JURNAL
CITRA KEPERAWATAN
ISSN: 2301-6035 (Print)
ISSN: 2502-3454 (Online)
Volume 14 No. 1, June 2026 ; Page: 38 - 44 DOI : 10.31964/jck.v14i01.425

Effectiveness of Windmill-Blowing Play Therapy on the Respiratory Status of Toddlers with Bronchopneumonia

Hanifa Farinda[1], Nur Eni Lestari[1*], Isti Anindya[1]

[1] Bachelor of Nursing Study Program, Universitas Indonesia Maju
Email : nurenilestari@gmail.com

Article Info
Article History:
Received, 01-04-2026
Accepted, 19-05-2026
Published, 30-06-2026

Keywords:
bronchopneumonia; respiratory status; windmill-blowing play therapy; toddlers

Abstract

Bronchopneumonia is one of the leading causes of respiratory problems in toddlers. Non-pharmacological interventions such as breathing exercises may help improve pulmonary ventilation and oxygenation. One approach that can be implemented is windmill-blowing play therapy to enhance children's participation during breathing exercises. This study aimed to examine the effect of windmill-blowing play therapy on respiratory status and the degree of respiratory distress in toddlers with bronchopneumonia. This study employed pre-experimental with one-group pretest–posttest design. A total of 30 toddlers diagnosed with bronchopneumonia were selected using purposive sampling. The measured parameters included respiratory rate, pulse rate, oxygen saturation, and the degree of respiratory distress. Data were analyzed using the Wilcoxon Test. The results demonstrated a significant reduction in respiratory rate from a mean of 52 to 37 breaths per minute ($p < 0.001$), a decrease in pulse rate from 150 to 124 beats per minute ($p < 0.001$), and an improvement in oxygen saturation from 89.50% to 96.00% ($p < 0.001$). The score of respiratory distress also decreased significantly from 14.90 to 6.87 ($p < 0.001$). Windmill-blowing play therapy showed a significant effect in improving respiratory status and reducing the degree of respiratory distress in toddlers with bronchopneumonia.

Background

Toddlers represent an age group that is highly vulnerable to infectious diseases due to their still-developing immune system. In addition, organs such as the lungs and respiratory tract are still undergoing maturation, making them more susceptible to infections caused by viruses, bacteria, and other microorganisms (Putri et al., 2025; Sollo et al., 2024). Several common illnesses affecting toddlers include acute respiratory infections, diarrhea, measles, dengue fever, and tuberculosis (Widyawati et al., 2020). According to the Indonesian Health Profile 2023, pneumonia remains one of the leading causes of mortality among children aged 12–59 months, accounting for approximately 1.6% of total deaths in this age group (Ministry of Health of Indonesia, 2024).

One of the common forms of pneumonia in toddlers is bronchopneumonia, an infection that affects the bronchi and lung tissue. The condition typically begins with an upper respiratory tract infection that subsequently spreads to the lower respiratory tract, resulting in inflammation and mucus accumulation in the alveoli. This process disrupts gas exchange and leads to clinical symptoms such as fever, productive cough, rapid breathing, and shortness of breath (Putri & Amalia, 2023; Lestari et al., 2025). In toddlers, bronchopneumonia is often characterized by an increased respiratory rate exceeding 40–50 breaths per minute, a pulse rate above 140 beats per minute, and decreased oxygen saturation below 90% as a physiological response to hypoxemia (Lestari et al., 2024).

Globally, bronchopneumonia continues to be a significant health problem in children. Data from UNICEF indicate that more than 740,000 children under five died from pneumonia in 2021. In Indonesia, the number of bronchopneumonia cases in 2024 exceeded 857,000 cases, while the prevalence of pneumonia among toddlers increased from 4.8% in 2018 to approximately 15.0% in 2023 (Ministry of Health of Indonesia, 2024). These findings highlight that bronchopneumonia remains a major contributor to respiratory disorders in children and requires appropriate management strategies.

Management of bronchopneumonia in children involves both pharmacological and non-pharmacological therapies. Pharmacological treatment commonly includes the administration of antibiotics, antipyretics, bronchodilators, and oxygen therapy to improve oxygen saturation. In addition, non-pharmacological interventions can also be applied to enhance pulmonary ventilation and oxygenation (Krishna & Rajan, 2023). One technique that can be utilized is *Pursed Lips Breathing* (PLB), a breathing exercise performed by inhaling through the nose and slowly exhaling through pursed lips. This technique helps maintain positive pressure in the airways, allowing the alveoli to remain open and facilitating more effective gas exchange (Indrianingsih et al., 2024).

However, breathing exercises are often challenging to implement in toddlers because children at this developmental stage may have difficulty following instructions consistently. Therefore, an approach that aligns with children's developmental characteristics is required. One possible approach is windmill-blowing play therapy, a breathing exercise modified into a play activity by asking children to blow a windmill toy. This activity indirectly trains children to exhale slowly in accordance with the principles of the PLB technique while simultaneously increasing motivation and participation during breathing exercises (Indrianingsih et al., 2024; Krishna & Rajan, 2023).

Several studies have reported that the use of play-based media in breathing exercises can positively influence children's oxygenation status. A study by Widyowati and Irdawati (2025) found that balloon-blowing exercises using the PLB technique were able to improve oxygen saturation and reduce respiratory rate in children with respiratory disorders. In addition, a systematic review conducted by Setiawati et al. (2025) indicated that PLB combined with play media such as balloons or windmills could enhance oxygenation status and reduce dyspnea symptoms in children with pneumonia.

A preliminary study conducted in the Emergency Department of RSIA X Depok City involving 10 toddlers with bronchopneumonia revealed an average oxygen saturation of 89.7%, a pulse rate of 153 beats per minute, and a respiratory rate of 52.4 breaths per minute. These findings indicate that most children experienced respiratory disturbances, including hypoxemia and tachypnea. Furthermore, non-pharmacological interventions in the form of breathing exercises using play-based approaches have not been widely implemented in this healthcare setting. Based on these considerations, an intervention is needed that not only improves respiratory function but also enhances children's participation during therapy. Therefore, this study was conducted to examine the effect of windmill-blowing play therapy on respiratory status and the degree of respiratory distress in toddlers with bronchopneumonia

Methods

This study employed a quantitative approach using a pre-experimental one-group pretest–posttest design to examine the effect of windmill-blowing play therapy on respiratory status and the degree of respiratory distress in toddlers with bronchopneumonia. The research was conducted in the Emergency Department of RSIA X, Depok City, from November to December 2025. The study population consisted of toddlers diagnosed with bronchopneumonia who were admitted to the emergency department, with an average of approximately 30 cases per month. The sample included 30 toddlers aged 3–5 years who were selected using a purposive sampling technique based on predetermined inclusion and exclusion criteria. Measurements were conducted before the intervention (pretest) and after the intervention (posttest). The intervention consisted of windmill-blowing play therapy that adopted the *Pursed Lips Breathing* (PLB) technique to assist children in performing controlled breathing exercises.

The research instruments included an observation sheet used to record respiratory status, consisting of respiratory rate, pulse rate, and oxygen saturation (SpO_2). Respiratory rate was measured using a stopwatch, while pulse rate and oxygen saturation were measured using a pulse oximeter. Data analysis involved univariate analysis to describe the distribution of the study variables and bivariate analysis to determine differences before and after the intervention. Normality testing was conducted using the Shapiro–Wilk test. As some variables were not normally distributed, further analysis was performed using the Wilcoxon Signed Rank Test with a significance level of $\alpha = 0.05$. This study received ethical approval from the Health Research Ethics Committee of Universitas Indonesia Maju with ethical clearance number 4639/Sket/Ka-Dept/RE/UIMA/XII/2025. All participants' parents or guardians provided informed consent prior to participation in the study.

Result and Discussion

Table 1 Presents The Descriptive Statistics Of Respiratory Rate, Pulse Rate, Oxygen Saturation, And The Degree Of Respiratory Distress Before And After The Intervention (n=30)

Variable	Pretest Min–Max	Mean	SD	Posttest Min–Max	Mean	SD
Respiratory Rate (breaths/minute)	48–56	52.00	2.877	34–40	37.00	2.213
Pulse Rate (beats/min)	145–155	150.00	3.474	120–128	124.00	2.877
Oxygen Saturation (SpO_2, %)	88–91	89.50	1.106	95–97	96.00	0.830
Degree of Respiratory Distress	12–18	14.90	1.626	5–9	6.87	1.196

Prior to the windmill-blowing play intervention using the *Pursed Lips Breathing* (PLB) technique, the average respiratory rate of the respondents was 52 breaths per minute (SD = 2.877), with a range of 48–56 breaths per minute. The mean pulse rate was 150 beats per minute (SD = 3.474), ranging from 145–155 beats per minute, while the average oxygen saturation was 89.50% (SD = 1.106) with a range of 88–91%. The mean score of respiratory distress before the intervention was 14.90 (SD = 1.626), ranging from 12–18, indicating that most respondents experienced a moderate level of respiratory distress.

After the intervention was administered, improvements in respiratory parameters were observed. The mean respiratory rate decreased to 37 breaths per minute (SD = 2.213) with a range of 34–40 breaths per minute. The average pulse rate also declined to 124 beats per minute (SD = 2.877) with a range of 120–128 beats per minute. Meanwhile, oxygen saturation increased to an average of 96% (SD = 0.830) with a range of 95–97%. In addition, the mean score of respiratory distress decreased to 6.87 (SD = 1.196), ranging from 5–9, indicating an improvement in the respondents' respiratory condition following the intervention.

Table 2. Effectiveness of Windmill-Blowing Play Therapy on Respiratory Status in Toddlers with Bronchopneumonia (n = 30)

Variable	Z	p-value
Respiratory Rate (Pre–Post)	-4.797	<0.001
Pulse Rate (Pre–Post)	-4.791	<0.001
Oxygen Saturation (SpO_2) (Pre–Post)	-4.805	<0.001
Degree of Respiratory Distress(Pre–Post)	-4.812	<0.001

The effectiveness of the windmill-blowing play therapy was further analyzed using the Wilcoxon Signed Rank Test. The results showed significant differences between the pre-intervention and post-intervention values. All variables demonstrated p-values of less than 0.001, indicating statistically significant changes in respiratory rate, pulse rate, oxygen saturation, and the degree of respiratory distress after the intervention was implemented. These findings indicate that windmill-blowing play therapy effectively improved respiratory status, as evidenced by reduced respiratory and pulse rates, increased oxygen saturation, and decreased respiratory distress scores among toddlers with bronchopneumonia.

The findings of this study revealed that prior to the intervention, most toddlers with bronchopneumonia experienced moderate respiratory distress, characterized by increased respiratory rate, elevated pulse rate, and decreased oxygen saturation. The average respiratory rate was 52 breaths per minute, the pulse rate reached 150 beats per minute, and the oxygen saturation averaged 89.5%. These findings indicate the presence of tachypnea and hypoxemia, conditions that commonly occur in children with bronchopneumonia due to impaired alveolar ventilation.

From a pathophysiological perspective, inflammation of the bronchioles and alveoli leads to mucus accumulation and airway narrowing, which subsequently interferes with the gas exchange process. This condition increases the workload of respiratory muscles and triggers elevated respiratory and heart rates as compensatory mechanisms in response to hypoxia (Hartati & Sari, 2023). These findings suggest that toddlers with bronchopneumonia often experience instability in respiratory status during the early phase of the disease.

Following the implementation of windmill-blowing play therapy incorporating the PLB technique, significant improvements in respiratory parameters were observed. The average respiratory rate decreased to 37 breaths per minute, the pulse rate declined to 124 beats per minute, and oxygen saturation increased to 96%. In addition, the respiratory distress score decreased from a moderate to a mild category. Physiologically, the PLB technique works by prolonging the expiratory phase, thereby generating mild positive expiratory pressure. This mechanism helps maintain alveolar patency, enhances alveolar ventilation, and improves the gas exchange process within the lungs. Improved ventilation subsequently contributes to better tissue oxygenation and reduces the workload of respiratory muscles, resulting in more stable respiratory and pulse rates (Widyowati & Irdawati, 2025).

The results of this study are consistent with findings reported by Pramesti and Laela (2024), who demonstrated that PLB exercises effectively increased oxygen saturation and reduced respiratory rate in children with respiratory disorders. Similarly, research conducted by Widyowati and Irdawati (2025) indicated that breathing exercises modified through play-based

media such as balloons or windmills significantly improved pulmonary ventilation and respiratory status in children. The use of play-based media in breathing exercises is considered effective because it increases children's participation and cooperation during therapy, particularly among preschool-aged children who may find it difficult to follow direct breathing instructions.

In this study, the windmill served as an assisting medium to facilitate controlled expiration in accordance with the PLB technique. This medium provides a relatively mild expiratory resistance, allowing children to exhale slowly without increasing the workload of respiratory muscles. Furthermore, the play-based approach may help reduce anxiety during hospitalization and supports the implementation of atraumatic care principles in pediatric nursing. Through a more engaging and enjoyable activity, children become more cooperative during breathing exercises, enabling the intervention to be implemented more effectively (Jansang et al., 2021; Lestari et al., 2024).

Statistical analysis using the Wilcoxon Signed Rank Test showed a p-value of less than 0.05, indicating a significant effect of PLB therapy using windmill play media on respiratory status and the degree of respiratory distress in toddlers with bronchopneumonia. The reduction in respiratory rate by 15 breaths per minute, the decrease in pulse rate by 26 beats per minute, and the increase in oxygen saturation by 6.5% demonstrate clinically meaningful improvements following the intervention. Therefore, windmill-blowing play therapy incorporating the PLB technique can be considered an effective non-pharmacological intervention for improving respiratory status in toddlers with bronchopneumonia. The PLB technique prolongs the expiratory phase and creates mild positive expiratory pressure, which helps maintain airway patency and prevents alveolar collapse during exhalation. This mechanism improves alveolar ventilation, facilitates carbon dioxide removal, and increases oxygen diffusion into the bloodstream (Pramesti & Laela, 2024; Widyowati & Irdawati, 2025).

The findings of this study also have important implications for pediatric nursing practice. PLB intervention combined with a windmill play approach may serve as a safe, simple, and practical independent nursing intervention to help stabilize respiratory status in children with bronchopneumonia, particularly during the acute phase in emergency departments or pediatric wards. This approach also supports the implementation of evidence-based practice in the management of respiratory disorders in children.

Conclusion

The windmill-blowing play approach incorporating the *Pursed Lips Breathing* (PLB) technique was shown to have a significant effect on improving respiratory status and reducing the degree of respiratory distress in toddlers with bronchopneumonia. The findings of this study indicate that windmill-blowing play therapy can serve as an effective, safe, and easily applicable non-pharmacological intervention in pediatric nursing practice to support the stabilization of respiratory function in toddlers with bronchopneumonia. Furthermore, this intervention supports the concept of atraumatic care, as it is delivered through a play-based method that creates a more enjoyable experience for children, thereby increasing their cooperation during treatment. Future studies are recommended to employ more robust research designs, such as quasi-experimental or randomized controlled trials, with larger sample sizes and longer observation periods. Such approaches would help strengthen the validity and generalizability of the research findings.

References

Hartati, S., & Sari, D. W. I. (2023). Analysis of the application of blowing balloon therapy to improve breath patterns in children with pneumonia at Hospital X Bekasi. *Proceeding 3rd International Ahmad Dahlan Health Science Conference (IAHSC)*, 45–52.

Indrianingsih, S. T., Modjo, D., & Rahman, N. A. (2024). Pemberian Terapi Pursed Lips Breathing (PLB) Terhadap Status Oksigenasi Pada Anak dengan Bronkopneumonia Di Ruangan Anak RSUD Prof. Dr. H. Aloei Saboe. *Journal Nursing Care Jurusan Keperawatan Politeknik Kesehatan Gorontalo*, *10*(1), 57. https://doi.org/10.52365/jnc.v10i1.1007

Jansang, S., Tungsukruthai, P., Srisuma, S., Sriyakul, K., Krajarng, A., & Kietinun, S. (2021). Effect of Pursed-Lip Breathing using a Windmill Toy Model on Breathing Efficiency in Chronic Obstructive Pulmonary Disease Patients. *TRENDS IN THE SCIENCES*, *18*(23), 714. https://doi.org/10.48048/TIS.2021.714

Kementerian Kesehatan Republik Indonesia. (2024). *Profil kesehatan Indonesia tahun 2023*. Jakarta: Pusat Data dan Informasi Kementerian Kesehatan RI

Krishna, G. V. A. R., & Rajan, N. O. (2023). Paediatric acute respiratory infections: a case series based clinical analysis and recommendations in accordance with WHO guidelines. *International Journal of Contemporary Pediatrics*, *10*(7), 1119–1121. https://doi.org/10.18203/2349-3291.ijcp20231853

Lestari, N. E., Purwati, N. H., Arini, D., Puspitasari, F. A., Rasmita, D., Nursasmita, R., ... & Ekawati, H. (2025). Buku Ajar Pengantar Ilmu Keperawatan Anak. PT. Sonpedia Publishing Indonesia.

Lestari, N.E., Arofi, T.M., Hidayah, H., Mahihody, A.J., & Laksono, R.D. (2024). Keperawatan Anak: Teori & Pedoman Praktis Asuhan dalam Keperawatan Anak. Jambi: Sonpedia Publishing.

Pramesti, A., & Laela, S. (2024). Pengaruh terapi pursed lips breathing terhadap status oksigenasi balita dengan bronkopneumonia. *Jurnal Keperawatan Medikal Bedah, 8*(2), 67–74.

Putri, N. A. M., Desmawati, E., Putri, N. A. M., & Desmawati, E. (2025). Parental smoking habits and the incidence of acute respiratory tract infections in toddlers. *Cendekia Medika*, *10*(2), 308–315. https://doi.org/10.52235/cendekiamedika.v10i2.539

Putri, R., & Amalia, D. (2023). Karakteristik klinis balita dengan bronkopneumonia di rumah sakit rujukan. *Jurnal Kesehatan Anak, 14*(3), 145–152.

Setiawati, D., Lestari, R., & Purnomo, H. (2025). Gamifikasi latihan pernapasan pursed lips breathing pada anak dengan pneumonia. *Jurnal Keperawatan Pediatrik, 9*(1), 1–9.

Shaima, S. N., Alam, T., Bin Shahid, A. S. M. S., Shahrin, L., Sarmin, M., Afroze, F., Parvin, I., Nuzhat, S., Jahan, Y., Mamun, G. M. S., Saha, H., Ackhter, M. M., Islam, M. Z., Shahunja, K. M., Islam, S., Ahmed, T., & Chisti, M. J. (2022). Prevalence, predictive factors, and outcomes of respiratory failure in children with pneumonia admitted in a developing country. *Frontiers in Pediatrics*, *10*, 1–7. https://doi.org/10.3389/fped.2022.841628

Sollo, I. A., Sinaga, M., & Bunga, E. Z. H. (2024). Determinan Kejadian Ispa pada Balita di Wilayah Kerja Puskesmas Eahun Kabupaten Rote Ndao Tahun 2024. *SEHATMAS Jurnal Ilmiah Kesehatan Masyarakat*. https://doi.org/10.55123/sehatmas.v3i4.4058

Widyowati, S., & Irdawati. (2025). Balloon blowing therapy with pursed lips breathing on oxygen saturation in pediatric pneumonia patients. *Indonesian Journal of Nursing Practice, 9*(1), 55–62.