

ORIGINAL ARTICLE

The Effect of Box Breathing on Sleep Disorders in Elderly at Tresna Werdha Social Institution

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ABSTRACT

Introduction: The elderly population has become a global phenomenon. Almost every country in the world is experiencing an increase in the elderly population. There are 703 million people in the world who are 65 or older. An elderly person will require more time to fall asleep and will experience less or shorter deep sleep. Factors that affect sleep disorders include age, history of illness, drinking coffee, and smoking cigarettes. To improve sleep quality in the elderly, a deep breathing relaxation technique, specifically the box breathing relaxation technique, is required. **Aim:** Research to identify the effect of box breathing on sleep disorders in the elderly at Tresna Werdha Social Institution, Bekasi City. **Methods:** In this, the quasi-experiment design was employed, which included a non-equivalent control group pretest-posttest design with an intervention group and a control group. The sample size in this study was 62 respondents and was divided into two groups, including 31 elderly people in the intervention group and 31 respondents in the control group. **Results:** It can be seen that the average difference in posttest minus pretest scores (posttest-pretest) or expressed as Δ mean in the intervention group of 5.29 and in the control group of 0.32. With a p value of 0.000 ($p > 0.05$), there are statistically significant differences in social sleep disorder in the elderly in Tresna Werdha Bekasi City in 2022 between the intervention and control groups. **Conclusion:** The box breathing technique can be an effective intervention to improve sleep quality in elderly individuals. The results showed a statistically significant improvement in sleep quality.

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INTRODUCTION

Sleep disorders are a significant health concern for the elderly, especially those living in social institutions such as nursing homes. According to the National Sleep Foundation, it is estimated that up to 50% of older adults suffer from some form of sleep disorder, which can have a significant impact on their overall health and well-being. Sleep disturbances can lead to daytime fatigue, mood changes, cognitive impairment, and an increased risk of falling. Sleep disorders can also exacerbate pre-existing conditions such as cardiovascular disease, depression, and anxiety, which are common in the elderly population. The elderly

have become a global phenomenon, with both their number and proportion in the population rising dramatically in almost every country in the world. In 2019, there were 703 million people worldwide who were 65 or older. By 2050, there will be 1.5 billion elderly people, a doubling of the current number (1). According to projections, there will be 5 million elderly people living in West Java by 2021, or 10% of the entire population (2).

The issues that affect the elderly most frequently include arthritis, diminished hearing and vision, loss of muscle mass and strength, a progressive decline in physical activity capacity, decreased memory, stress, and sleep disturbances. At this point, elderly people will take longer time to fall asleep (lying in bed for a long time before falling asleep), and their sleep duration will be shorter or less (3). A normal part of aging can include changes in sleep patterns (4,5).

Severe sleep disorders include sleep apnea syndrome (SAS), rapid eye movement (REM), sleep behavior disorder (RBD), restless leg syndrome (RLS), and psychological conditions including sadness and anxiety. Age, medical conditions, drug and alcohol use, and environmental factors can cause sleep disturbances in the elderly (6).

In addition to impairing physical performance and raising the risk of falling, insomnia can lead to physical and cognitive decline. In long-term research, daytime drowsiness has also been connected to negative consequences such as cardiovascular disease, accidents, and death (7). Sleep issues, including short sleep intervals and poor sleep quality, can cause mental illnesses, long-term medical diseases, cardiovascular disease, and even death. As a result, it's critical to pay attention to sleep quality and how it relates to wellbeing (8,9). Several pharmacological techniques are available to manage sleep disorders, but these can have side effects, particularly in the elderly (10). Therefore, non-pharmacological interventions, such as breathing exercises, are gaining increasing attention as a potential solution for sleep disturbances. One of the breathing techniques that have been studied in this regard is box breathing, which is a simple technique that involves inhaling deeply, holding the breath, exhaling, and holding the breath again. Box breathing has been shown to reduce stress and anxiety, both of which are known to interfere with sleep. Therefore, this study aims to investigate the effect of box breathing on sleep disorders in the elderly living in Tresna Werdha Social Institution(10,11).

For elderly people to overcome their sleep issues, non-pharmacological therapy is necessary. At present, sleep disorders in the elderly still often use pharmacological therapy. This therapy has side effects such as drowsiness, nausea, allergies, and dizziness. Researchers are interested in conducting research on relaxation techniques (11,12). Relaxation techniques are effective in overcoming sleep disturbances. One of the relaxation techniques is Box Breathing, which involves breathing deeply and concentrating on relaxing parts of the body rather than stressing areas such as the nervous system or the cardiovascular system (13,14).

Box breathing is a technique used to reduce pain intensity and improve mood. It indirectly helps with conditions such as generalized anxiety disorder (GAD), panic disorder, and post-traumatic stress disorder (PTSD), and it has been proven that it reduces the risk of developing Alzheimer's disease (15).

MATERIALS AND METHODS

Study Design

A type of quantitative research known as quasi-experimental design seeks to establish causal relationships between independent and dependent variables. It entails establishing a control group and an intervention group, both of which are pretested before the intervention is implemented. Following that, the intervention is given to the intervention group while being withheld from the control group. Both groups were post-tested following the intervention to compare how the dependent variable differed between the groups. When a researcher is unable to account for all of the uncontrollable factors that could affect the study's results, this design is helpful. Researchers can learn more about the effectiveness of the intervention and the causal relationship between the independent and dependent variables by contrasting the intervention and control groups.

Population and Research Sample

The population and sample in this study were the elderly at Tresnha Werdha Social Home. The inclusion criteria for respondents in this study were that they were at least 60 years old, had normal vision and hearing, could speak clearly, had no history of acute respiratory disease, and were willing to participate in this study. Exclusion criteria: elderly using antidepressant medication, alcohol consumption, acute respiratory distress, and elderly with dementia. This study used a total sampling technique. The number of samples in this study was 62 and was divided into two groups, including 31 elderly people in the intervention group and 31 respondents in the control group.

Instrument

The Sleep Quality Scale (SQS), which was created in (16,17), was used in this study. In comparison to longer or more frequent sleep questionnaires given to patients with depression and insomnia, the instruments' single items had favorable measurement characteristics. SQS instruments for single items use a 0–10 scale with a horizontal line that has 11 different number choices, including (15).

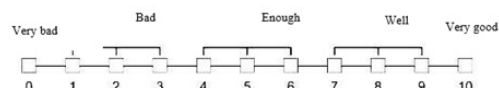
0= very bad

1-3= bad

4-6= fair

7-9= good

10= very good



Intervention

Control Group

An intervention box breathing technique was taught to elderly patients with dementia, but not in the control group.

Study Group

For a month, box breathing techniques were provided to senior citizens twice daily - in the morning and evening - to help them sleep better. The researchers measured the sleep of the elderly using the SQS single item for the elderly as initial data. After that, the researchers taught the box breathing technique to the elderly who were part of the intervention group.

Data Analysis

In this study, univariate and bivariate data analysis were employed. The data were displayed as mean, mode, median, standard deviation, maximum, minimum, variance, and interquartile range. If the data is regularly distributed, the median value should be used to understand the data, along with the maximum and lowest values. The univariate test in this study included age, sex, education, and medical history. Bivariate analysis was used to identify the value of the difference between sleep disturbances before and after techniques box breathing the shapiro wilk test was utilized in this study to examine the impact of box breathing on sleep disturbances in elderly patients. Applying the Wilcoxon Sign Rank Test with a significance level of 0.000 p value, researchers compared the effectiveness of box breathing before and after the intervention.

Ethical Clearance

The Health Research Ethics Committee of Bani Saleh High School of Health Sciences has given its clearance No: EC.076/KEPK/STKBS/II/2022 dated 5th July 2022 for this study.

RESULTS

The study's findings provide information about the respondents' age, gender, education level, medical history, smoking habits, coffee intake, and drug use. In the form of frequency and percentage, a summary of the distribution of sleep disturbances both before and after box breathing techniques is given.

According to Table II, the majority of respondents in the intervention group had a bad sleep disorder as many as 21 respondents (67.7%) prior to receiving the box breathing intervention, but after receiving the intervention, there was an increase, with the majority having a good sleep disorder as many as 23 respondents (74.2%).

Based on Table III, it can be seen that most of the

respondents in the control group who were not given box breathing intervention before had bad sleep disturbances as many as 23 respondents (74.2%), and afterwards they still had bad sleep disturbances as many as 23 respondents (74.2%), which means in this control group they did not experience an increase or decrease in sleep disturbance.

Based on Table IV, which shows the results of the Shapiro-Wilk test used to determine whether the data were normally distributed, it is known that the p value in the intervention group before and after the intervention was $p = 0.000$, or $p > 0.05$, indicating that the data in the intervention group are not normally distributed. The Wilcoxon signed rank test may be used statistically to ascertain the impact of breathing on geriatric sleep disturbances because both the control group in the table and the experimental group have the same p-value.

According to Table V, there was an increase in the average value before and after the box breathing intervention was given to the intervention group. The average value in the intervention group before the box breathing intervention was 3.45, and the average value after the box breathing intervention was 8.74. There was a significant difference between the sleep disturbance scores before and after the intervention, according to the statistical results of the Wilcoxon sign rank test, and it can be concluded that box breathing has an effect on elderly sleep disorders in Tresnha Werdha homes. The intervention group had a p value = 0.000 ($p > 0.05$), which means that H_0 was rejected (hypothesis accepted).

The control group's average value prior to the experiment was 3.39, while the average value after the experiment was 3.71. The control group's Wilcoxon signed rank test findings showed a p-value of 0.025, a p-value of 0.05, and H_0 was rejected (hypothesis accepted), indicating that there was a significant difference between the control group's pre- and post-intervention sleep disruption ratings. There was a change in the sleep disturbance score in the control group, which received simply conventional care without any intervention.

According to Table VI, which displays the outcomes of the data normality test by performing the Shapiro-Wilk test The results showed that the p-value in the intervention group was p-value = 0.056, so $p > 0.05$, which means that the data in the intervention group was normally distributed, in contrast to the control group, which had a p-value of 0.05, which means that the data in the control group was not normally distributed. Statistical tests can be used to determine differences in effectiveness or reductions in sleep

Table I : Frequency Distribution Description of Respondent Characteristics in the Elderly

Demographic Characteristics	Treatment		Control	
	F	%	F	%
Age Category Respondents				
Young Elderly (60 – 75 years)	21	67.7	22	71.0
Old Elderly (75-90 Years)	10	32.3	9	29.0
	31	100.0	31	100.0
Gender				
Man	22	71.0	23	74.2
Woman	9	29.0	8	25.8
	31	100.0	31	100.0
Education				
No school	7	22.6	14	45.2
Primary school	3	9.7	3	9.7
Junior high school	8	25.8	4	12.9
Senior High School	10	32.3	5	16.1
Bachelor	3	9.7	5	16.1
	31	100.0	31	100.0
Disease History				
Yes	17	54.8	17	54.8
No	14	45.2	14	45.2
	31	100.0	31	100.0
Smoking History				
Smoking \geq 1 Month	9	29.0	5	16.1
Do not smoke	22	71.0	26	83.9
	31	100.0	31	100.0
Coffee Consumption				
Yes	12	38.7	7	22.6
No	19	61.3	24	77.4
	31	100.0	31	100.0
Consumption of sleeping pills				
Yes	2	6.5	0	0
No	29	93.5	31	100.0
Total	31	100.0	31	100.0

Table II : The Prevalence of Sleep Disorders among the Elderly intervention Group.

Characteristics	Frequency Distribution (n=31)	
Prior Sleep Disorders	F	%
Bad	21	67.7
Fair	10	32.3
Sleep Disorders After		
Well	23	74.2
Very good	8	25.8

Table III : Frequency Distribution of Sleep Disorders in the Control Group in the Elderly at Tresna Werdha Social Institution, Bekasi City year 2022 (n=31)

Characteristics	Frequency Distribution (n=31)	
Sleep Disturbances Before Box Breathing Intervention	F	%
Bad	23	74.2
Fair	8	25.8
Sleep Disorders After		
Bad	23	74.2
Fair	8	25.8

Table IV : Data Normality Test Results for Intervention Group and Control Group Before and After (n=31)

	Variable	Statistics	p Value
Intervention Group	Before the Box Breathing Intervention	0.820	0.000
	After	0.770	0.000
Control Group	Before	0.752	0.000
	After	0.549	0.000

Table V : The Effect of Box Breathing on Elderly Sleep Disorders at the Tresna Werdha Social Institution, Bekasi City, in 2022

Group		Means	Min-Max	Z Wilcoxon	P Value
Intervention	Before	3.45	(1-6)	- 4.905	0.000
	After	8.74	(7-10)		
Control	Before	3.39	(1-6)	-2.236	0.025
	After	3.71	(3-6)		

Table VI : Normality Test Results Comparison of the difference in value (Δ mean) of sleep disorders in the Elderly at Tresna Werdha Social Institution, Bekasi City in 2022 between the Intervention and Control groups

	Variable	Statistics	p Value
Difference in sleep disturbances (Δmean)	Intervention	0.934	0.056
	Control	0.445	0.00

Table VII : Comparison of differences in sleep disturbances in Elderly Sleep Disorders at the Tresna Werdha Social Institution, Bekasi City in 2022 between the Intervention and Control groups

	Group	n	(Δ mean)	p-value
Difference in sleep disturbances	Intervention	33	5.29	0.00
	Control	33	0.32	

disturbances. A non-parametric test is the Mann Whitney test.

According to Table VII, the mean difference between the posttest and pretest scores (posttest-pretest) was 5.29 for the intervention group and 0.32 for the control group. There are statistically significant differences between the intervention and control groups for the social sleep problem Tresna Werdha Bekasi City in the elderly in the year 2022, with a p-value of 0.000 ($p > 0.05$).

DISCUSSION

The study that gathered data from the Integrated Center and compassionate care facilities in Bekasi City found that box breathing interventions had a significant impact on elderly people who had sleep disturbances. The study divided the participants into two groups, the intervention group, and the control group. The intervention group received box breathing training, while the control group did not receive any intervention. The results showed that the intervention group had a significant improvement in sleep quality compared to the control group.

Interestingly, the study found that both the male intervention group and the male control group had a high percentage of participants with sleep problems. This finding is in line with previous studies that have reported a high prevalence of sleep disturbances among the elderly population. For example, a study by (14) found that patients with obstructive sleep apnea, which is common in the elderly population, benefited from breathing exercises.

Another study that investigated the effects of (16) on sleep quality in women with sleep disturbances found similar results to the study on box breathing

interventions in the elderly population. reported that breathing exercises significantly improved the sleep quality of women with sleep disturbances. The study also reported that the participants in the intervention group had reduced levels of stress and anxiety, which are known to interfere with sleep.

The study on box breathing interventions in the elderly population supports previous findings that non-pharmacological interventions, such as breathing exercises, can improve sleep quality in various populations. The study also highlights the high prevalence of sleep disturbances among the elderly population, particularly those living in social institutions. Therefore, box breathing interventions can be an effective, non-invasive, and easily implementable solution for managing sleep disorders in the elderly population. Further research is needed to investigate the long-term effects of box breathing interventions on sleep quality and to identify the optimal frequency and duration of the intervention (12).

The study revealed that sleep problems were commonly reported among elderly residents in nursing homes, especially if they had a history of certain health conditions, such as diabetes, gout, osteoporosis, hypertension, or a minor stroke. The prevalence of chronic cardiometabolic diseases, such as heart failure, diabetes mellitus, or hypertension, was also found to be high among the respondents, with 58.3% of them having at least one of these conditions. Although half of the respondents did not have any comorbidities, 20% of them had more than one type of disease. Interestingly, the majority of respondents (42.5%) were able to accurately judge the duration of their illness.

This study's findings are consistent with previous research that has reported a high prevalence of sleep

problems and chronic health conditions among the elderly population, particularly those living in nursing homes or long-term care facilities. For instance, a study by (17) found that 71.4% of elderly residents in Korean nursing homes reported sleep disturbances, with hypertension and cardiovascular disease being significant risk factors. Another study (18) reported a high prevalence of chronic diseases, such as hypertension, diabetes, and osteoporosis, among elderly residents in nursing homes. The present study's findings highlight the need for healthcare providers to prioritize sleep management and chronic disease management among elderly residents in nursing homes. Implementing non-pharmacological interventions, such as breathing exercises, may help improve sleep quality in this population. Additionally, regular health assessments and appropriate medical techniques should be provided to manage chronic health conditions effectively.

In conclusion, the study sheds light on the high prevalence of sleep problems and chronic health conditions among elderly residents in nursing homes, indicating a need for effective sleep and health management strategies. The findings are consistent with previous research in this area and reinforce the importance of providing adequate healthcare services to this vulnerable population. Further research is needed to explore other potential risk factors and interventions for improving sleep quality and chronic disease management in elderly nursing home residents.

The box breathing technique was selected for this study because it is highly beneficial for the elderly who have trouble falling or staying asleep. The Box Breathing Technique teaches seniors how to breathe deeply, gently, and slowly while keeping their maximal inspiration. Box breathing is a deep breathing relaxation method that can be used to reduce anxiety and pain intensity as well as physical and mental stress. The goal of using this strategy is to keep the body's blood sugar stable. Most people who use this approach sit up straight with their backs straight or lie down in bed. For four seconds, inhale slowly through your nose. For four seconds, hold breath. For four seconds, exhale thoroughly through mouth. To feel peaceful, repeat this cycle as often as necessary (14). The advantages that the elderly can experience after practicing deep breathing relaxation techniques include being calmer, having peace of mind, and reducing anxiety. This may have an impact on age-related sleep disorders.

CONCLUSION

The study on "The Effect of Box Breathing on Sleep Disorders in Elderly at Tresna Werdha Social Institution" found that box breathing can be an

effective intervention to improve sleep quality in elderly individuals. The results showed a statistically significant improvement in sleep quality in the intervention group compared to the control group. The intervention group also reported fewer instances of sleep disturbances and better sleep efficiency. These findings suggest that box breathing may be a useful non-pharmacological intervention for improving sleep quality in elderly individuals with sleep disorders. Box breathing is a simple and easy technique that can be taught to elderly individuals in social institutions, making it a practical and accessible intervention option. Overall, this study highlights the importance of non-pharmacological interventions in improving sleep quality and quality of life in the elderly population.

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