Effect of breathing relaxation on stress related to COVID-19 pandemic among older adults in nursing homes: A pre-experimental study

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Abstract

Background: Older adults in nursing homes are facing more mental health consequences due to the COVID-19 pandemic situation. Assessment of the appropriate intervention in declining the level of stress related to pandemic situations among institutionalized older adults is critical.
Purpose: This study was conducted to evaluate the effect of breathing relaxation on stress related to the COVID-19 pandemic among older adults in nursing homes.
Methods: A pre-experimental with a one-group pretest-posttest design was used in the present study. Thirty older adults were recruited using the purposive sampling method. The Perceived Stress Scale (PSS-10) related to COVID-19 was used to identify the level of stress among older adults. Twenty minutes of breathing relaxation were conducted once a day for 1-week from January 6 to January 12, 2021. The intervention was taught and guided by the researcher in small groups of 5-7 older adults based on the number of residents in the homesteads.
Results: Of 30 participants, 60% were female, and the mean age was 72.80 (SD=8.50) years. The average length of stay in the nursing home was 8.10 (SD=8.75) years. The older adults in nursing homes who performed breathing relaxation once a day for one week significantly decreased their stress related to the COVID-19 pandemic (t = 4.881, ρ = .000).
Conclusion: Based on this finding, breathing relaxation therapy could be promised as one of the interventions that could reduce the stress level associated with COVID-19 among older adults in nursing homes.

Keywords: COVID-19; frail older adults: nursing homes; psychological stress; relaxation therapy

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Introduction

Older adults are severely hit in terms of mortality due to Coronavirus Disease 2019 (COVID-19). In the United States of America, compared to 18 to 29 years old, the rates of hospitalization and death are four and thirty times higher respectively in 50 to 64 years old. The rates also significantly increased in those who are 65 years and older (Centers for Diseases Control and Prevention, 2021). The cases are similarly reported in other countries such as China (Wang et al., 2020), and India (Mudgal & Wardhan, 2020). Italy has been hit very hard with high mortality rates of COVID-19 among older adults especially in long-term care facilities (Amore et al., 2021). A cohort study in the United Kingdom shows a significantly increased proportion of deaths in care homes for older people between March and June 2020 compared with 2016 (Hollinghurst et al., 2021). In Indonesia, the case fatality rate of COVID-19 among older adults is about 15% as of 9 September 2020. This percentage is quite high (Komazawa et al., 2021).

Older adults are aware of their heightened susceptibility to COVID-19, and this awareness has led to feelings of anxiety and fear surrounding the potential contraction of the virus (Age UK, 2020). Fear of the COVID-19

pandemic among older adults can have an impact on long-term psychological effects to the occurrence of stress. This condition can result in lowering the immune system that is already weakened among older adults (Banerjee, 2020). Moreover, the older adults in nursing homes are facing more mental health consequences due to the pandemic situation such as an impressive rate of loss of their loved ones, ban on visitors to nursing homes, social isolation, and omitted group activities (Skoog, 2020). A brief report from Italy showed that the older adults in nursing homes are often seen crying repeatedly due to losing their friends or roommate within the nursing home (de Leo & Trabucchi, 2020). Another piece of literature highlights that emotional anxiety and loneliness are the main psychological consequences for nursing home residents caused by COVID-19 (Mo & Shi, 2020). Further, a preliminary study conducted by researchers in one of the Indonesian government nursing homes in November 2020 also showed that out of all residents (61 older adults), most of the older adults reported that they fear being exposed to COVID-19, and felt lonely due to activity restrictions. The situation can lead to institutionalized older adults' feelings of abandonment, loneliness, stress, and more downheartedness, which can compound the pre-existing diseases (de Leo & Trabucchi, 2020; Skoog, 2020). Despite the studies focus on the psychological consequences of COVID-19 among older adults in nursing homes, there have been limited studies evaluating the appropriate intervention in declining the level of stress related to pandemic situations among institutionalized older adults during such unprecedented global crises.

The relaxation method is among the non-pharmacological interventions that have been established as effective in lowering the level of depression, stress, and anxiety. Various relaxation methods are available, and among them, Benson's Relaxation Technique (BRT) stands out as a widely recognized and easily accessible approach. BRT is used as a theoretical framework for the present study. BRT is characterized by inducing a profound state of physical relaxation that primarily engages the parasympathetic nervous system, reducing an individual's physiological and emotional reactions to stress. (Benson et al., 1975). BRT was initially performed to lower blood pressure in hypertensive patients with twice daily relaxation during two months (Benson et al., 1975). However, this relaxation technique has been widely studied to reduce psychological problems in respondents with various disease backgrounds. For instance, a recent cluster-randomized trials study revealed that there was a statistically significant reduction in perceived stress among hemodialysis patients. This study shows that respondents who performed twice a day Benson's breathing relaxation technique for 10 minutes during a one-week intervention can reduce the score of perceived stress (Abu Maloh et al., 2023). Another example, a randomized controlled study showed that a 2-week intervention period of Benson's relaxation technique was effective in modulating immune activity and reducing the negative effects and psychological distress of older adults in nursing homes (Reig-Ferrer et al., 2014). Extant literature also disclosed that Benson's relaxation method was effective in reducing depression, anxiety, and stress of undergoing hemodialysis patients (Abu Maloh et al., 2022; Heidari Gorji et al., 2014; Meawad Elsayed, 2019) as well as in multiple populations such as women with high-risk pregnancy (Araújo et al., 2016), patients in emergency care (Ibrahim et al., 2019), parents of children with leukemia under chemotherapy (Pouraboli et al., 2019), and patients undergoing coronary angiography (Tahmasbi & Hasani, 2016). Therefore, the breathing relaxation intervention in this study was based on Benson's relaxation techniques (Benson et al., 1974, 1977).

Further, a previous study showed that breathing relaxation is a useful non-pharmacological therapy particularly in reducing anxiety and improving sleep quality among nursing staff during the COVID-19 pandemic (Liu et al., 2021). However limited research has explored the application of this intervention for older adults in nursing homes who represent a highly vulnerable population facing unique stressors during the pandemic such as grieving the loss of a loved one and isolation (Skoog, 2020). Additionally, during social isolation and activity restriction, non-group or individual activities such as breathing relaxation can be more effective in preventing the rapid spread of COVID-19 in nursing homes (Mo & Shi, 2020). This present study addressed this gap by evaluating the potential of breathing relaxation techniques to reduce stress related to COVID-19 in older adults residing in nursing homes. By shifting the focus from healthcare providers, and other patient populations examined in previous studies to elderly residents, this study not only expands the scope of application for breathing relaxation but also contributes valuable insight into its feasibility for improving mental health in a high-risk population during public health crises. Specifically, this study aimed to assess the effect of breathing relaxation on stress related to COVID-19 pandemic among older adults in nursing homes.

Materials and Methods

Design

A pre-experimental with a one-group pretest-posttest design was used in the present study.

Setting and sample

This study was conducted in an Indonesian nursing home in Kupang City, East Nusa Tenggara Province. During the study process, the researcher conducted a COVID-19 test and the results were negative. The researcher also used preventive equipment and took strict precautions. These were done to prevent the spread of COVID-19 infection. The researcher also explained in detail the procedures done by the researcher to avoid the possibility of anxiety related to the transmission of COVID-19 felt by respondents.

The researcher approached the respondent during routine health checks carried out by the health team in the nursing home.

The study population is 61 older adults. G Power 3.1.7.9. was used to calculate the sample size using a 0.57 effect size (Manzoni et al., 2008), a power level of 0.80, and an alpha of 0.05. Based on the calculation, the minimum sample of this study was 27 respondents. Then, the researcher added 10% to anticipate the participant dropout. Therefore, the total sample of this study was 30 respondents. The purposive sampling was used to recruit the older adults in the nursing home who met the following inclusion criteria: 1) age between 60-90 years old; 2) willing to participate in this study by signing the informed consent; 3) having at least 12 months living in the nursing home; 4) having no consumption of stress medication; 4) having no experience of stressful events recently screened by the researcher using a modified Stressful Life Events Screening Questionnaire from a previous study (Allen et al., 2015); 5) having no illnesses at the time of data collection process; 6) having ability to listen. The older adults who have a psychiatric illness; physical illness specifically chronic diseases including diabetes mellitus, chronic kidney diseases, heart failure, and cancer; and cognitive impairment diagnosed by a physician were excluded from this study. In this study, sixty-one older adults were screened for eligibility and only thirty-four respondents were found to be eligible with the remaining subjects exhibiting instances of fever during the study period, instances of hearing impairment, and had not resided in the nursing home for 12 months yet. Then, out of thirty-four eligible respondents, 4 respondents were excluded due to cognitive impairment diagnosed by a physician. Thirty participants who met the inclusion criteria and were willing to participate in this study were asked to sign the informed consent.

Instruments

The researcher adapted the Perceived Stress Scale (PSS-10) from a previous study (Pedrozo-Pupo et al., 2020) with granted permission to identify COVID-19 related stress of the older adults in nursing homes. Each Item is ranging from 0 for “Never” to 4 for “Very often”. Items 1, 2, 3, 6, 9, and 10 are negative items and are scored from 0 to 4. Items 4, 5, 7, and 8 are positive items and are scored reversely from 4 to 0. A higher score indicated a higher perceived COVID-19-related stress on the older adults. The original questionnaire was in English, and a forward translation procedure was employed. Two independent translators translated the questionnaire into the Indonesian language. To ensure translation accuracy, the initial translation was independently back-translated by two other independent translators. The back-translators were individuals who were unaware of the intended concepts being measured by the questionnaire, in order to prevent bias.

Prior to data collection, the questionnaire’s validity was assessed by three experts in the fields of mental health nursing and gerontology, using the Content Validity Index Item (CVI-I). The experts rated each item’s relevance and clarity using a 4-point rating scale from 1 for “irrelevant” to 4 for “very relevant”. The results of CVI-I were 0.86 indicating that the questionnaire was valid. Additionally, the questionnaire’s reliability was assessed by administering it to thirty older adults residing in a different nursing home, who were not part of the participant group in this study. Cronbach’s alpha was used to calculate the internal consistency of the questionnaire. The result of Cronbach’s alpha was 0.97 indicating that the questionnaire was reliable to measure the level of COVID-19-related stress.

Intervention

Prior to conducting the intervention, the researcher explained the objectives and procedures of this study. Stress-related to the COVID-19 pandemic of respondents was assessed before and 1 week after the intervention, each for about 30 minutes. The Perceived Stress Scale related to the COVID-19 pandemic questionnaire was read by the researcher to each respondent. Based on the answers of respondents, the researcher fills out the questionnaire. The older adults were taught about essential skills of breathing relaxation for one session. Thereafter, twenty minutes of breathing relaxation techniques from Herbert Benson (Benson et al., 1974, 1977) were conducted once a day in the morning for 1 week guided by the researcher from January 6 to January 12, 2021. The intervention was given for 20 minutes with the following instruction:

1. Assume a comfortable seated position, maintaining posture without stiffness or tension; 2. Deeply relax the head, neck, shoulders, back, arms, buttocks, thighs, and legs; 3. Gaze straight ahead, then gradually close their eyes; 4. Inhale slowly, fostering relaxation and tranquility; 5. Breathe normally; . Maintaining to focus their thoughts and concentration on the inhalation and exhalation of breath through the nostrils; 7. Aware of breathing by focusing attention on the sensation of air moving in and out of the body while breathing through the nostrils; 8. Maintain to feel the expansion and contraction of the abdomen during inhalation and exhalation; 9. Feel the coolness and warmth of the air entering and exiting the nostrils during breathing; 10. Observe any arising thoughts; 11. If carried away by thoughts, simply observe where the thoughts lead and return focus to the breath; 12. Maintain concentration on the inhalation and exhalation of breath through the nose; 13. Aware of the relaxed state of the head, neck, shoulders, arms, back, buttocks, thighs, and feet; 14. Acknowledge that their feet are firmly planted on the floor; 15. Return to their initial state of awareness and slowly open their eyes; 16. Rise from the seated position slowly to prevent falls and gradually move their head, neck, shoulders, and legs.

Before the intervention sessions, the participants were also asked to have breakfast and a meal at least 2 hours since the digestive process can intercede in the incoming relaxation response (Benson et al., 1977). The researcher taught and guided the breathing relaxation method for 1 week of intervention in each of the respondents' homesteads. The researcher was in a separate room that was limited by the glass during the intervention sessions to prevent the spread of COVID-19 at that time. In this nursing home, there are several homesteads. The intervention was implemented in small groups of 5-7 older adults based on the number of residents in homesteads. At the end of the intervention, the researcher said thank you to all participants as an appreciation of their willingness to participate in this study.

Data collection

This study was conducted from January 5 to 12, 2021. Pre-test data collection regarding stress related to the COVID-19 pandemic was carried out for 1 day on January 5, 2021, then from January 6 to 12, 2021, a breathing relaxation intervention was conducted. Finally, post-test data collection was carried out on the last day after completing the intervention.

Data analysis

Descriptive statistics were used to analyze the mean, standard deviation, number, and percentages of the respondents' characteristics. A paired t-test was used to evaluate the effect of breathing relaxation on perceived stress associated with COVID-19 pandemic among the older adults in the nursing home. The significance level was two-tailed and was considered at a ρ value less than .05.

Before conducting the Paired t-test, the researcher performed a test of data normality using the Shapiro-Wilk test because the sample size in this study consisted of 30 individuals. Based on the test results, it was found that the pre-test and post-test data had a normal distribution with ρ -values of 0.07 for the pre-test data and 0.26 for the post-test data.

Ethical consideration

The present study was approved by the Ethical Commission of the Faculty of Health, Citra Bangsa University (EC No. 005/A/2020). The researcher explained the objectives and procedures of this study to all participants. All participants involved in this study signed the informed consent.

Results

The nursing home had 61 residents. Thirty older adults met the inclusion criteria and completed all sessions of the intervention. The characteristics of respondents are shown in table 1. Of 30 participants, 60% were female, and the mean age was 72.80 (SD=8.50) years. The average length of stay in the nursing home was 8.10 (SD=8.75) years. Most of the participants graduated from elementary school

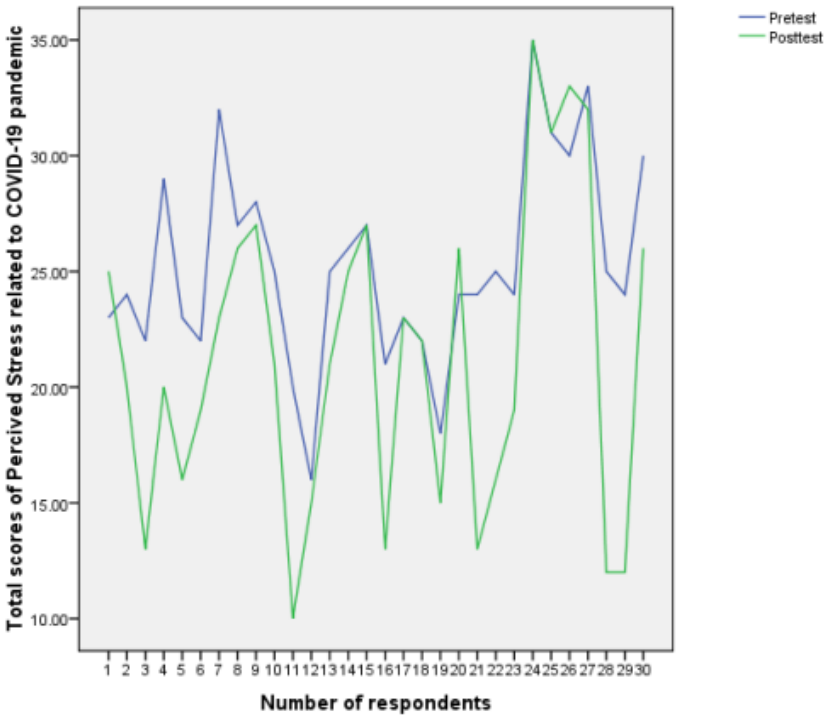

Figure 1. Line graph of perceived stress related to COVID-19 pandemic of pre-test and post-test (N = 30)

Table 1. Descriptive statistics of respondents' Characteristics (N = 30)

Variables	n	%
Age, years (Range, Mean ± SD)	(60-89, 72.80±8.50)	
Length of stay in the nursing home, years (Range, Mean±SD)	(1-36, 8.10±8.75)	
Gender		
Female	18	60
Male	12	40
Education Level		
Uneducated	5	17
Elementary school	14	46
Junior high school	5	17
Senior high school	6	20
Previous employment status		
Unemployed	14	47
Employed	16	53

Table 2. Effect of breathing relaxation on perceived stress related to COVID-19 pandemic among older adults in nursing homes (N = 30)

Variable	M ± SD		t	ρ
	Pre-test	Post-test		
Overall perceived stress related to COVID-19 pandemic	25.26 ± 4.33	21.20 ± 6.83	4.881	0.000

(see table 1).

Further, results indicated that perceived stress related to the COVID-19 pandemic of the older adults in the nursing home (t = 4.881, ρ = .000) decreased significantly after 7 days of breathing relaxation intervention. The average perceived stress related to the COVID-19 pandemic among older adults in the nursing home decreased from 25.26 (SD=4.33) in the pre-test to 21.20 (SD=6.83) in the post-test (see Table 2). The line graph in Figure 1 shows the comparison between pre and post-test total scores of perceived stresses related to the COVID-19 pandemic among older adults. The lowest score of the pre-test was 16, whereas the post-test was 10. The highest score for the pre-test and post-test was 35.

Discussion

During the COVID-19 pandemic, psychological issues such as stress have become common among older adults living in institutional settings. The objective of this study was to assess the potential effect of breathing relaxation using the Benson Relaxation Technique to reduce the perceived stress associated with COVID-19 among older adults residing in nursing homes. This research employed a pre-experimental (pre-post) design with purposive sampling. According to the paired t-test analysis, there was a notable and statistically significant decrease in perceived stress levels after participants engaged in breathing relaxation sessions once a day for a duration of one week.

Further, the results of this study showed that the mean score for the pre-test was 25.26. Based on the previous study, scores equal to or higher than 25 were categorized as high perceived stress related to COVID-19 (Pedrozo-Pupo et al., 2020). This confirms that before the intervention of breathing relaxation, the average older adults in the nursing home in this study had high perceived stress associated with the COVID-19 pandemic. This might be related to the increasing number of people with COVID-19 infection in early January 2021 in Indonesia. As reported by the National Task Force for COVID-19, the total number of infected people increased from 109,963 cases on December 31, 2020, to 110,679 on January 3, 2021 (The COVID-19 National Task Force, 2021). Another possible reason for this finding might be related to the restrictions on regular activities in the nursing home during the COVID-19 pandemic such as spiritual group activities, exercise group activities, and recreational activities. The older adults are only allowed to carry out activities in their homesteads and are not allowed to visit their friends in other homesteads. The results of this study underlined the need for psychological support and intervention for older adults in the nursing home during the pandemic situation.

Moreover, the purpose of this study was to evaluate the effect of breathing relaxation on stress associated with the COVID-19 pandemic among older adults in nursing homes. The current study highlights the significance of breathing relaxation therapy in decreasing the total scores of perceived stresses related to the COVID-19 pandemic among older adults in nursing homes. During the practice of breathing relaxation, the sympathetic nervous

system becomes inhibited, leading to a decrease in the body's oxygen consumption. This, in turn, promotes muscle relaxation, contributing to a sense of calm and comfort. As the relaxation process unfolds, the oxygen supply to the brain increases, and the parasympathetic system becomes dominant. This shift allows individuals to feel more at ease and empowers them to effectively manage mental symptoms such as stress (Benson et al., 1975, 1977). When individuals engage in breathing relaxation, there are potential biases that can emerge (Benson et al., 1974, 1977). Firstly, to elicit a favorable relaxation response, it's essential to reduce muscle tension. To account for the potential bias of this factor, participants were instructed to sit in a comfortable position. Additionally, the digestive process can influence the effectiveness of the relaxation response. Thus, in this study, the intervention was administered to participants at least two hours after they had breakfast and finished eating. Furthermore, a tranquil setting with minimal external distractions is vital for a successful relaxation experience. Therefore, participants in this study were instructed to close their eyes and the intervention was conducted in a quiet room, located within their homesteads (Benson et al., 1974, 1977).

This finding is also consistent with a recent study about tele-yoga involving breathing intervention that disclosed that there was a significant reduction in the perceived stress level of 54 participants who completed the intervention. The previous research also noted that after 4 weeks of tele-yoga intervention, 36% of participants reported feeling calm and relaxed, 23% of participants felt less tired and energetic, and 18% of participants felt refreshed (Jasti et al., 2020). Unfortunately, this tele-yoga intervention might be difficult to implement among older adults in nursing homes due to limited skills in using such technology, limited body strength, and a limited certified yoga teacher.

In the current study, the results showed that as a single intervention method, breathing relaxation significantly reduces the level of perceived stress among institutionalized older adults. Breathing relaxation is a simple exercise, easy to learn, and economical intervention that can be implemented for older adults under any circumstances. Therefore, this intervention could be used as a daily practice during social isolation and activity restriction to improve the psychological well-being of older adults in nursing homes. Furthermore, this study aligns with a prior research study on the effectiveness of breathing exercises in reducing stress levels among patients with SARS-CoV-2 infection who were under institutional isolation. The previous study demonstrated that a 7-day controlled breathing program had a positive effect in reducing stress levels among respondents aged 17-70 years old (Mahendru et al., 2021).

The findings of this pre-experimental study imply that breathing relaxation could be a promising, non-invasive, and low-cost intervention to reduce stress levels among institutionalized older adults during pandemics. As a pre-experimental study, this finding could serve as a groundwork for future research, particularly experimental or quasi-experimental design. To strengthen the evidence base, future research should employ more robust designs, such as randomized controlled trials or quasi-experimental methods, to confirm the effectiveness of breathing relaxation techniques and establish causality. Further, this finding can be used by healthcare professionals, particularly those working in nursing homes with older adults to introduce breathing relaxation as a regular implementation of stress reduction interventions.

The strong point of this study is that, to the best of our knowledge, it is the first pre-experimental investigation to employ the Benson Relaxation Technique in reducing stress levels associated with COVID-19 among older adults in Indonesian nursing homes. The findings can inform preparedness for managing mental health in future similar situations or public health crises. However, like many other studies, this research had its limitations. This study was conducted solely in one government-run nursing home in East Nusa Tenggara, Indonesia. As a result, the findings of this study cannot be generalized to encompass all older adults in nursing homes across Indonesia.

Conclusions

Based on this finding, the authors concluded that relaxation therapy could be promised as one of the interventions that could reduce the level of stress associated with COVID-19 among older adults in nursing homes. Therefore, this study highlights the potential for integrating breathing relaxation into routine care for older adults.

Declaration of Interest

The authors have declared no conflict of interest

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Data Availability

The datasets produced and examined during the present study can be obtained from the corresponding author upon a reasonable request.

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