantly improves feeding, but after some time these changes do not remain statistically significant.

CONCLUSION

By this study, we can conclude that nasal suction is an effective supportive treatment in the patients with bronchiolitis and by its use it improves the feeding in the infants suffering from bronchiolitis. In patients with bronchiolitis nasal suction should be used as a supportive therapy because of its documented benefit in alleviating obnoxious symptoms.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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