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Exploring the Effect of Physiotherapy Interventions on Respiratory Tract Infections in Hospitalized Children: A Review of the Existing Evidence

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ABSTRACT

Background: Respiratory tract infections (RTIs) are among the leading causes of hospitalization in children, often resulting in prolonged hospital stays and increased healthcare burden. Physiotherapy interventions have been suggested as adjunctive measures to improve respiratory function and recovery.

Objective: This review aims to explore and synthesize the existing evidence on the effectiveness of physiotherapy interventions in managing RTIs among hospitalized pediatric patients.

Methods: A comprehensive literature search was conducted in major databases, including PubMed, Scopus, Web of Science,SID and Google Scholar focusing on studies that evaluated physiotherapy approaches for children hospitalized with RTIs. Studies assessing outcomes such as symptom severity, duration of hospitalization, pulmonary function, and complication rates were included.

Results: Evidence indicates that physiotherapy interventions such as airway clearance techniques, breathing exercises, and mobilization may improve respiratory outcomes and reduce hospital stay in certain pediatric populations. However, the quality and consistency of available studies vary, and some interventions showed limited or inconclusive benefits.

Conclusion: Physiotherapy may serve as a beneficial adjunct in the management of pediatric RTIs, but further high-quality, randomized controlled trials are needed to establish standardized protocols and confirm efficacy across diverse patient groups.

Introduction

Respiratory tract infections (RTIs) represent one of the most prevalent causes of morbidity and hospitalization in pediatric populations worldwide [1]. Children are particularly susceptible to RTIs due to the immaturity of their immune systems, anatomical differences in the respiratory tract, and increased exposure to infectious agents in communal settings such as schools and daycare centers [2].

These infections range from mild upper respiratory tract involvement, such as common colds, to severe lower respiratory tract infections, including bronchiolitis and pneumonia, which can lead to significant clinical complications and prolonged hospitalization[3].

Hospitalized children with RTIs often experience impaired pulmonary function, secretion retention, reduced physical activity, and increased risk of secondary complications.

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Conventional management typically includes pharmacological treatments, such as antibiotics or antivirals, supportive care, and oxygen therapy when required [4].

However, these approaches may not fully address the functional respiratory impairments or facilitate optimal clearance of airway secretions. Consequently, there has been growing interest in the role of physiotherapy as an adjunctive intervention in pediatric respiratory care [5].

Physiotherapy interventions encompass a range of strategies, including airway clearance techniques, chest physiotherapy, breathing exercises, mobilization, and postural management. These interventions aim to enhance ventilation, improve mucociliary clearance, reduce respiratory distress, and support overall functional recovery [6]. Several studies have suggested that physiotherapy can contribute to improved pulmonary outcomes, shorter hospital stays, and enhanced quality of life in children with RTIs. Nevertheless, the available evidence remains heterogeneous, with variations in intervention protocols, outcome measures, and study populations [7].

Given the clinical burden of pediatric RTIs and the potential benefits of physiotherapy, a comprehensive synthesis of the existing literature is essential [8]. Understanding the efficacy, safety, and practical application of physiotherapy interventions can inform evidence-based guidelines and optimize patient care in hospitalized children [9]. This review seeks to critically evaluate current evidence regarding the impact of physiotherapy on respiratory outcomes in pediatric patients with RTIs, highlighting gaps in knowledge and areas for future research

Methods

Data Sources: A thorough literature search was conducted across five major electronic databases to identify relevant studies. The databases searched included PubMed, Scopus, Web of Science, Google Scholar, and SID, all of which are widely recognized for their extensive coverage of health, medical, and social science research.

Search Strategy

The literature search employed the following key terms: (“Physiotherapy interventions” OR “Physiotherapy Technique”) AND (“Respiratory tract infections” OR “Respiratory infections”) AND (“Children” OR “Pediatrics” OR “Childhood”), with Boolean operators used to optimize results. Additionally, the reference lists of relevant articles were manually reviewed to ensure comprehensive coverage.

Inclusion Criteria

Studies were eligible if they investigated impact of effect of physiotherapy interventions on respiratory tract infections in hospitalized children. Research focusing on the broader challenges of children respiratory tract infections was also included if it offered relevant insights.

Study Design

Both quantitative and qualitative studies were considered, including experimental, observational, systematic reviews, and case reports.

Time Frame

Only studies published between January 2010 and Agust 2025 were included.

Language

Publications had to be in English or Persian.

Exclusion Criteria

Studies without empirical data or a clearly defined methodology (e.g., commentaries, editorials, letters) were excluded unless they provided structured empirical results. Articles not in English or Persian, or those lacking sufficient outcome data to determine relevance, were also omitted.

Data Extraction and Management

Two independent reviewers extracted data using a standardized form, including authorship, year, study design, sample size, and setting. Information on the types, duration, frequency, and focus of psychosocial problems encountered by parents was collected. Records were initially compiled in Google Sheets and later managed in EndNote to remove duplicates and maintain accurate citations. The initial search strategy was developed by the primary author and refined with two senior team members. Although a professional librarian was not involved, the final search protocol underwent internal peer review. Any disagreements regarding study selection or data extraction were resolved through discussion or consultation with a third reviewer. These procedures ensured methodological rigor, transparency, and consistency.

Quality Assessment

Given methodological heterogeneity, multiple evaluation tools were applied: randomized controlled trials were assessed using the Cochrane Risk of Bias Tool 2, observational studies with the Newcastle-Ottawa Scale, and qualitative research with the CASP Checklist. This approach allowed each study to be appraised with the most appropriate instrument, enhancing the precision and relevance of quality assessments. Standardized scoring procedures were followed, and discrepancies were resolved collaboratively. All studies were included regardless of risk of bias; however, findings from studies with moderate or high risk were interpreted cautiously during the narrative synthesis.

Data Analysis

Themes were identified by systematically examining recurring patterns across studies. Any disagreements were resolved through discussion or consultation with a third reviewer. A hybrid thematic analysis was used to accommodate qualitative differences across studies. The analysis followed Brown and Clarke's six-phase framework: (1) data familiarization, (2) initial code generation, (3) theme searching, (4) theme reviewing, (5) defining and naming themes, and (6) producing the final report. Two independent reviewers conducted an inductive coding process, and themes were established based on consistently observed patterns. Differences were resolved through discussion or input from a third reviewer, allowing consolidation of key concepts into coherent thematic categories.

Limitations

Several limitations were identified:

- ✓ **Diversity in study designs:** Variation in sample sizes, outcome measures, and methodologies prevented full meta-analysis.
- ✓ **Quality of evidence:** Some studies had moderate or high risk of bias, potentially affecting reliability.
- ✓ **Geographic and technological constraints:** Limited access to technology and internet infrastructure in some regions may reduce generalizability.
- ✓ **Scope of included studies:** Few studies specifically addressed parental psychosocial challenges, highlighting a scarcity of empirical research in this area, although retained studies provided valuable insights.

Results

A total of 30 studies were ultimately included in this review after a comprehensive screening process. The initial search across five major databases identified a substantial number of articles examining the psychosocial challenges faced by parents of children undergoing chemotherapy. Figure 1 illustrates the study selection process using a PRISMA-compliant flow diagram, showing the number of records identified, screened, assessed for eligibility, and included in the review, along with the reasons for exclusion at each stage.

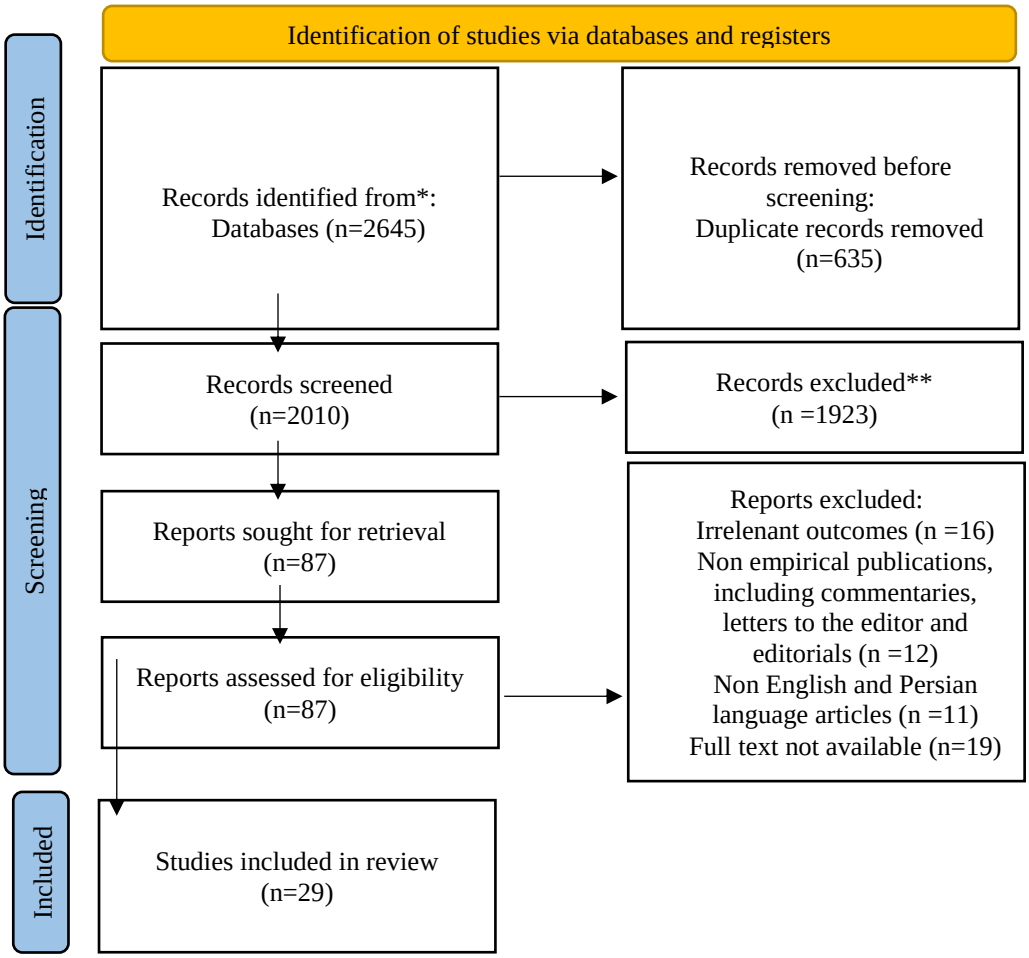

Figure 1. PRISMA flow diagram [10]

Discussion

Respiratory tract infections (RTIs) remain a significant cause of morbidity and hospitalization in pediatric populations worldwide [11]. The present review synthesized the available evidence regarding the efficacy of physiotherapy interventions in hospitalized children with RTIs, highlighting both their potential benefits and current limitations [12].

The analysis of the literature indicates that physiotherapy interventions, including airway clearance techniques, chest physiotherapy, breathing exercises, and early mobilization, may contribute to improved pulmonary function, enhanced secretion clearance, and reduced respiratory distress in children with RTIs [13]. Several studies reported that these interventions could shorten the duration of hospital stay and decrease the risk of complications, such as atelectasis or secondary bacterial infections. Physiotherapy was also associated with better patient comfort and reduced caregiver burden, suggesting that its benefits extend beyond purely clinical outcomes [14].

Despite these promising findings, the overall quality and consistency of the evidence are variable. Many studies exhibited small sample sizes, heterogeneous intervention protocols, and diverse outcome measures, which limit the generalizability of results[15]. Additionally, few randomized controlled trials (RCTs) directly compared different physiotherapy techniques or standardized protocols, making it difficult to establish definitive recommendations. The variability in patient age, severity of infection, and underlying comorbidities further complicates interpretation [16].

Moreover, while physiotherapy appears safe when performed by trained professionals, the literature emphasizes the need for individualized approaches [17]. Overly aggressive airway clearance techniques in young infants or children with severe respiratory compromise may pose risks, underscoring the importance of clinical judgment and adherence to evidence-based guidelines[18]. Integration of physiotherapy into comprehensive care plans requires coordination among pediatricians, respiratory therapists, and nursing staff to optimize timing, frequency, and modality of interventions [19].

Future research should prioritize high-quality RCTs with standardized outcome measures, larger sample sizes, and long-term follow-up to evaluate the efficacy and safety of specific physiotherapy interventions[20]. Investigating cost-effectiveness and the impact on quality of life would provide further insights into the practical utility of physiotherapy in pediatric RTIs [21]. In addition, exploring tailored interventions for subgroups, such as infants or children with chronic respiratory conditions, could refine clinical guidelines and enhance patient-centered care [22].

Physiotherapy interventions hold considerable potential as adjunctive therapy for managing RTIs in hospitalized children, contributing to improved respiratory outcomes and overall recovery [23]. However, due to methodological limitations and heterogeneity in existing studies, further rigorous research is necessary to establish evidence-based protocols and optimize clinical application.

Conclusion

Physiotherapy interventions appear to be valuable adjunctive therapies for hospitalized children with respiratory tract infections (RTIs). Evidence suggests that techniques such as airway clearance, chest physiotherapy, breathing exercises, and early mobilization can improve pulmonary function, facilitate secretion clearance, reduce respiratory distress, and potentially shorten hospital stay. These interventions also contribute to better overall patient comfort and may alleviate caregiver burden, emphasizing their holistic benefits in pediatric care.

However, despite these promising outcomes, the current body of evidence is limited by methodological heterogeneity, small sample sizes, and variability in intervention protocols and outcome measures. Consequently, while physiotherapy shows potential, definitive conclusions regarding standardized application, optimal frequency, and long-term efficacy cannot yet be drawn.

Future research should focus on high-quality, randomized controlled trials with standardized protocols and outcome assessments, as well as long-term follow-up to assess sustained benefits and safety. Additionally, studies should explore tailored interventions for specific subgroups, such as infants, children with severe infections, or those with underlying chronic respiratory conditions. Such evidence would enable the development of clear, evidence-based guidelines for physiotherapy in pediatric RTIs, optimizing clinical outcomes and supporting recovery.

Physiotherapy represents a promising, safe, and supportive component of comprehensive management for children hospitalized with RTIs. Integrating evidence-based physiotherapy into routine clinical practice may enhance recovery, reduce complications, and improve overall quality of care, but further rigorous research is required to establish standardized, widely applicable protocols.

Limitations of the study

This review focused on studies published in Persian and English, which means that some influential and high-quality research may have been overlooked. Although a thorough search was conducted to identify relevant studies, a meta-analysis was not

feasible due to the lack of homogeneous and aggregated quantitative data on physiotherapy interventions indicators across the included studies. Most studies employed qualitative designs, varied conceptual frameworks, different measurement tools, and diverse outcome variables, preventing statistical comparability and the calculation of combined effect sizes. Since meta-analysis requires a certain degree of consistency in study design, measurement variables, and indicators, attempting it under these conditions could produce misleading or invalid results. Consequently, a systematic qualitative analysis was considered the most reliable and appropriate method to address the research question.

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Authors' Contributions
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