



The Effectiveness of Slow Deep Breathing as a Pain Management Intervention in Coronary Heart Disease: A Case Report

Koroner Kalp Hastalığında Bir Ağrı Yönetimi Müdahalesi Olarak Yavaş ve Derin Nefes
Almanın Etkinliği: Bir Olgu Raporu

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ABSTRACT

Patients with coronary heart disease often experience pain as their primary complaint. One effective nursing intervention to alleviate this pain is the practice of slow, deep breathing. This case study focuses on Mrs. A, a 57-year-old woman diagnosed with coronary heart disease five years ago. To help manage her pain, a slow, deep breathing relaxation technique was administered for four consecutive days. This nursing intervention not only reduced her pain but also calmed her down, highlighting its positive impact on pain management.

Keywords: Coronary disease, pain management, breathing exercise, relaxation therapy

Öz

Koroner kalp hastalığı olan hastalar genellikle birincil şikayetleri olarak ağrıyı deneyimlerler. Bu ağrıyı hafifletmek için etkili olan hemşirelik müdahalelerinden birisi de, yavaş ve derin nefes alma uygulamasıdır. Bu olgu çalışmasında, beş yıl önce koroner kalp hastalığı teşhisi konulan 57 yaşındaki Bayan A değerlendirildi. Ağrısını yönetmesine yardımcı olmak için, evinde dört gün boyunca yavaş ve derin nefes alarak gevşeme tekniği uygulandı. Bu hemşirelik müdahalesi sadece hastanın ağrısını azaltmakla kalmayıp, aynı zamanda sakinleştirerek ağrı yönetimi üzerindeki olumlu etkisini vurguladı.

Anahtar Kelimeler: Koroner hastalık, ağrı yönetimi, nefes egzersizi, gevşeme terapisi

INTRODUCTION

Slow, deep breathing exercises use diaphragmatic breathing, where the abdomen rises slowly and the chest expands as the patient inhales deeply¹⁻⁴. This method is commonly employed as a non-pharmacological intervention because it helps reduce pain by promoting relaxation^{5,6}. It alleviates stress and anxiety, lowers blood pressure, and improves lung function and oxygen supply to the heart⁷⁻⁹. Together, these effects contribute to

pain reduction, making this technique particularly beneficial as a nursing intervention for patients with coronary heart disease, who experience pain^{2,3}.

Slow, deep breathing relaxation and psychoeducation were provided at the patient's home over four consecutive days. Patient data were collected through face-to-face interviews, observation, and physical examination. At the first meeting, the researchers assessed the patient's pain intensity using

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the Numeric Rating Scale (NRS) and then administered the intervention. During the second to fourth meetings, the patient practiced slow, deep breathing relaxation for 15 minutes or until the pain subsided. On the fourth day, the pain intensity was measured again to evaluate the effectiveness of the therapy. This study aims to analyze the effectiveness of slow, deep breathing techniques in reducing pain and to educate families as a support system for patients undergoing therapy.

CASE REPORT

Mrs. A, a 57-year-old woman, was diagnosed with coronary heart disease in February 2022. Her medical history revealed that she had been suffering from hypertension and heart disease for the past five years. Despite regularly taking antihypertensive medication, her heart condition continued to require special attention, particularly following her diagnosis of coronary heart disease.

In March 2022, Mrs. A experienced severe chest pain, leading to hospitalization. A percutaneous coronary intervention, including angiography, revealed a blockage in her coronary arteries, necessitating the placement of a stent. Despite this procedure, Mrs. A's lifestyle remained a contributing risk factor. She continued to consume salty and fatty foods and rarely exercised. Additionally, she often forgot to take her prescribed 5 mg dose of amlodipine, which was essential for managing her hypertension.

In April 2022, Mrs. A began experiencing left-sided chest pain that radiated to her back and left hand. These symptoms were especially pronounced during physical activities, such as lifting heavy objects or talking for extended periods. At the time of assessment, Mrs. A was fully conscious and able to comprehend questions but reported that strenuous activities or long conversations often triggered chest tightness and pain. Vital signs showed a blood pressure of 154/92 mmHg, a pulse of 96 beats per minute, and a respiratory rate of 21 breaths per minute. In addition to her verbal complaints, physical signs such as a furrowed brow, grimacing expression, and clutching the left side of her chest indicated significant discomfort. This condition interfered with her daily activities, causing her to feel anxious and uncomfortable.

After being diagnosed with coronary heart disease, Mrs. A was prescribed isosorbide dinitrate as an antianginal medication to manage her angina pectoris symptoms, particularly the chest pain radiating to her back and left arm. Despite taking the medication regularly, she continued to experience angina attacks several times a month, especially during physical activities. Furthermore, she suffered from a persistent headache after taking the medication, which exacerbated her anxiety and diminished her quality of life.

Given the lack of improvement, Mrs. A consulted her cardiologist once again. After further evaluation and considering her ongoing symptoms, the doctor decided to change her antianginal therapy from isosorbide dinitrate to a nitroglycerin transdermal patch. This new treatment was chosen because it provided a more stable antianginal effect with a lower risk of side effects.

Following the change in therapy, Mrs. A reported a significant reduction in the frequency of angina attacks, from 4-5 times per week to only 1-2 times per week. The severity of her pain also decreased, with the average intensity dropping from a scale of 7 to 4-5. Her pain subsided more quickly, typically lasting only 5-10 minutes, and did not always necessitate stopping her activities. The anxiety that had previously accompanied her angina attacks also diminished. Additionally, the side effects of headaches that she had experienced with isosorbide dinitrate were drastically reduced. With the decrease in both the frequency and severity of her angina attacks, as well as the reduction in drug-related side effects, Mrs. A experienced a significant improvement in her quality of life. She could now perform daily activities more comfortably and with fewer disruptions.

For Mrs. A, repeat tests such as myocardial perfusion scintigraphy, stress test, or coronary angiography were not necessary as her symptoms remained stable and under control. Usually, these tests are only repeated if the patient experiences worsening symptoms or if standard treatment does not relieve her pain. As Mrs. A's chest pain and other signs of ischemia could be effectively managed with lifestyle changes, medication, and slow deep breathing, further tests might not be necessary at that time.

In addition, since coronary angiography is an invasive test with some risks, doctors usually avoid it unless new symptoms arise. The positive effect of slow deep breathing on her pain suggested that her symptoms were responding well to this nursing intervention, thus reducing the need for more intensive testing. Clinical guidelines also recommend avoiding expensive tests, such as myocardial perfusion and coronary angiography unless they are necessary. In single-case report research, ethical approval is obtained by securing the patient's and their family's permission. The researcher provides a detailed explanation of the study's objectives, procedures, and methods. Following this, approval is formalized through informed consent from the patient and family. This study adhered to the principles of honesty, ensuring patient and family privacy, and maintaining anonymity.

Methods and Implementation

The slow, deep breathing nursing intervention was implemented in the patient's home over four days. Before the intervention,

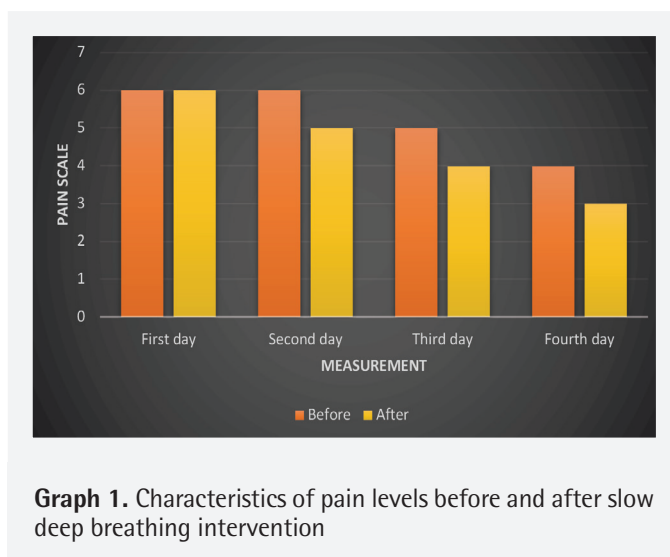
the patient was given a NRS questionnaire to measure the level of pain experienced (Figure 1). The NRS is a pain measurement tool that uses a scale from 0 to 10. This scale is effective in assessing pain both before and after the intervention. A score of 0 indicates "no pain," 1-3 indicates "mild pain," 4-6 indicates "moderate pain," and 7-10 indicates "severe pain" (Figure1).

The patient was guided through a slow deep breathing relaxation technique with the following steps:

- 1) Position the patient in a semi-Fowler's position, 2) Ask the patient to place one hand on their chest and the other on their abdomen, 3) Instruct the patient to take a deep breath through their nose, counting to three while keeping their mouth closed, 4) Encourage the patient to notice the expansion of their abdomen as they inhale, 5) Have the patient hold their breath for three seconds, 6) Instruct the patient to exhale slowly, counting to three, through their mouth as if blowing, 7) Repeat steps 1-6 for 15 minutes.

Slow, deep breathing relaxation was carried out with the active involvement of the patient's family, who were educated on how to support the patient during pain episodes. Nurses educated the patient and their family about the benefits of slow, deep breathing techniques for alleviating chest pain. They also highlighted the crucial role of family support, explaining how it could boost the patient's motivation to follow medical therapy and help reduce their symptoms.

The bar chart (Graph 1) illustrates changes in pain scale measurements over four days, comparing pain levels before and after a specific intervention. On the first day, before the intervention, the pain scale is at its highest, recorded at 6. After the intervention, the pain level remains unchanged at 6, indicating no immediate relief. By the second day, the pain scale before the intervention remains at 6, but after the intervention, there is a slight decrease to 5, suggesting the intervention begins to have some effect. On the third day, the pain scale before the intervention decreases to 5, and after the intervention, it further drops to 4, reflecting a continued positive impact. By the fourth day, the pain scale before the intervention is 4, while after the intervention, it decreases to 3, marking the most significant improvement in pain relief over the four days. The chart reveals a progressive decrease



Graph 1. Characteristics of pain levels before and after slow deep breathing intervention

in pain levels following the intervention, with no change on the first day but a steady reduction from the second day onward. By the fourth day, the significant difference between pain levels before and after the intervention demonstrates the effectiveness of the treatment in reducing pain over time

DISCUSSION

The results of this study indicate that implementing slow, deep breathing techniques can effectively reduce pain in patients with coronary heart disease. This is achieved because slow, deep breathing enhances alveolar ventilation, maintains gas exchange, prevents lung atelectasis, improves cough efficiency, and reduces physical and emotional stress¹⁰⁻¹². Consequently, it decreases pain intensity and anxiety. Patients who practice deep breathing relaxation techniques experience notable benefits, including pain relief, mental calmness, and reduced anxiety¹³⁻¹⁵.

The results of this research are supported by findings from Gholamrezaei et al.¹, who observed a reduction in chest pain levels among patients with coronary heart disease in Belgium after implementing deep and slow breathing relaxation techniques compared to those practicing uncontrolled breathing. Although the overall difference in pain intensity between controlled and unchecked breathing was approximately 0.5 points on a 10-point scale, this difference was more pronounced, about 1 point, in patients with higher pain scores. Additionally, research by Shao et al.¹⁶ demonstrated significant improvements in chest pain characteristics in the study group after applying deep breathing techniques over two days. All aspects of pain-severity, quality, and expression showed improvement, with more participants reporting no pain, compared to a higher percentage in the control group, who continued to experience moderate pain, persistent pain quality, and restlessness. These findings confirm the



Figure 1. Numeric Rating Scale

positive impact of deep breathing technique training on pain reduction^{7,10,13,14}.

Deep breathing relaxation techniques reduce pain levels and effectively alleviate the stress experienced by patients during painful episodes¹⁷. The benefits of these techniques include a sense of calm, reduced anxiety, and diminished feelings of worry and restlessness. Additionally, deep breathing helps lower blood pressure, decrease heart rate, and enhance disease resistance¹⁸. Beyond these physiological effects, it contributes to better mental health¹⁹, improved sleep quality¹², enhanced memory²⁰, and increased creativity and confidence²¹.

Deep breathing exercises have a significant impact on reducing anxiety levels, improving quality of life, and reducing medication use in patients with coronary heart disease²². By optimizing oxygen exchange and reducing the stress response, these exercises can lower the anxiety that often accompanies coronary heart conditions¹⁶. In addition, patients who regularly perform deep breathing exercises tend to report improved quality of life, including improvements in sleep, energy, and emotional well-being⁵. Along with reduced anxiety and increased self-control, patients' need for sedatives or painkillers may decrease, potentially reducing dependence on pharmacotherapy and lowering the risk of side effects related to long-term drug use¹⁴.

Deep breathing techniques have a profound long-term impact on the quality of life and well-being of patients, particularly those with chronic conditions such as coronary heart disease. Regular practice of these techniques not only aids in managing physical pain but also enhances patients' mental and emotional well-being.

Physiologically, deep breathing improves oxygenation efficiency, lowering blood pressure and enhancing cardiovascular function. This improvement helps to reduce the frequency and intensity of angina attacks, enabling patients to be more active and independent in their daily lives. Additionally, deep breathing is effective in alleviating anxiety and stress, which often exacerbate heart conditions. By managing stress more effectively, patients experience better moods, improved sleep, and a reduced need for sedatives or analgesics.

The psychological benefits of deep breathing are equally significant. Patients who consistently engage in deep breathing exercises often feel more empowered and in control of their condition. This sense of control fosters increased self-confidence and emotional well-being, further enhancing overall quality of life. Thus, incorporating deep breathing techniques into long-term care provides holistic benefits, addressing patient health's physical, mental, and emotional aspects.

Although deep breathing techniques provide various benefits, their application in managing chronic diseases like coronary heart disease is not always straightforward and can encounter several challenges and limitations. One significant challenge is ensuring patient motivation and compliance with consistent practice. Patients may struggle to incorporate these techniques into their daily routine, especially if they do not experience immediate benefits or lack understanding of their importance. Additionally, physical limitations such as severe breathlessness or fatigue, common in patients with serious health conditions or comorbidities, can hinder the effective practice of these exercises. Education and support limitations also pose barriers, as constrained time and resources in healthcare settings often make it difficult to provide comprehensive guidance. Without proper support, patients may not know how to execute these techniques correctly or appreciate the need for consistent practice. Environmental factors, such as environments that do not promote relaxation, and social factors, such as a lack of family support, can further diminish the effectiveness of deep breathing techniques. Moreover, responses to these techniques may vary among patients due to age, disease severity, and mental state, potentially leading to varied outcomes despite correct adherence to the exercise regimen. Addressing these challenges requires a holistic and integrated approach, including ongoing educational support, regular monitoring by healthcare professionals, and tailoring techniques to meet individual patient needs.

CONCLUSION

Deep breathing exercises reduce pain, improve quality of life, and decrease medication use in patients with coronary heart disease. These exercises help lower pain intensity by increasing alveolar ventilation and reducing stress while enhancing patients' mental and emotional well-being, improving overall quality of life. Moreover, as anxiety and pain diminish, patients become less reliant on sedative and analgesic medications, thereby lowering the risk of side effects and the costs associated with long-term treatment. As a non-pharmacological intervention, deep breathing exercises offer holistic benefits and should be integrated into the routine care of coronary heart patients.

Ethics

Informed Consent: In single-case report research, ethical approval is obtained by securing the patient's and their family's permission. The researcher provides a detailed explanation of the study's objectives, procedures, and methods. Following this, approval is formalized through informed consent from the patient and family. This study adhered to the principles of honesty, ensuring patient and family privacy, and maintaining anonymity.

Footnotes

Authorship Contributions

Concept: Y.B.P., T.P.W., Design: Y.B.P., Data Collection or Processing: Y.B.P., T.P.W., Analysis or Interpretation: Y.B.P., Literature Search: Y.B.P., T.P.W., Writing: Y.B.P.

Conflict of Interest: No conflict of interest was declared by the authors.

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