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# Deep Breathing Techniques and Postural Drainage as Supportive Interventions for Respiratory Infections in Children

**Dr. Shivanjali[1], Desh Deepak[2], Dr. Anirban Patra[3]**

[1]*Professor, Department of Physiotherapy, Dean Allied and Health Care Sciences, RasBihari Bose Subharti University Dehradun*

[2]*Ph.D. Physiology, RasBihari Bose Subharti University Dehradun*

[3]*Professor, Faculty of Allied health Care Science, Rasbihari Bose Subharti University Dehradun*

## Abstract

*Respiratory infections such as pneumonia and bronchiolitis remain a major cause of illness and hospital admission in children under five years. Poor sanitation, indoor smoke, overcrowding and malnutrition add to the risk. This review looks at deep breathing techniques and postural drainage as supportive measures in respiratory physiotherapy. Deep breathing aims to improve lung expansion and breathing control, while postural drainage uses gravity-assisted positions to help move retained mucus. Recent studies on chest physiotherapy, mainly in hospitalised toddlers with pneumonia, suggest better airway clearance and some improvement in respiratory status. Research on breathing exercises in adults' points in a similar direction. Still, evidence specific to young children is limited and uneven. Age, feeding time, oxygen levels and severity of distress must be checked before any technique is used. These approaches should support medical treatment, not replace it. Proper clinical assessment is essential.*

***Keywords:*** *Respiratory Infections; Pediatric Pneumonia; Deep Breathing Exercises; Postural Drainage; Chest Physiotherapy.*

## INTRODUCTION

Respiratory infections are a common health problem in children, and the youngest ones, under five years, are hit hardest. Their respiratory system is still growing, so it copes less well with infection and is more likely to run into breathing trouble. Pneumonia, bronchiolitis and other lower respiratory tract infections can upset how the lungs work. Children with these illnesses often have a persistent cough, fever, fast breathing, a congested chest and a lot of mucus [1]. Sometimes secretions build up and the airways become inflamed, which makes breathing harder and can interfere with oxygen exchange. Risk goes up further in certain living conditions: crowded homes, smoke indoors, poor sanitation, malnutrition, and little access to healthcare. Careful respiratory care matters here. It helps keep breathing normal and cuts down complications [2].

In respiratory physiotherapy, deep breathing techniques and postural drainage are used as supportive measures. Both may improve breathing patterns and help clear secretions. Deep breathing means slow, controlled breaths in and out, which can help the lungs expand and improve ventilation. Postural drainage is different. The child is placed in certain positions so that gravity can help loosen mucus and move it out of the airways [3]. The two serve different purposes, yet both aim at keeping the lungs working and the airways clear. In young children, though, they cannot be applied casually. Age, physical condition and the type of infection all have to be considered, and not every child will benefit. A clinical assessment and proper medical advice should come first. This review looks at the possible benefits of both techniques, their place in supportive care, and their limits and safety concerns in children [4].

**Table 1: Major Risk Factors Associated with Respiratory Infections in Children Under Five Years**

| Risk factors | Description and their association with respiratory infections |
|---|---|
| Poor sanitation | Unhygienic surroundings, improper waste disposal and inadequate access to clean water increase children's exposure to infectious agents. |
| Indoor air pollution | Smoke from cooking fuels, tobacco smoke and poor indoor ventilation can irritate the respiratory tract and increase the risk of respiratory illness. |
| Overcrowding | Living in crowded households increases close contact between individuals and facilitates the spread of respiratory infections through respiratory droplets. |
| Malnutrition | Poor nutritional status can weaken immune function and reduce the body's ability to fight respiratory infections. |
| Limited healthcare access | Delayed diagnosis, inadequate medical facilities and difficulties in obtaining timely treatment may increase the risk of severe respiratory complications. |

Respiratory Infections in Children and the Need for Supportive Respiratory Care

In young children, respiratory infections can reach several parts of the system: the nose, throat, airways and lungs. Pneumonia and bronchiolitis, for example, inflame and swell the respiratory passages, so air cannot move freely. Small children are at greater risk because their airways are narrow and still developing. The usual signs are cough, fever, mucus build-up, fast breathing and trouble getting air in. When the illness is more serious, the chest may draw inward with each breath, a sign that the child is working hard to breathe. Thick mucus and swelling can block part of the airflow and interfere with oxygen exchange. The child may then feel uncomfortable, feed poorly, tire easily and play less [5] [6].

Effective respiratory care matters at this stage. It keeps breathing comfortable and helps catch any worsening early. Supportive care includes enough ventilation, adequate fluids, and regular checks of respiratory rate and oxygen saturation. Some children also keep secretions that they cannot clear alone, and these may need airway clearance techniques under professional supervision [7]. Deep breathing exercises and postural drainage can be tried in selected cases to support ventilation and move mucus along. They do not suit every child, though, especially infants and those with severe breathing difficulty. Supportive care should never take the place of medical treatment. Depending on the cause and severity of the infection, antibiotics, oxygen therapy or other treatment may still be needed [8].

## DEEP BREATHING TECHNIQUES AND THEIR ROLE IN IMPROVING RESPIRATORY FUNCTION

Deep breathing means taking slow, controlled breaths so the lungs can fill more fully on the way in. The diaphragm contracts and moves down, and the chest cavity widens, letting air enter. This improves lung expansion and helps air reach different parts of the respiratory system. Controlled breathing may also steady the breathing pattern and cut down needless effort in children who are suitable for it [9]. In respiratory care, the main aim is to support ventilation and keep breathing comfortable. How useful it depends on the child’s age, physical condition and ability to follow instructions. Infants cannot do voluntary deep breathing the way older children can. Younger children may need simple instructions and help from a caregiver [10].

The possible benefits include better control of breathing in and out, improved chest movement and support for normal respiratory function. Preschool-aged children, who can understand basic instructions, may find these exercises more practical. During a respiratory infection, though, they need careful thought, especially if the child has fever, tiredness or breathing difficulty [11]. Deep breathing is often described as part of respiratory physiotherapy, yet strong clinical evidence for its effect on acute respiratory infections in children is limited. It should not be assumed that the exercises remove mucus or treat the infection itself. In selected cases they may play a supportive role. Trained healthcare professionals should guide their use [12].

**Table 2: Basic Principles and Potential Role of Deep Breathing Techniques in Children**

| Aspect | Description |
|---|---|
| Controlled inhalation | Slow inhalation allows the lungs to expand and supports air entry. |
| Diaphragmatic movement | Diaphragm contraction helps increase the space within the chest cavity during breathing. |

| | |
|---|---|
| Lung expansion | Greater chest movement may support ventilation in different regions of the lungs. |
| Controlled exhalation | Slow exhalation helps maintain a steady and comfortable breathing pattern. |
| Age-appropriate practice | Simple breathing instructions may be suitable for cooperative older children, whereas infants cannot perform voluntary exercises. |
| Clinical limitations | Effectiveness in treating childhood respiratory infections is not well established, and exercises may be unsuitable during severe respiratory distress. |

## POSTURAL DRAINAGE AND ITS ROLE IN AIRWAY SECRETION CLEARANCE

Postural drainage is a physiotherapy technique where the child is placed in set positions so that mucus can move from the lungs toward the larger airways. Gravity does most of the work, helping secretions slide out of the smaller air passages. During a respiratory infection, inflammation and irritation of the airways can increase mucus production [13]. If too much stays inside, it partly blocks airflow and breathing becomes uncomfortable. Children often cough persistently, feel congested and struggle to clear the secretions. This is more common in the very young, whose cough is not yet fully developed.

The positions are chosen according to the affected area of the lung and the child's condition. A child may lie on the back, the stomach or either side, depending on what is needed. Positioning matters. A wrong position can cause discomfort or make breathing worse. The technique may help loosen and move retained secretions in children who cannot clear mucus on their own [14]. It is not needed in every respiratory infection, though, and the benefit differs from child to child. Infants and very young children need extra care, as they cannot hold a position for long or tell anyone they are uncomfortable. Head-down tilting may be unsuitable for some children. For these reasons, postural drainage should be done only after a proper clinical assessment, with a trained healthcare professional guiding it [15].

**Table 3: Precautions, Age-Related Limitations and Situations Where Postural Drainage May Not Be Appropriate**

| Precautions and limitations | Explanation |
|---|---|
| Very young age | Infants have limited ability to maintain positions and may not tolerate certain drainage postures. |
| Severe breathing difficulty | Positioning procedures may increase discomfort or respiratory effort in children experiencing severe respiratory distress. |
| Oxygen desaturation | Children with unstable oxygen levels require careful monitoring, and unsuitable positioning may worsen their condition. |
| Recent feeding | Performing drainage immediately after feeding may increase the risk of vomiting or aspiration. |
| Gastro-oesophageal reflux | Head-down positions may worsen reflux and increase discomfort. |
| Unstable medical conditions | Children with certain cardiac, neurological or other serious medical conditions may require modified positioning or avoidance of the technique. |
| General discomfort | Crying, agitation, pain or poor tolerance during positioning may require stopping or modifying the procedure. |

Clinical Effectiveness, Safety and Practical Considerations of Respiratory Physiotherapy

How well respiratory physiotherapy works in children depends on the type of infection, how much mucus is retained and the child's general health. Deep breathing may improve control of breathing and chest expansion, but only in children who can follow instructions. Postural drainage is different. It may help move secretions when they are hard to clear. The two are sometimes used together to support ventilation and airway clearance, yet combining them does not always give a bigger benefit. Clinical evidence in childhood respiratory infections is limited and inconsistent. Some children clear secretions more easily and breathe more comfortably. Clear gains in respiratory rate, oxygen saturation or recovery time, however, have not been shown consistently. Respiratory physiotherapy is best seen as a supportive approach, not a standard treatment for every childhood respiratory infection.

### *Safety Considerations*

Proper assessment is important before starting any respiratory physiotherapy technique. Incorrect positioning or excessive physical effort may cause discomfort, coughing or

increased breathing difficulty in some children. Oxygen saturation and general respiratory condition should be monitored, particularly in children with severe infections. Techniques should be stopped if the child develops unusual distress, colour changes or worsening symptoms. Infants and children with unstable medical conditions require additional care and professional supervision [16].

### *Practical Challenges in Urban Slum Communities*

Providing respiratory physiotherapy in overcrowded and resource-limited communities can be difficult due to limited healthcare facilities, a shortage of trained professionals and low awareness among parents. Poor housing conditions, indoor smoke exposure and delayed medical attention may further affect respiratory health. Lack of regular follow-up also makes it difficult to maintain proper care. Simple parental education, early identification of breathing difficulties and access to nearby healthcare services may help improve respiratory care among young children [17].

## LITERATURE REVIEW

(Amanda et al., 2026) [18] This review set out to test how well chest physiotherapy, nebulization and therapeutic positioning, used together, improve the respiratory status of children with pneumonia. It was a systematic literature review that followed the PRISMA approach. The interventions raised oxygen saturation and lowered both respiratory rate and respiratory distress. They also improved airway clearance by mobilizing secretions, and children were more comfortable. Combination therapy gave broader gains than any single intervention, since it worked on pulmonary ventilation, airway clearance and oxygenation at the same time. The authors conclude that this combination is an effective, evidence-based supportive intervention for children with pneumonia. In pediatric nursing care, it may help respiratory recovery, work alongside drug treatment and lead to better clinical outcomes.

(Indolfi et al., 2026) [19] Acute respiratory infections (ARIs) are still a leading reason for pediatric consultations, emergency visits and hospital admissions across the world, and they place a heavy clinical, organizational and economic load on healthcare systems. Since the COVID-19 pandemic, and with nirsevimab immunization against RSV now available, the epidemiology and prevention of these infections have changed a lot. RespiVirNet has also strengthened national surveillance of respiratory viruses. All this points to a need for integrated models of care. This narrative perspective covers the current epidemiology and burden of pediatric ARIs, mostly in the Italian setting. It looks at how family and hospital pediatricians complement each other in clinical assessment, risk stratification, referral and continuity of care. Antimicrobial stewardship gets particular attention, including ways to cut inappropriate antibiotic prescribing. RSV prevention and influenza, pneumococcal and pertussis vaccination are treated as part of coordinated care. Last, the authors discuss how surveillance, prevention, shared referral criteria, structured information transfer and measurable quality indicators could support better primary–hospital coordination and offer a framework for prospective evaluation.

(Pasaribu et al., 2026) [20] This study examined the effect of chest physiotherapy on airway clearance in toddlers with pneumonia. A quasi-experimental one-group pretest–posttest design was used, in the Melati B Inpatient Ward of RSUD Kota Cilegon in 2024. Thirty-six toddlers were recruited by purposive sampling. Airway clearance was scored with a structured respiratory checklist covering respiratory rate, breath sounds, sputum production and use of accessory muscles; reliability was acceptable (Cronbach's alpha > 0.70). The intervention was postural drainage, percussion and vibration, given twice daily for three days. A paired t-test was used for analysis ($p < 0.05$). The mean airway clearance score rose significantly, from $3.28 \pm 0.659$ to $5.81 \pm 0.525$ ($p = 0.001$). Chest physiotherapy clearly improves airway clearance in toddlers with pneumonia and can be recommended as an evidence-based pediatric nursing intervention.

(Falke et al., 2026) [21] Finding the incidence of acute respiratory infections among hospitalized children under five in a central Indian tertiary hospital is the aim of this study. From January 2024 to December 2025, a descriptive cross-sectional research was carried out in a Central Indian tertiary hospital. The convenience sampling method was applied. Frequency, percentage, and a point estimate with a 95% confidence interval were computed and displayed in tables and figures. The most frequent cause of hospitalization for children under five is acute respiratory infections, and the frequency was higher than in the typical research. Fever and cough are the main symptoms.

(Zare et al., 2025) [22] assess how breathing exercises alone and in combination with breathing-stretching exercises affected respiratory indices, the severity of the disease, and the ability to exercise in COPD patients. In May and July of 2024, Jahrom University of Medical Sciences hosted this randomized clinical experiment. Convenience sampling was used to randomly assign the 32 COPD patients in the study population into control (regular breathing exercises) and intervention (combined routine breathing and breathing-stretching exercises) groups. Five days of training consisted of twice-daily sessions. Venous blood gas, pulse oximeter, and the COPD assessment test were among the tools employed. The mean PCO2, O2sat, severity, and 6MWT scores in both groups before and after the intervention

differed statistically (P-value < 0.05). In comparison to the control group, the intervention group's Pco2 and severity decrease, O2sat, and 6MWT rose more significantly. When regular breathing and breathing-stretching exercises were combined, COPD patients' respiratory indices improved, the severity of the disease decreased, and their ability to exercise rose more than when breathing exercises were used alone.

(Burge et al., 2024) [23] evaluate how breathing techniques affected adults with severe respiratory illnesses who were experiencing dyspnea. In order to find randomized controlled studies evaluating breathing techniques—which do not include respiratory muscle training—in individuals with severe respiratory conditions, electronic databases were examined. Breathlessness was the main result, whereas adverse events and health-related quality of life were the secondary outcomes. Two authors independently assessed the risk of bias, extracted data, and screened for inclusion. There were no documented adverse effects associated with breathing techniques. In patients with severe respiratory illnesses, breathing techniques may alleviate dyspnea and continuously improve health-related quality of life. The use of breathing exercises in the treatment of patients with severe respiratory conditions is supported by these findings.

(Reddy & Rani, 2021) [24] To measure the respiratory parameters in children (6–12 years old) with lower respiratory tract infections both before and after postural drainage and deep breathing were administered to the experimental group and control group. to compare the respiratory parameters of children (6–12 years old) with lower respiratory tract infections in the experimental and control groups before and after administering postural drainage and deep breathing. to ascertain the relationship between the effects of deep breathing and postural drainage in children with lower respiratory tract infections (ages 6 to 12) and their chosen demographic characteristics.

(Schaad et al., 2016) [25] Children worldwide are affected by respiratory tract infections (RTIs), which are linked to high rates of morbidity and death. Although bacterial infections are sometimes frequent, viruses are typically the cause of RTIs. Due to the relative immaturity of their immune systems, children are more sensitive to RTIs. Additionally, some populations are more susceptible to infection due to genetic factors (like a family history of atopy) and/or environmental variables (like exposure to pollutants and pathogens). Additionally, RTIs frequently reoccur and might cause many infections annually. Physicians face a great deal of difficulty in managing recurrent RTIs since they have few tools at their disposal to cure the disease, reduce symptoms, and stop recurrences. Antibiotics are still often used to treat RTIs even though they are rarely warranted. The necessity for new approaches to treat recurring RTIs is highlighted by the ensuing rise in bacterial resistance, the ineffectiveness of treatment, and drug-related adverse effects. With a focus on the importance of immunomodulation as a preventative measure, this paper reviews key topics in the diagnosis and treatment of recurrent RTIs in children using a typical pediatric case study.

## DISCUSSION

The reviewed studies suggest that chest physiotherapy can be a useful add-on in childhood pneumonia, though the picture is not simple. Pasaribu et al. reported a clear rise in airway clearance scores in toddlers after postural drainage, percussion and vibration, but the design had no control group, so the gain cannot be credited to the technique alone. Amanda et al. found that combining chest physiotherapy, nebulization and positioning improved oxygen saturation and lowered respiratory rate more than single measures. Evidence for deep breathing comes largely from adults. Burge et al. saw better breathlessness and quality of life with no adverse events, and Zare et al. noted gains in oxygen saturation in COPD patients. These results cannot be moved straight to infants, who are unable to follow instructions. Reddy and Rani studied children aged 6 to 12, which fits better with the age group able to cooperate. Practical limits matter too. In crowded slum settings, trained staff are few and follow-up is weak, so parent education and early referral become important.

## CONCLUSION

Deep breathing techniques and postural drainage can play a supportive part in the care of children with respiratory infections, but they do not replace medical treatment. Deep breathing suits older, cooperative children, while postural drainage may help when mucus is hard to clear. Current evidence is small in scale and mixed in quality. Most findings come from short studies in hospitalised toddlers or from adult populations, and gains in recovery time are not firmly shown. Safety needs attention. Infants, children in severe distress, those with unstable oxygen levels or reflux, and children just fed need careful assessment, or these methods should be avoided. Any session should stop if distress or colour change appears. In low-resource communities, simple parent teaching and timely referral may matter more than the technique itself. Larger controlled trials in children under five are needed before firm recommendations can be made.

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