

THE APPLICATION OF ORTHOPNEIC POSITION IN MEETING OXYGENATION NEEDS IN CKD PATIENTS AT RSUP DR. SARDJITO YOGYAKARTA

Maria Friskila¹, Umi Istianah², Maryana³, Rosa Delima⁴

Department of Nursing Polytechnic of Health – Yogyakarta, Indonesia

Article History

Received : January 2026

Revised :

Published : April 2026

Contact

mariafriskilla90@gmail.com

Keywords

*CKD, Orthopneic Position,
Oxygenation, Dyspnea*

ABSTRACT

Introduction

CKD is a noncommunicable disease with a global prevalence of 14.2% in 2023 and a prevalence of 6.1% in DIY. One of the most common complications is dyspnea caused by fluid overload and cardiopulmonary dysfunction. Orthopneic positioning, as a non pharmacological intervention, can optimize lung expansion and improve oxygen saturation in patients with CKD.

Method

This study employed a descriptive design using a case study approach involving two patients with chronic kidney disease (CKD) who experienced dyspnea. Nursing care was provided through assessment, diagnosis, intervention, implementation, and evaluation, utilizing and evidence-based clinical responses of the patients.

Result

The use of the orthopneic position for three days in both patients resulted in progressive improvement in respiratory function. Mr. A's respiratory rate decreased from 27 to 20 breaths per minute and his SpO₂ increased from 95% to 98%, while Mr. B's respiratory rate decreased from 27 to 21 breaths per minute and his SpO₂ increased from 95% to 98%. Shortness of breath decreased and nursing issues were resolved in both patients.

Conclusion

The use of the orthopneic position 3 days (24 hours each day) for 20 minutes per session was effective in reducing oxygenation problems in patients with CKD.

INTRODUCTION

Chronic Kidney Disease (CKD) is a noncommunicable disease whose prevalence continues to rise and poses a major challenge to global healthcare. CKD is defined as a decline in kidney function lasting more than three months, resulting in the kidneys' inability to maintain the balance of fluids, electrolytes, and metabolic waste products. This condition can progress to end-stage kidney disease, which requires renal replacement therapy, such as hemodialysis or kidney transplantation (Kovesdy, 2022). According to the Global Burden of Disease Study, it is estimated that in 2023, approximately 788 million adults worldwide will have CKD, with a prevalence of 14.2%, and the disease is projected to be the fifth leading cause of years of healthy life lost by 2040 (Mark et al., 2025).

The prevalence of CKD in Indonesia is also on the rise. According to the 2023 Indonesian Renal Registry, the majority of CKD patients are in the productive age group of 45–64 years, while the 2023 Indonesian Health Survey indicates that the main risk factors for CKD include diabetes mellitus, hypertension, and being male (Indonesian Ministry of Health, 2023; Andhika et al., 2025). In the Special Region of Yogyakarta, the prevalence of CKD reaches 6.1%, with a high frequency of hemodialysis visits reflecting the large number of patients in advanced stages (Indra et al., 2025).

Oxygenation disorders are one of the most common nursing issues encountered in patients with CKD. Decreased kidney function leads to fluid retention, resulting in increased intravascular volume, pulmonary congestion, and pulmonary edema, which trigger dyspnea (Zoccali et al., 2022). Additionally, cardiovascular disorders that often accompany CKD, such as hypertension and congestive heart failure, further impair respiratory function. Research also indicates that markers of fluid overload correlate with pulmonary congestion and symptoms of shortness of breath in CKD patients, while approximately 31.6% of patients report respiratory complaints such as dyspnea, cough, and chest pain (Raz et al., 2024; Shaik et al., 2021).

One nonpharmacological nursing intervention that can be used to address oxygenation disorders is body positioning. The orthopneic position allows for more optimal lung expansion through increased diaphragmatic

activity, reduced respiratory muscle workload, and improved alveolar ventilation, thereby increasing oxygen saturation and reducing respiratory rate. Previous studies have shown that the forward-leaning or orthopneic position is effective in reducing the sensation of shortness of breath and improving patient comfort shortly after the intervention is administered (Rahmawati et al., 2024; Topcuoglu et al., 2024). Nevertheless, the application of the orthopneic position as a nursing intervention for CKD patients with oxygenation disorders still requires further reporting and validation in clinical practice.

Based on the aforementioned background, this study aims to describe the implementation of the orthopneic position as a non-pharmacological nursing intervention to meet the oxygenation needs of patients with *Chronic Kidney Disease* (CKD) at Dr. Sardjito General Hospital, Yogyakarta, and to evaluate its impact on patients' oxygenation status.

METHOD

This study adopted a descriptive case study design using the nursing process approach supported by Evidence-Based Nursing (EBN). The study included two patients diagnosed with *Chronic Kidney Disease* (CKD) who presented with ineffective breathing patterns and fulfilled the established eligibility criteria. Eligible participants were patients with a respiratory rate of >20 breaths/minute, oxygen saturation (SpO_2) $\leq 95\%$, intact consciousness (*compos mentis*), and willingness to participate in the study. Patients with a history of thoracic surgery or those unable to maintain an upright sitting position were excluded.

Data were obtained through patient interviews, physical examinations, direct clinical observations, and reviews of medical records using standardized nursing assessment and observation instruments. The intervention involved positioning patients in the orthopneic position, defined as sitting upright at approximately 90° with the arms supported by a pillow or bedside table. The intervention was administered for 20 minutes once daily, or whenever dyspnea occurred, for three consecutive days. Respiratory rate, oxygen saturation, and other vital signs were evaluated before and after each intervention to assess changes in the patients' oxygenation status.

The study was conducted in Dahlia 2 Ward, Dr. Sardjito General Hospital, Yogyakarta,

between 11 and 23 May 2026. Data were analyzed descriptively by comparing the clinical responses of the two patients following the implementation of the orthopneic position and were presented in a narrative format.

RESULT

Table 1. Characteristics of the Participants

Variable	Patient 1	Patient 2
Age	18 years	19 years
Sex	Male	Male
Medical diagnosis	CKD stage V on hemodialysis, acute pulmonary edema, anemia	CKD stage V on hemodialysis, bilateral pleural effusion, lupus nephritis, anemia
Main complaint	dyspnea	dyspnea

This case study included two male patients diagnosed with *Chronic Kidney Disease* (CKD) stage V who were undergoing routine hemodialysis and experienced ineffective breathing patterns. Both patients presented with dyspnea, tachypnea, and decreased oxygenation status, accompanied by hypertension, anemia, and bilateral lower-extremity edema. The primary nursing diagnosis in both cases was an ineffective breathing pattern related to impaired respiratory effort.

Table 2. Changes in Oxygenation Status Following the Orthopneic Position

Variable	Baseline	Day 1	Day 2	Day 3
Patient 1				
Respiratory rate (breaths/min)	27	25	24	20
SpO ₂ (%)	95	96	97	98
Patient 2				
Respiratory rate (breaths/min)	27	26	23	21
SpO ₂ (%)	95	96	97	98

The orthopneic position was implemented for 20 minutes once daily, or whenever dyspnea occurred, for three consecutive days in addition to standard nursing care and oxygen therapy. Respiratory rate (RR),

oxygen saturation (SpO₂), and subjective complaints of dyspnea were assessed before and after each intervention.

Table 3. Comparison of Oxygenation Outcomes After Three Days of Intervention

Outcome	Patient 1	Patient 2
Initial RR (breaths/min)	27	27
Final RR (breaths/min)	20	21
RR reduction	7	6
Initial SpO ₂ (%)	95	95
Final SpO ₂ (%)	98	98
SpO ₂ improvement	+3%	+3%

Both patients demonstrated progressive improvements in oxygenation status throughout the intervention period. Patient 1 showed a reduction in respiratory rate from 27 to 20 breaths/minute and an increase in oxygen saturation from 95% to 98%. Similarly, Patient 2 demonstrated a reduction in respiratory rate from 27 to 21 breaths/minute, while oxygen saturation improved from 95% to 98%. In addition, both patients reported decreased dyspnea and improved breathing comfort following the implementation of the orthopneic position.

DISCUSSION

This case study demonstrated that the implementation of the orthopneic position was associated with progressive improvements in the oxygenation status of both patients with *Chronic Kidney Disease* (CKD). After three consecutive days of intervention, both patients experienced reductions in respiratory rate, increases in oxygen saturation, and alleviation of subjective dyspnea. These findings indicate that the orthopneic position may serve as an effective non-pharmacological nursing intervention to improve respiratory function in patients with CKD experiencing ineffective breathing patterns. The improvement observed in both patients suggests that the intervention not only enhanced physiological oxygenation parameters but also increased patients' comfort during breathing.

The respiratory impairment observed in both cases was closely related to complications commonly associated with advanced CKD.

Although both patients had the same primary diagnosis of CKD stage V requiring hemodialysis, the underlying pulmonary complications differed. Patient 1 experienced acute pulmonary edema, whereas Patient 2 presented with bilateral pleural effusion. In addition, both patients had normocytic normochromic anemia, a common complication of CKD resulting from decreased erythropoietin production. These pathological conditions contribute to impaired oxygen delivery through different mechanisms. Fluid overload leads to pulmonary congestion and reduced alveolar gas exchange, while anemia decreases the oxygen-carrying capacity of the blood, thereby increasing respiratory workload and exacerbating dyspnea. These findings are consistent with previous reports indicating that pulmonary congestion, pleural effusion, and anemia are major contributors to impaired oxygenation and respiratory symptoms in patients with advanced CKD (Sharad Patel et al., 2023; Badura et al., 2024).

The improvement in oxygenation following the orthopneic intervention can be explained by its physiological effects on respiratory mechanics. The orthopneic position allows patients to maintain an upright sitting posture with arm support, thereby reducing the pressure exerted by the abdominal organs on the diaphragm. This position facilitates greater diaphragmatic excursion, enhances thoracic expansion, increases lung volume, and promotes more effective alveolar ventilation. Consequently, respiratory muscle workload decreases, resulting in more efficient gas exchange, reduced respiratory rate, and improved oxygen saturation. In addition, supporting the upper extremities stabilizes the shoulder girdle and enables the accessory respiratory muscles to function more effectively during inspiration, thereby reducing the sensation of breathlessness. These physiological mechanisms explain the consistent clinical improvement observed throughout the intervention period.

The findings of this study are consistent with previous evidence regarding the effectiveness of body positioning in improving respiratory function. Rahmawati et al. (2024) reported that the orthopneic position significantly reduced dyspnea and increased oxygen saturation in patients with respiratory compromise. Likewise, Topcuoglu et al. (2024) demonstrated that the forward-leaning position improved diaphragmatic function, decreased respiratory

effort, and enhanced pulmonary ventilation. Similar improvements were observed in the present study, where both patients exhibited progressive reductions in respiratory rate and increases in oxygen saturation over the three-day intervention period. Although the underlying pulmonary complications differed between the two patients, both responded positively to the intervention, suggesting that the orthopneic position may provide clinical benefits across different causes of oxygenation impairment in patients with CKD.

From a nursing perspective, these findings highlight the importance of incorporating evidence-based non-pharmacological interventions into routine clinical practice. The orthopneic position is simple, inexpensive, safe, and can be implemented independently by nurses without requiring additional medical equipment. As an adjunct to pharmacological therapy and oxygen administration, this intervention may contribute to improving patients' respiratory comfort and oxygenation status while reducing the work of breathing. Therefore, the orthopneic position should be considered as part of comprehensive nursing management for patients with CKD who experience dyspnea or ineffective breathing patterns.

This study has several limitations. The findings were derived from only two patients and were observed over a relatively short intervention period; therefore, the results cannot be generalized to all patients with CKD. Furthermore, improvements in oxygenation may have been influenced by concurrent treatments, including oxygen therapy and routine hemodialysis. Nevertheless, the consistent positive responses observed in both patients indicate that the orthopneic position has promising potential as a supportive nursing intervention. Future studies involving larger sample sizes and more rigorous research designs are recommended to further evaluate its effectiveness in improving oxygenation among patients with CKD.

CONCLUSION

This case study demonstrated that the orthopneic position may effectively improve oxygenation status in patients with *Chronic Kidney Disease* (CKD) experiencing ineffective breathing patterns. Progressive reductions in respiratory rate, improvements in oxygen saturation, and decreased subjective dyspnea

were consistently observed in both patients following three days of intervention. These findings support the use of the orthopneic position as a practical, low-cost, and evidence-based nursing intervention that can complement standard respiratory management in patients with CKD. Nevertheless, because this study involved only two patients, further research using larger samples and more robust study designs is required to confirm its effectiveness and support its wider implementation in clinical nursing practice.

BIBLIOGRAPHY

- Akbar, R. R., Arifin, M. T., & Rochana, N. (2020). Efek Posisi Orthopneic Terhadap Fungsi Pernapasan: Systematic Review. *Jurnal Ilmiah Kesehatan*, 13(2), 59–68. <https://doi.org/10.48144/jiks.v13i2.252>
- Andhika, R., Afiatin, Supriyadi, R., Bandiara, R., Sukesu, L., Sudarmadi, A. P., Wahyudi, K., & Sofiatin, Y. (2025). One-year Survival of End-Stage Kidney Disease Patients Undergoing Hemodialysis in Indonesia. *International Journal of Nephrology and Renovascular Disease*, 18, 87–101. <https://doi.org/10.2147/IJNRD.S508012>
- Badura, K., Janc, J., Wąsik, J., Gnitecki, S., Skwira, S., Młynarska, E., Rysz, J., & Franczyk, B. (2024). Anemia of Chronic Kidney Disease—A Narrative Review of Its Pathophysiology, Diagnosis, and Management. *Biomedicines*, 12(6), 1191. <https://doi.org/10.3390/biomedicines12061191>
- Bila, Q. S., Zul'irfan, M., Wardah, & S, T. S. (2025). Penerapan Pemberian Posisi Orthopneic Pada Pasien Ckd Yang Mengalami Dispnea Dengan Masalah Keperawatan Pola Napas Tidak Efektif Di Rsud Arifin Achmad Provinsi Riau. *Medic Nutricia: Journal Ilmu Kesehatan*, 19(4), 91–100.
- Ceyhun Topcuoglu, Eylem Tutun Yumin, & Merve Basol Goksuluk. (2024). *Neural Respiratory Drive During Different Dyspnea Relief Positions and Breathing Exercises in Individuals With COPD*.
- Gembillo, G., Calimeri, S., Tranchida, V., Silipigni, S., Vella, D., Ferrara, D., Spinella, C., Santoro, D., & Visconti, L. (2023). Lung Dysfunction and Chronic Kidney Disease: A Complex Network of Multiple Interactions. *Journal of Personalized Medicine*, 13(2), 286. <https://doi.org/10.3390/jpm13020286>
- Intan Corina Indra, Fahdrian Kemala, & Pujiyanto. (2025). *Analysis Of Hemodialysis Service Utilization By Jkn Participants In The Special Region Of Yogyakarta: An Analysis Of Bpjs Kesehatan Claim Data In 2023*.
- Janice L. Hinasal kanulle, Kerry H. Cheever, & Kristen Overbaugh. (2021). *Textbook of: Medical-Surgical Nursing*.
- Jusriani, Nadia Alfira, & Muriyati. (2024). *Penerapan Posisi Orthopnea Terhadap Penurunan Frekuensi Sesak Pada Ny.M Dengan Diagnosa Chronic Kidney Disease (Ckd) Di Ruang Lovebird Rs Bhayangkara Tk Ii Makassar*.
- Kovesdy, C. P. (2022). Epidemiology of chronic kidney disease: An update 2022. *Kidney International Supplements*, 12(1), 7–11. <https://doi.org/10.1016/j.kisu.2021.11.003>
- Mark, P. B., Stafford, L. K., Grams, M. E., Aalruz, H., Abd ElHafeez, S., Abdelgalil, A. A., Abdulkader, R. S., Abeywickrama, H. M., Abiodun, O. O., Abramov, D., Abrar, M. M., Abreu, L. G., Abubakar, B., Aburuz, S., Addo, I. Y., Adegboye, O. A., Adegoke, N. A., Adeyeoluwa, T. E., Adnani,
- Patricia A. Potter, Anne G. Perry, Patricia A. Stockert, & Amy Hall. (2020). *Fundamentals of Nursing*.
- Patricia A. Potter, Anne G. Perry, Patricia A. Stockert, Amy Hall, & Wendy R. Ostendorf. (2025). *Fundamentals of Nursing*. <https://shop.elsevier.com/books/fundamentals-of-nursing/potter/978-0-443-12406-8>
- Rahmawati, D. N., Husain, F., & Wulandari, I. (2024). Penerapan Posisi Orthopnea Untuk Penurunan Sesak Napas Pada Pasien CKD Di Ruang Observasi Emergency (ROE) IGD RSUD Dr.

- Moewardi Surakarta: *Jurnal Kolaboratif Sains*, 7(8), 3361–3373. <https://doi.org/10.56338/jks.v7i8.5726>
- Raz, M. A., Grupper, A., Soetendorp, H., Feder, O., Amsterdam, D., Schwartz, D., & Kliuk-Ben Bassat, O. (2024). Use of lung ultrasound to assess volume status and its association with physical examination in patients with chronic kidney disease. *Clinical Kidney Journal*, 17(7), sfae167. <https://doi.org/10.1093/ckj/sfae167>
- Roisyah, F. A. F., Chayati, N., & Purnomo, S. (2025). Manajemen Keperawatan pada Pasien Chronic Kidney Disease (CKD) Stadium Akhir dengan masalah Pola Napas Tidak Efektif, Nyeri Akut, dan Risiko Perfusi Renal Tidak Efektif di IGD: Studi Kasus Deskriptif Kualitatif. *Jurnal Penelitian Perawat Profesional*, 7(2), 971–978. <https://doi.org/10.37287/jppp.v7i2.6443>
- Shaik, L., Thotamgari, S. R., Kowtha, P., Ranjha, S., Shah, R. N., Kaur, P., Subramani, R., Katta, R. R., Kalaiger, A. M., & Singh, R. (2021). A Spectrum of Pulmonary Complications Occurring in End-Stage Renal Disease Patients on Maintenance Hemodialysis. *Cureus*, 13(6), e15426. <https://doi.org/10.7759/cureus.15426>
- Sharad Patel, Adam Green, Sandhya Ashokumar, Andrew Hoke, & Jean-Sebastien Rachoin. (2023, October 5). *Objective Methods of Assessing Fluid Status to Optimize Volume Management in Kidney Disease and Hypertension: The Importance of Ultrasound*. <https://www.mdpi.com/2077-0383/12/19/6368>
- Siregar, M. A., Tarigan, A. P., Ariani, Y., & Utara, S. (2021). *The Effects Of Combination Orthopneic Position And Pursed Lips Breathing On Respiratory Status Of Ckd Patients*. https://www.semanticscholar.org/paper/The-Effects-Of-Combination-Orthopneic-Position-And-Siregar-Tarigan/c62f38dbf4e142cb811b831c407deea112a93f2a?utm_source=chatgpt.com
- Teresa K Chen, Melanie P Hoenig, Dorothea Nitsch, & Morgan E Grams. (2023, December 5). *Advances in the management of chronic kidney disease | The BMJ*. <https://www.bmj.com/content/383/bmj-2022-074216>
- Zeder, K., Siew, E. D., Kovacs, G., Brittain, E. L., & Maron, B. A. (2024). Pulmonary hypertension and chronic kidney disease: Prevalence, pathophysiology and outcomes. *Nature Reviews. Nephrology*, 20(11), 742–754. <https://doi.org/10.1038/s41581-024-00857-7>
- Zoccali, C., Mallamaci, F., & Picano, E. (2022). Detecting and Treating Lung Congestion with Kidney Failure. *Clinical Journal of the American Society of Nephrology: CJASN*, 17(5), 757–765. <https://doi.org/10.2215/CJN.14591121>
- Murtilita. (2025). Kombinasi Intervensi Posisi High Fowler, Pursed Lips Breathing, dan Terapi Akupresur terhadap Penurunan Tingkat Sesak Napas pada Pasien Efusi Pleura dengan CKD Stage V. *Tanjungpura Journal of Nursing Practice and Education*.
- Herdman, T. H., & Kamitsuru, S. (2024). *NANDA International Nursing Diagnoses: Definitions and Classification 2024–2026*. Thieme.
- Dali, A. S., dkk. (2026). Effectiveness of Prone and Orthopneic Positions on Oxygen Saturation and Respiratory Rate. *Babali Nursing Research*.