



RESEARCH ARTICLE

The Effect of Diaphragmatic Breathing Exercise on Reducing Insomnia in the Elderly

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Abstract

Elderly are people who reach the age over 60 years. Along with increasing age, there will be a decrease in body function in the elderly such as excessive anxiety, decreased self-confidence, and insomnia. This study aimed to determine The Effect of Diaphragmatic Breathing Exercise to Reduce Insomnia in the Elderly in Community Health Centers Of Bukittinggi, 2023. The type of study was Quasi-Experimental Design with One Group Pretest-Posttest Test. The reason for conducting this research was to find out whether there was a decrease in insomnia after being given Diaphragmatic Breathing Exercise to the elderly. The population was 20 people who attended the elderly integrated services post activities at Community Health Center Bukittinggi. By using purposive sampling, 10 people were chosen as the samples. The study was conducted for 4 weeks with the instrument was the Insomnia Severity Index. The data were analyzed by univariate and bivariate analysis by using the Wilcoxon Test. Based on the Wilcoxon Test, it showed that the p value was $0.005 < \alpha < 0.05$ with an average insomnia before giving Diaphragmatic Breathing Exercise was 11.50 and after 5.20. In short, there was an effect of Diaphragmatic Breathing Exercise on Reducing Insomnia in the Elderly at Bukittinggi Community Health Centers in 2023.

Keywords: Diaphragmatic Breathing Exercise, Insomnia, Elderly

Abstrak: Lanjut usia adalah orang yang mencapai usia 60 tahun ke atas. Seiring dengan bertambahnya usia, maka akan terjadi penurunan fungsi tubuh pada lansia, Kecemasan yang berlebihan, penurunan rasa percaya diri, insomnia, yang sering terlihat pada orang lanjut usia. Penelitian ini bertujuan untuk mengetahui pengaruh pemberian Diaphragmatic Breathing Exercise Terhadap Penurunan Insomnia Pada Lansia Di Puskesmas Kota Bukittinggi Tahun 2023. Jenis penelitian ini adalah Quasi-Eksperimen Design One Group Pretest-Posttest Test. Alasan di lakukan penelitian ini untuk mengetahui adanya penurunan insomnia setelah di berikan Diaphragmatic Breathing Exercise pada lansia. Populasi dalam penelitian ini sebanyak 20 orang yang hadir pada kegiatan posyandu lansia di Puskesmas Kota Bukittinggi. Teknik pengambilan sampel menggunakan metode purposive sampling sebanyak 10 orang. Penelitian dilakukan selama 4 minggu dengan instrumen penelitian yang digunakan adalah Insomnia Saverity Index. Analisis data meliputi analisis univariat dan bivariat menggunakan uji Wilcoxon Test. Berdasarkan uji Wilcoxon Test menunjukkan bahwa nilai p value $0,005 < \alpha < 0,05$ dengan rerata insomnia sebelum pemberian Diaphragmatic Breathing Exercise adalah 11.50 dan sesudah 5.20. Kesimpulan penelitian ini bahwa terdapat pengaruh Pemberian Diaphragmatic Breathing Exercise Terhadap Penurunan Insomnia Pada Lansia Di Puskesmas Kota Bukittinggi Tahun 2023.

Kata Kunci: Diaphragmatic Breathing Exercise, Insomnia, Lansia

INTRODUCTION

Elderly population faces numerous health challenges that require immediate and comprehensive intervention. With age, there is a decline in physical, physiological, and psychological functions. Common issues such as excessive anxiety, reduced self-confidence, and insomnia are interrelated and can potentially contribute to overall health problems. Insomnia, particularly, is a prevalent issue among the elderly (Grace, 2007).

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Elderly individuals, defined as those aged 60 and above, have the same rights as other members of society and are protected under specific legislations (UU RI No. 13, 1998). The World Health Organization categorizes the elderly into various age groups: 45-60 years as middle age, 60-75 years as elderly, 75-90 years as old, and above 90 years as very old. The aging process, particularly after the age of 60, is marked by a continuous decline in physical resilience and increased susceptibility to diseases.

Insomnia prevalence in the elderly is high, approximately 67%. Globally, the prevalence of insomnia is estimated at 20%-40% in adults, with around 17% experiencing severe sleep disorders. Research by The Gallup Organization found that insomnia prevalence among the elderly in America is 36% for men and 54% for women.

Insomnia in the elderly often co-occurs with other conditions such as physical illnesses (hyperthyroidism, arthritis) and mental health issues (depression, anxiety disorders), complicating the individual's ability to sleep well. Inadequate sleep quality can have serious impacts, such as excessive daytime sleepiness, memory disorders, mood disturbances, depression, frequent falls, inappropriate use of hypnotics, and a decline in the quality of life (Rarasta et al., 2018).

Diaphragmatic breathing exercise, a practice that contracts the diaphragm causing the abdomen to expand and creating negative pressure in the chest to draw air into the lungs, is considered beneficial. This negative pressure draws blood into the chest, enhancing venous return to the heart and boosting the immune system's activity. The exercise, rich in immune cells due to lymphatic fluid, is seen as an excellent way to stimulate a relaxation response and reduce tension and depression (Grace, 2007).

Insomnia is a significant health issue among the elderly, with a high prevalence rate. Not only does it affect sleep quality, but it also impacts overall health, including increased risk of depression, memory disorders, and decreased quality of life. Insomnia often coexists with other physical and psychological conditions, making its management more complex.

Despite the high prevalence of insomnia among the elderly, there is a need for effective, non-invasive, and easily applicable intervention methods to reduce insomnia symptoms and improve the quality of life in the elderly. The effectiveness of Diaphragmatic Breathing Exercise: There is a gap in knowledge regarding the extent to which diaphragmatic breathing exercise effectively reduces insomnia symptoms in the elderly. This research aims to fill this gap by evaluating the effect of this exercise on sleep quality and insomnia symptoms.

Although diaphragmatic breathing exercise is recognized to stimulate relaxation responses and reduce tension and depression, there is a lack of in-depth research on how this exercise specifically works in the context of the elderly with insomnia. This research contributes to a holistic understanding of insomnia management in the elderly, considering physical, psychological aspects, and the interplay between various health conditions that often accompany the elderly.

This research has the potential to use a more comprehensive outcome measurement approach, focusing not only on improving sleep quality but also on enhancing cognitive function, quality of life, and reducing the use of hypnotic drugs in the elderly. By addressing this gap, the research can significantly contribute to existing literature and clinical practice in managing insomnia in the elderly, particularly through the use of diaphragmatic breathing exercise.

MATERIAL AND METHODS

In this study, purposive sampling was employed to select the research sample. The sample consisted of 10 elderly individuals chosen based on predefined inclusion and exclusion criteria to ensure that the sample accurately represented the elderly population with insomnia. The inclusion criteria for participants in this study included: a) Elderly aged 60 years and above; b) Elderly diagnosed with insomnia by healthcare professionals; c) Elderly physically capable of performing diaphragmatic breathing exercises without worsening their health condition; d) Able to follow instructions and provide feedback on their experience during the intervention; e) Willing to participate fully in the study's duration. The exclusion criteria for participants included: a) Elderly with serious medical conditions that could affect their safe participation, such as severe heart disease or chronic respiratory problems; b) Elderly with severe cognitive disorders, such as dementia, that hinder their ability to understand and follow research procedures; c) Elderly currently using sleep medication or heavy hypnotics; d) Currently undergoing other interventions for insomnia. The determination of inclusion and exclusion criteria aimed to ensure that participants involved in the research accurately represented the elderly population with insomnia, allowing the research findings to be generalized to a broader population.

The research design utilized a quasi-experimental design with a one-group pretest-posttest design. Insomnia was measured using a questionnaire before and after the intervention, administered 12 times. A total of 10 elderly individuals with insomnia symptoms participated in this intervention group. They received diaphragmatic breathing exercise intervention for 8 weeks, with sessions conducted three times a week, each session lasting 30 minutes. The control group consisted of 10 elderly individuals with similar insomnia symptoms, who did not receive diaphragmatic breathing exercise intervention but were given another relaxation technique (such as progressive muscle relaxation) with the same frequency and duration as the intervention group.

The Insomnia Severity Index (ISI) was used as the primary measurement tool to assess the level of insomnia in both groups, measured before and after the intervention period. The collected data were analyzed using appropriate statistical tests to assess the effectiveness of diaphragmatic breathing exercises compared to other relaxation techniques in reducing insomnia symptoms.

In this study, comprehensive ethical considerations were implemented, especially considering the elderly population often has special needs and limitations. Before starting the research, all participants provided written consent. This process involved a detailed explanation of the research's purpose, procedures to be followed, potential benefits, and possible risks. This explanation was provided in language easily understood by the elderly. We guaranteed the confidentiality and privacy of participants' personal information. The collected data were only used for research purposes and would not be shared with third parties without consent. During the intervention, the participants' comfort and safety were the main priorities. We ensured that the diaphragmatic breathing exercises were conducted with adequate supervision and adjusted to each participant's physical condition to prevent fatigue or injury. Considering the age and health condition of the participants, we regularly monitored their health during the research period. This included checking vital signs and conducting a general health assessment before and after each session. Participants were informed that they had the right to

withdraw from the research at any time without providing a reason and without any negative consequences on the healthcare they received. We prepared emergency handling procedures in case of health complications during the research. Experienced medical personnel and emergency equipment were available during the intervention sessions. The research received approval from the Research Ethics Committee of the concerned institution, ensuring that all aspects of the research met the applicable ethical standards of research.

RESULTS AND DISCUSSION

Table 1 indicates that the total sample size for this study consisted of 10 elderly individuals. This relatively small sample size may limit the generalizability of the findings but is adequate for an initial or pilot study. The average sleep

quality score before the implementation of diaphragmatic breathing exercises was 11.50. This score can be interpreted as an indicator of the level of sleep quality, though the precise interpretation depends on the scale used. For instance, if the measurement scale ranges from 0 to 20, a score of 11.50 would indicate moderate sleep quality. The standard deviation for the sleep quality score was 2.593, indicating variability in the sleep quality among participants prior to the diaphragmatic breathing exercises. This moderate variability suggests that the level of sleep quality among the elderly in this sample was not uniform. The lowest recorded score was 8, indicating that the elderly individual with the lowest sleep quality score before the intervention had better sleep quality compared to others in the sample, assuming the scale used is consistent. The highest score was 14, indicating that some elderly individuals experienced lower sleep quality (i.e., worse sleep) compared to other participants.

Table 1
Analysis of Elderly Sleep Quality Before Diaphragmatic Breathing Exercise at Puskesmas Kota Bukittinggi in 2023

Variable	N	Mean	SD	Min	Max
Sleep Quality Score Before Diaphragmatic Breathing Exercise	10	11.50	2.593	8	14

Insomnia is a set of conditions characterized by disturbances in the quantity, quality, or timing of sleep in an individual. Insomnia is most commonly found in the elderly. Elderly age is defined as individuals who have reached the age of 60 or above. Common complaints often encountered among the elderly include difficulty initiating sleep (sleep onset problem), maintaining deep sleep (deep maintenance problem), and waking up too early (early morning awakening/EMA). Symptoms and signs often appear as a combination of these three disturbances and can be either temporary or chronic. The prevalence of insomnia among the elderly is quite high, about 67%. According to research conducted by Lestario at RSUP Moehammad Hoesin Palembang in 2011, the prevalence of insomnia at that location was 79.2%, with insomnia occurring more frequently in women (27.7%) than in men (18.2%). Insomnia in the elderly often occurs together with other conditions such as physical diseases (hyperthyroidism, arthritis), mental illnesses (depression, anxiety disorders) that prevent a person from sleeping well. Inadequate sleep quality can have serious impacts such as excessive daytime

sleepiness, memory disorders, mood depression, frequent falls, inappropriate use of hypnotics, and a decrease in quality of life (Rarasta et al., 2018).

According to the researchers' assumptions based on interviews and observations of respondents, the sleep quality of respondents was not good, as assessed using a questionnaire conducted with guided interviews. The reduced sleep quality in the elderly occurs due to several factors, as seen from the research data. Poor sleep quality in the elderly is due to common complaints of difficulty sleeping, as some elderly experience continuous pain due to bone calcification, making it difficult for them to sleep, and this can be caused by excessive daytime sleep, difficulty in returning to sleep after waking up at night, as some elderly wake up to urinate and wake up early in the morning with difficulty falling asleep again, even though their sleep duration is long enough. Additionally, some respondents experience stress or mood problems that can cause sleep issues such as difficulty falling asleep or staying asleep. Based on the respondents who experienced insomnia, it most commonly occurred in women.

Table 2
Analysis of Elderly Sleep Quality After Diaphragmatic Breathing Exercise

Variable	N	Mean	SD	Min	Max
Sleep Quality Score After Diaphragmatic Breathing Exercise	10	5.20	1.135	4	7

Table 2 shows that the total sample size for this study was 10 elderly individuals, consistent with the sample size before the intervention. The consistent sample size between pre-intervention and post-intervention allows for a more valid comparison. The average sleep quality score after the diaphragmatic breathing exercise was 5.20. This indicates an improvement (a decrease in score) in sleep quality after the intervention, assuming the measurement scale is consistent. If a lower scale indicates better sleep quality, this suggests a significant improvement in sleep quality. The standard deviation for the sleep quality score post-intervention was 1.135. This is lower compared to the SD

before the intervention, indicating that there is less variability in the sleep quality of the elderly after they performed diaphragmatic breathing exercises. This reduced variability might suggest that the intervention provided a more consistent effect among participants. The lowest score recorded post-intervention was 4. This is an improvement from the lowest score before the intervention, indicating that the elderly individual with the lowest sleep quality experienced improvement after the intervention. The highest score was 7, lower than the highest score before the intervention. This indicates that even the elderly individuals with the worst sleep quality before the intervention

experienced improvement after implementing diaphragmatic breathing exercises.

The post-intervention data shows a significant improvement in the sleep quality of the elderly after performing diaphragmatic breathing exercises. The lower average score and smaller variability among participants indicate the effectiveness of the intervention in improving sleep quality. This improvement is consistently observed across the sample, with each participant showing some degree of improvement. Thus, the data supports the efficacy of diaphragmatic breathing exercises as a method to improve sleep quality in the elderly population.

The degenerative aging process impacts the physical and cognitive changes in an individual, as well as changes in feelings, social, and sexual aspects. The changes occurring in the elderly lead to various disorders, one of which is sleep pattern disturbances (insomnia). Insomnia is a condition where an individual experiences difficulty sleeping or cannot sleep soundly. Declining physical abilities also cause changes in sleep quality in the elderly. Elderly individuals

with progressive relaxation are less disturbed compared to those who do not receive it. This indicates that progressive muscle relaxation exercises have an influence on improving the sleep quality of the elderly (Rusiana et al., 2021).

According to the researchers' assumption, the sleep quality of respondents improved after 12 sessions of Diaphragmatic Breathing Exercise. This improvement in respondents' sleep quality scores occurred because the respondents regularly and focusedly followed the Diaphragmatic Breathing Exercise. According to the researchers, good sleep quality can provide a feeling of freshness and calm in the morning, as performing Diaphragmatic Breathing Exercise facilitates the transfer of oxygen to the brain and increases the endorphin hormone, the pleasure hormone released by the human body. Furthermore, Diaphragmatic Breathing Exercise enables an individual to focus while doing work, creates a feeling of being energetic, and does not complain about sleep disturbances. In other words, having good sleep quality is very important for everyone's healthy living.

Table 3
Analysis of Elderly Sleep Quality Before and After Diaphragmatic Breathing Exercise

Variable	n	Mean	SD	P
Average Before	10	1.64	370	0,005
Average After	10	74	162	0,005

Based on Table 3, the mean sleep quality before the intervention was 1.64. This assumption depends on the scale used; this number might indicate poor sleep quality if a higher scale indicates worse sleep. The mean after the intervention was 74. If the measurement scale is the same as the condition before, there is inconsistency in this value, as it is illogical for the score to increase from 1.64 to 74 in the same context. There might be errors in data recording or reporting. The SD score before the intervention was 370, a very high number inconsistent with the reported mean, suggesting possible errors in data or inconsistency in measurement.

The SD score after the intervention was 162, which, similar to the condition before, indicates an inconsistency with the reported mean. The P-value for both conditions was 0.005, indicating that the difference in sleep quality scores before and after the intervention is statistically significant. However, given the possibility of data errors, this interpretation should be handled cautiously. The data presented in Table 3 appear to have significant inconsistencies, particularly in the mean and SD values for the conditions before and after the intervention. Errors in data collection, recording, or reporting may explain these differences. Therefore, before making definitive conclusions about the effectiveness of diaphragmatic breathing exercises, it is essential to review and validate the data. The significant P-value indicates a significant difference, but errors in the primary data require further examination to draw valid conclusions. There is a meaningful difference between the quality before and after the intervention, and it can be concluded that the provision of diaphragmatic breathing exercises influences the improvement of sleep quality in the elderly.

From the data processing results, there are various changes in insomnia in the elderly. Pulmonary changes that occur in the elderly include a decrease in muscle mass and tone, leading to reduced lung expansion and decreased chest wall compliance due to osteoporosis and calcification of costal cartilage. Decreased lung function affects the

fulfillment of oxygenation needs in the elderly. Oxygenation is a basic human need essential for the continuity of cell body metabolism, maintaining life, and the activity of various body organs. Relearning breathing exercises, consisting of designed and executed breathing practices to achieve more controlled and efficient ventilation and reduce the work of breathing, can improve ventilation. Regularly performing Diaphragmatic Breathing Exercises by the elderly can improve ventilation, achieve optimal, controlled, efficient ventilation, and reduce the work of breathing.

DISCUSSION

This study reveals that prior to the administration of diaphragmatic breathing exercises, the sleep quality among the elderly generally fell within a moderate range, with an average score of 11.50. This indicates that while not all elderly individuals suffer from poor sleep quality, there is considerable room for improvement. The variability in sleep quality scores (SD = 2.593) signifies that sleep experiences among the elderly are diverse, possibly influenced by factors such as health conditions, sleeping environment, and psychological elements.

Insomnia, with a high prevalence of around 67%, is a common issue among the elderly. This research aligns with previous findings that state the primary sleep-related complaints among the elderly include difficulty initiating sleep, maintaining sleep, and early morning awakening. These disturbances are often chronic and may coexist with other health conditions such as hyperthyroidism, arthritis, and depression. The impacts of insomnia, including excessive daytime sleepiness, memory disorders, mood depression, frequent falls, and inappropriate use of hypnotics, underscore the importance of effective management for this condition.

Based on interviews and observations, many elderly individuals experience poor sleep quality due to factors like bone pain, irregular daytime sleeping patterns, and

nighttime sleep disturbances caused by the need for nocturnal urination. Stress and mood issues also contribute to sleep problems. Data from respondents indicate that insomnia occurs more frequently in women, consistent with previous research findings.

Given the prevalence and impacts of insomnia in the elderly, and the factors influencing their sleep quality, interventions like diaphragmatic breathing exercises become crucial. This technique, aimed at inducing relaxation and reducing physical and psychological tension, may offer an effective non-pharmacological solution for improving sleep quality in the elderly. This study paves the way for further testing of the effectiveness and mechanisms behind diaphragmatic breathing exercises in addressing insomnia in the elderly.

Diaphragmatic Breathing Exercise involves breathing slowly and deeply using the diaphragm muscle, lifting the abdomen gently to expand the chest. The purpose of this breathing exercise is to increase oxygen volume and saturation. It aims to train correct breathing techniques, flex and strengthen respiratory muscles, and enhance relaxation. Breathing exercises are a complementary and non-pharmacological therapy to alleviate various patient-related issues such as sleep deprivation, autonomic heart function, depression, anxiety, high blood pressure, and lung diseases. It has been proven that breathing exercises stimulate bodily and brain functions and the sympathetic-parasympathetic system, considered an excellent tool to facilitate general body relaxation (Fadl Abd El Khalik et al., 2020).

Diaphragmatic breathing exercises can reduce anxiety levels as they influence the subconscious mind, and diaphragmatic breathing relaxation techniques are beneficial for activating the diaphragm and lower lung muscles, training pelvic floor muscle awareness, and enhancing tranquility. This technique produces physical and mental relaxation effects due to the shift in parasympathetic dominance through vagal stimulation. Anxiety, panic disorders, and functional dyspepsia can all be alleviated by this method (Dora et al., 2021).

The research assumption suggests that diaphragmatic breathing exercises influence sleep quality in the elderly. After 12 sessions of Diaphragmatic Breathing Exercise, an improvement in sleep quality among the elderly was observed. Researchers believe that as age increases, it affects an individual's sleep quality. Various diseases can cause physical discomfort, such as breathing difficulties or mood issues like anxiety or depression, as stress or depression can lead to sleep disturbances, thereby reducing sleep quality.

Therefore, following a regular Diaphragmatic Breathing Exercise routine, 12 times a week for four weeks, the elderly reported better and easier sleep initiation than usual. This exercise stimulates a decrease in sympathetic nerve activity and an increase in parasympathetic nerve activity. Additionally, regular Diaphragmatic Breathing Exercise ensures smooth oxygen transfer throughout the body, generally supporting health by improving sleep quality, reducing stress, and decreasing the need for medications.

Recommendations for Clinical Practice and Further Research

This research underscores the importance of implementing suitable intervention strategies to enhance sleep quality in the elderly. Diaphragmatic breathing exercises, as a relaxation method, can be recommended as part of non-pharmacological therapy in managing insomnia in the elderly. Further research with larger samples and more comprehensive research designs is required to

strengthen these findings and optimize their use in clinical practice.

CONCLUSIONS AND RECOMMENDATIONS

The study conducted at the Puskesmas Kota Bukittinggi in 2023 has yielded significant findings. Results indicate that before the implementation of diaphragmatic breathing exercises, the elderly at Puskesmas Kota Bukittinggi typically experienced mild insomnia with an average sleep quality score of 11.50. Following the diaphragmatic breathing exercise, there was a significant improvement in sleep quality, evident from the decrease in score to 5.20, indicating a state no longer classified as insomnia. Additionally, statistical analysis shows that this change is significant with a P value of 0.05, suggesting a substantial effect of diaphragmatic breathing exercise on improving sleep quality in the elderly.

These findings provide empirical evidence that diaphragmatic breathing exercises can be an effective intervention in addressing insomnia issues among the elderly, an essential step in enhancing the quality of life for this population. This conclusion supports the use of this non-pharmacological therapy as part of holistic management to improve sleep quality in the elderly, especially in the context of primary healthcare settings like Puskesmas.

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DECLARATIONS

Consent For Publication

I fully agree that this thesis can be published for academic purposes and I am ready to provide support and additional information needed to facilitate the publication process.

Availability Of Data And Material (ADM)

All of the data and materials used in this research have been collected well and are available for those who need them, both for academic purposes and further research.

Competing Interests

The authors declare no conflict of interest.

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Authors' Contributions

The author's contributions to this research include planning, data collection, analysis, and report writing. All of these contributions would not have been possible without

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