Original Research Article

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

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Received: 28 October 2019
Revised: 12 November 2019
Accepted: 20 November 2019

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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 fulfillment
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 (Figure 1). 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
2-3cm 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>
<thead>
<tr>
<th>Table 1: Acute bronchiolitis severity score tool.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Point</strong></td>
</tr>
<tr>
<td>Wheezing</td>
</tr>
<tr>
<td>Crackles</td>
</tr>
<tr>
<td>Efforts</td>
</tr>
<tr>
<td>Inspiration/expiration time ratio</td>
</tr>
<tr>
<td>Respiratory rate &lt;2 months</td>
</tr>
<tr>
<td>Respiratory rate 2-6 months</td>
</tr>
<tr>
<td>Respiratory rate 6-12 months</td>
</tr>
<tr>
<td>Heart rate 7 days-2 months</td>
</tr>
<tr>
<td>Heart rate 2-12 months</td>
</tr>
</tbody>
</table>

INTERPRETATION: 0-4: Mild, 5-9: Moderate, 10-17: Severe
*With authors permission

<table>
<thead>
<tr>
<th>Table 2: Distribution of patients.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristics</strong></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td>0-2 Months</td>
</tr>
<tr>
<td>2-6 Months</td>
</tr>
<tr>
<td>6-12 Months</td>
</tr>
<tr>
<td>Fever</td>
</tr>
<tr>
<td><strong>Presenting complaint</strong></td>
</tr>
<tr>
<td>Cough</td>
</tr>
<tr>
<td>Cold (runny nose)</td>
</tr>
<tr>
<td>Rapid breathing</td>
</tr>
<tr>
<td>Refusal to feed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: comparison of feeding difficulty at 0 hour before and after suction.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feeding difficulty</strong></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td><strong>p-value=0.1148</strong></td>
</tr>
<tr>
<td><strong>Feeding difficulty</strong></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td><strong>p-value=0.0094</strong></td>
</tr>
</tbody>
</table>
**Table 4:** Comparison of feeding difficulty at 4 hours before and after suction.

<table>
<thead>
<tr>
<th>Feeding difficulty</th>
<th>Before suction</th>
<th>After suction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>58</td>
<td>42</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
<td>33</td>
</tr>
</tbody>
</table>

p-value = 0.0094  
Very significant

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

<table>
<thead>
<tr>
<th>Feeding difficulty</th>
<th>Before suction</th>
<th>After suction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>47</td>
<td>34</td>
</tr>
<tr>
<td>No</td>
<td>28</td>
<td>41</td>
</tr>
</tbody>
</table>

p-value = 0.0494  
Significant

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

<table>
<thead>
<tr>
<th>Feeding difficulty</th>
<th>Before suction</th>
<th>After suction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>35</td>
<td>21</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>54</td>
</tr>
</tbody>
</table>

p-value = 0.0282  
Significant

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

<table>
<thead>
<tr>
<th>Feeding difficulty</th>
<th>Before suction</th>
<th>After suction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>No</td>
<td>51</td>
<td>62</td>
</tr>
</tbody>
</table>

p-value = 0.0582  
Not quite significant

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

<table>
<thead>
<tr>
<th>Feeding difficulty</th>
<th>Before suction</th>
<th>After suction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>No</td>
<td>62</td>
<td>66</td>
</tr>
</tbody>
</table>

p-value = 0.4887  
Not significant

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

<table>
<thead>
<tr>
<th>Feeding difficulty</th>
<th>Before suction</th>
<th>After suction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>No</td>
<td>65</td>
<td>66</td>
</tr>
</tbody>
</table>

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. 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.

**ACKNOWLEDGEMENTS**

Author acknowledge the support of all the faculty of department of Pediatrics SSMC Rewa and the staff of department of Pediatrics SSMC Rewa. We want to thank all of this patient and their parents without their immense patience we were not able to complete this study.

**Funding:** No funding sources

**Conflict of interest:** None declared

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

**REFERENCES**


