
Reducing Stress Levels in the Elderly through a Combination Intervention of Exercise and Lavender Aromatherapy

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Abstract: This study aims to examine the level of effectiveness of the combination of elderly exercise and lavender aromatherapy on stress levels in the elderly. This study was conducted in the Sasanawaluyo Purwodadi, Purworejo gymnastics group from January 4 to January 23, 2025. This study was a quasi-experimental study with a one-group pretest-posttest design. The population in this study was the Sasanawaluyo gymnastics group in Purwodadi, Purworejo. The sample in this study was 15 women with an age range of 60-90 years. The sampling technique used in this study was purposive sampling. Respondents received a combination of elderly exercise and lavender aromatherapy for 3 weeks with 9 meetings. Stress levels were measured before and after treatment using the Depression, Anxiety, and Stress Scales-42 (DASS-42) instrument. Data analysis techniques involved prerequisite tests and hypothesis tests. The results indicate that the provision of a combination of elderly gymnastics and lavender aromatherapy treatment in the elderly in the Sasanawaluyo Purwodadi, Purworejo gymnastics group results in a significant decrease in stress levels. This is evidenced by the results of the DASS-42 questionnaire. The average sample stress score decreases from 20.07 in the pretest to 14.4 in the posttest, with a total difference of 5.67. The significance value in the pretest-posttest = 0.000 (<0.05) with an effectiveness level of 29.6%.

Keywords: Lavender Aromatherapy, Elderly, Elderly Gymnastics, Stress.

INTRODUCTION

Elderly is a stage of human development that begins in infancy, continues through childhood and adulthood, and culminates in old age (Azizah in Esprensa et al., 2022). The World Health Organization (WHO) classifies the elderly into four age groups, middle age is individuals aged between 45 and 59 years, elderly is individuals aged between 60 and 74 years, old age is individuals aged 75 to 90 years, and very old is individuals aged over 90 years (Ni Kadek in Esprensa et al., 2022). According to the 2023 Indonesian Population Census, around 29 million people, representing almost 12% of Indonesia's total population, are classified as elderly. This number will increase until 2045, when around 20% of the population, or 50 million people, will be elderly. As the population grows, Indonesia must take steps to ensure that the elderly remain healthy, active and happy (Kemkes, 2024).

The World Health Organization (WHO) reports that about 15% of elderly people aged 60 years and over face mental health problems. WHO reports that the incidence of stress is categorized as high enough to affect around 350 million people worldwide and is ranked 4th in diseases in the world (Eka et al., 2024). The incidence of stress in the elderly in Indonesia reached 8.34% Priyota in (Eka et al., 2024). Stress can weaken the physical condition and immune system of the elderly making them more susceptible to disease (Esprensa et al., 2022). According to research (Santoso & Tjhin, 2018), women experience more moderate and severe stress (33.8%), while men experience more mild stress (39.7%). According to Alizadeh (dalam Kurniawati et al., 2020), women are 1.7 times more likely than men to experience stress and depression. According to survey results from the American Psychological Association (APA), only 16% of men and 23% of women reported having stress levels of 8, 9 or 10. Hormonal changes associated with menstruation, pregnancy, and menopause are major sources of stress in women (Rahman dalam Wahyu Nala Siwi et al., 2025). Women are more often exposed to factors from the environment that can trigger stress, but are more likely to have a lower stress response than men (Putri dalam Wahyu Nala Siwi et al., 2025).

Health problems are increasing due to reduced physical activity and exercise, especially due to reliance on machines for most jobs. Regular physical activity is essential for overall health. Engaging in

physical activity or exercise offers many benefits, as it supports physical and mental well-being and increases enjoyment of life (Sulistyowati, 2021). For many older people, exercise serves as a way to manage stress. Many people feel relieved and happy after exercise because exercise triggers physiological reactions that make the heart work harder and release chemicals that protect memory neurons. Exercise also helps to stay fit, strengthen bones and rid the body of free radicals (Kaunang et al., 2019). Elderly gymnastics is one form of exercise that is suitable for the elderly. It is classified as low-impact aerobic exercise, meaning it avoids jumping movements, and has a light to moderate intensity while engaging most of the body's muscles. These exercises aim to improve muscular strength and endurance, as well as alleviate psychological issues such as stress related to aging (Nugroho in Desi Intarti et al., 2024). Research conducted by (Sulistyowati, 2021) elderly gymnastic activities carried out jointly in Mangir Tengah Hamlet, Sendangsari, Pajangan, Bantul, succeeded in reducing the stress level of the elderly. After being routinely carried out every week for one month, there was a decrease in stress levels of around 44 percent.

In addition to using exercises, aromatherapy can reduce stress levels by increasing a sense of well-being. This method creates a calm atmosphere and improves mental and physical health by using essential oils from aromatic plants (Goel et al., 2005; Sari & Leonard, 2018; Simanjuntak et al., 2020; Yogasara et al., 2014). Its aromatic molecules affect the hypothalamus and neurological system, causing a calming response that lowers cortisol levels, so lavender essential oil is specifically good for reducing stress. Lavender aromatherapy is known to have antidepressant and calming benefits. It can also increase alpha brain waves, which can promote calmness (Adiwibawa et al., 2020). In addition, compared to other aromatherapies, lavender essential oil is easier to obtain, more affordable, and more beneficial for physical and mental health (Yoshiko & Purwoko, Filiptsova et al in Adiwibawa et al., 2020). Research conducted by (Sya'diyah & Apriliani, 2017) showed that before being given treatment, the average respondent had a moderate level of stress, while after being given treatment, the respondent's stress level decreased to moderate and mild levels. This shows that lavender aromatherapy has an effect on reducing stress levels in the elderly.

Aromatherapy promotes relaxation and a sense of well-being, while elderly exercises concentrate on improving physical and mental health, combining lavender aromatherapy with elderly exercises can help reduce stress levels in the elderly (Adela, 2022; Hardhianti & Uyun, 2024; S. W. Putra et al., 2022). Therefore, both can provide a comprehensive approach to reducing stress. Lavender aromatherapy and elderly gymnastics provide benefits that support each other to reduce stress. Seeing the explanation above, the researcher is interested in providing non-pharmacological therapy using elderly gymnastics and lavender aromatherapy where the method is relatively simple and easy to do. This makes researchers interested in taking the title "The Effectiveness of the Combination of Elderly Gymnastics and Lavender Aromatherapy on Stress Levels in the Elderly".

METHODS

This study employed a quasi-experimental research design to examine the effects of the intervention. The population comprised elderly individuals participating in the Sasanawaluyo gymnastics group located in Purwodadi, Purworejo, with a total of 15 participants. This study used purposive sampling technique with sample inclusion criteria including: (1) Not in a state of illness, (2) Elderly age > 60 years and over, (3) Female (4) Willing to be a research sample, (5) Not doing other sports besides elderly gymnastics during the study period. Sample exclusion criteria include: (1) Having injuries or disability of limbs, (2) Having asthma disease (3) Allergic to aromatherapy (4) Elderly people who experience illness such as shortness of breath, lung disease (5) and are participating in other studies. The sample in this study amounted to 15 people. The instrument utilized in this study was the Depression, Anxiety, and Stress Scales-42 (DASS-42). Data analysis involved testing for normality using the Shapiro-Wilk test, followed by hypothesis testing using the paired t-test.

RESULTS AND DISCUSSION

Table 1. Age Characteristics of Respondents

Age (Years)	Frequency	Percentage (%)	Mean
60-75	11	73,3	70,73
76-90	4	26,7	

Based on Table 1 of 15 respondents, most respondents aged 60-75 years were 11 people or 73.3% with an average age of 70.73.

Table 2. Pre-Test of Stress Level in the Elderly

Stress Levels	Frequency	Percentage (%)
None	0	0
Mild	4	26,7
Moderate	11	73,3
Severe	0	0
Very Severe	0	0
Total	15	100

Table 2 data shows that the level of stress in the elderly before being given the treatment of combination of elderly gymnastics and lavender aromatherapy is dominated by moderate stress levels as many as 11 respondents (73.3%) with a score of 19-25.

Table 3. Post-Test Stress Level in the Elderly

Stress Levels	Frequency	Percentage (%)
None	8	53,3
Mild	5	33,3
Moderate	2	13,3
Severe	0	0
Very Severe	0	0
Total	15	100

Table 3 data shows that the level of stress in the elderly after being given treatment for 3 weeks in the form of combination of elderly gymnastics and lavender aromatherapy is predominantly not stressed as many as 8 respondents (53.3%) with a score of 0-14.

Table 4. Total DASS42 Final Score

No	Variables	Score
1	Pretest DASS 42	307
2	Posttest DASS 42	216

The following are the results of the Shapiro Wilk test can be seen as follows:

Table 5. Normality Test

Variables	Significance	Description
Pretest DASS 42	0,574	Normal
Posttest DASS 42	0,512	Normal

Based on table 5 presented the significance value of both pretest and posttest > 0.05 both are normally distributed and meet the requirements for hypothesis testing.

Hypothesis testing uses the parametric paired t test analysis technique whose results can be seen in the following table:

Table 6. Descriptive Statistics

No	Variables	Mean
1	Pretest DASS 42	20,47
2	Posttest DASS 42	14,4

From the data in Table 6 presented, there is an average decrease from the pretest of 20.47, then given treatment and carried out an average posttest to 14.4. It can be concluded that stress in the elderly decreased after being given combination of elderly gymnastics and lavender aromatherapy.

Table 7. Paired T-Test

DASS 42	Sig	Description
Pretest-Posttest	0,000	Significance

Based on table 7 above, the pretest-posttest data obtained a significance value of 0.000 ($p < 0.05$). This means that there is an effect of giving combination of elderly gymnastics and lavender aromatherapy on reducing stress levels in the elderly in the Sasanawaluyo gymnastics group. How to determine the level of effectiveness in this study can be described by the effectiveness formula as follows:

$$\begin{aligned}
 \text{Effectiveness} &= \frac{\text{Posttest} - \text{PreTest}}{\text{PreTest}} \times 100\% \\
 &= \frac{14,4 - 20,47}{20,47} \times 100\% \\
 &= 29,6\%
 \end{aligned}$$

Based on the results of the effectiveness calculation above, it shows that the effectiveness value of the combination of elderly gymnastics and lavender aromatherapy on stress levels in the elderly has a value of 29.6% with an ineffective level of effectiveness.

Stress Levels of the Elderly Before the Combination of Elderly Gymnastics and Lavender Aromatherapy

Before the intervention, the elderly in the Sasanawaluyo gymnastics group had an average stress score of 20.47 on the DASS-42 questionnaire, which shows a moderate level of stress. Continuous moderate stress can harm both physical and mental health in older adults if not treated early (Kaunang et al., 2019). The respondents were all female, with an average age of 70.73 years. At this age, physical strength decreases, daily activities become limited, and recurring health problems often lead to feelings of depression (Anisah, 2015). Women tend to experience stress more often than men because of hormonal changes during life stages such as pregnancy, childbirth, and menopause. They also face more environmental stressors, even though their stress response may be lower compared to men (Rahman and Putri in Wahyu Nala Siwi et al., 2025).

Analysis of the DASS-42 stress questionnaire (14 questions) showed a total pre-intervention score of 307 across all respondents. The main stress symptoms were difficulty relaxing, nervousness, sensitivity, and impatience. Many elderly found it hard to relax, leading to constant worry about health, money, family, or possible problems—even when there was little reason for concern (American Association for Geriatric Psychiatry, 2022). Nervousness made them feel always on edge, afraid of being judged, or worried about embarrassing themselves, with little control over these emotions (National Council on Aging, 2025).

The respondents also showed higher sensitivity and impatience. Aging brings physical, emotional, and social changes that can make older adults feel more sensitive—they may experience loss of independence, rely more on family, face health uncertainty, or feel lonely and disconnected from others. These factors can make them easily upset or feel belittled in social situations (Javed & Fatima, 2022). Impatience often appears with stubbornness when routines change or social interactions become stressful. Together, these symptoms explain the moderate stress levels seen before the combination of elderly gymnastics and lavender aromatherapy was given (Javed & Fatima, 2022).

Stress Levels of the Elderly After Being Given a Combination of Elderly Gymnastics and Lavender Aromatherapy

After receiving the combination of elderly gymnastics and lavender aromatherapy three times a week for three weeks, 13 out of 15 respondents in the Sasanawaluyo gymnastics group showed a clear decrease in stress levels. When looking at the final scores from the DASS-42 questionnaire, all 15 respondents experienced lower stress, with an average score of 14.4, which falls into the “no stress” or “normal” category. The most improved symptoms were difficulty relaxing, nervousness, sensitivity, and impatience. Many participants reported feeling calmer, fitter, happier, and more comfortable after the regular sessions.

Lavender aromatherapy works by calming the mind and body. Its main ingredient, linalool, enters the brain through inhalation and helps release feel-good chemicals like serotonin and endorphins, which improve mood and reduce stress (Andria in Adiwibawa et al., 2020; Susanto, 2021). The scent travels through the nose to the limbic system in the brain, which controls emotions and memories. This process promotes relaxation, reduces pain, and increases positive feelings (Adela, 2022). At the same time, elderly gymnastics boosts the production of endorphins (the “happiness hormone”), improves physical strength, flexibility, and endurance, and helps regulate blood pressure and heart rate. These changes support better mental health and lower stress levels (Hardhianti & Uyun, 2024; Ningsih, 2019; S.W. Putra et al., 2022).

Together, elderly gymnastics and lavender aromatherapy create a strong combined effect. Gymnastics improves physical and mental fitness, while aromatherapy adds deep relaxation and emotional comfort. This holistic approach addresses stress from both the body and the mind. The method is simple, safe, and easy to apply in community centers or at home, making it a practical way to improve well-being and reduce stress in the elderly (Adela, 2022; Hardhianti & Uyun, 2024; S.W. Putra et al., 2022).

Effectiveness of Combination of Elderly Gymnastics and Lavender Aromatherapy on Elderly Stress Levels

The results of this study show that the combination of elderly gymnastics and lavender aromatherapy significantly reduced stress levels in the elderly participants. Statistical analysis using the paired t-test gave a significance value of 0.000 ($p < 0.05$), meaning the difference before and after the intervention was real and not due to chance. All participants experienced a decrease in stress scores, from a total of 307 before the intervention to 216 afterward. However, when calculating practical effectiveness using the effectiveness formula, the result was only 29.6%, which falls into the “ineffective” category. Even so, the findings still support the original hypothesis that this combined intervention can help lower stress levels statistically.

The reduction in stress is supported by previous studies. Regular elderly gymnastics helps control heart rate, blood pressure, and muscle tension, while also reducing anxiety through muscle relaxation and better social interaction in group activities (Desi Intarti et al., 2024; Putra et al. 2022; Ningsih, 2019; S. W. Putra et al., 2022; Sya’diyah & Apriliani, 2017). Lavender aromatherapy adds a calming effect because its component, linalool acetate, helps lower pulse rate faster after physical activity (D.K. Putra & Setiowati, 2023; Sya’diyah & Apriliani, 2017). Together, these two interventions provide a holistic way to manage stress. The relatively low practical effectiveness in this study may be due to the shorter duration—only 3 weeks with 3 sessions per week—compared to other studies that used 4 weeks or more (Desi Intarti et al., 2024; Putra et al., 2022).

Individual differences also influenced the results. Factors outside the researcher's control, such as lack of family support, limited social interaction, declining physical and psychological function, and existing health problems (for example, hypertension), can keep stress levels higher (Jamini et al., 2020; Sholikhatun et al., 2022). It is important to remember the difference between statistical significance and practical significance (Nuryadi et al., 2017; Lantz, 2013). A result can be statistically significant but still have only a small real-life impact, especially with a small sample size. Therefore, while this intervention is proven effective statistically, it may need longer duration, more frequent sessions, or additional psychosocial support to achieve stronger practical benefits for the elderly.

CONCLUSION

This study concludes that before the intervention, elderly participants in the Sasanawaluyo gymnastics group had an average stress score of 20.47, indicating a moderate stress level. After receiving the combination of elderly gymnastics and lavender aromatherapy three times a week for three weeks, their average stress score decreased to 14.4, falling into the no-stress or normal category. The paired t-test showed a significant reduction in stress levels ($p = 0.000$; $p < 0.05$). However, the intervention's effectiveness was calculated at only 29.6%, placing it in the ineffective category, possibly due to the relatively short duration of the intervention, which may require more time to achieve stronger practical results.

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