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Strength Training Formulation to Support Successful Aging for the Elderly

Margono[1], Farid Imam Nurhadi[1]*, Subagyo[1]

[1]Universitas Negeri Yogyakarta, Indonesia

* Corresponding Author. E-mail: faridimamnurhadi@uny.ac.id

Abstract: Older adults will experience physical changes characterized by decreased hearing, deteriorating vision, and decreased muscle strength, resulting in slow movements. Physical changes in older adults result in physical mobility impairments that can limit their independence in performing daily activities. The quality of physical condition, health, and social conditions has an impact on the success of the aging process for older adults. Proper exercise formulation is the first step to achieving a successful aging process for the elderly. This study employed a systematic literature review method using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The first step was to determine the topic of the articles to be used, namely, strength training and well-being for the elderly. Articles were searched for using Mendeley Cite. The results of the literature review of the five articles show that strength training has a positive effect on the quality of life of the elderly. Strength training formulation considers the frequency, intensity, duration, and type of strength training selected. Strength training can be done 2-3 times a week. The selection of training intensity can start from low to moderate intensity (60-85% RM). Intensity can be gradually increased by observing improvements in the physical condition of the elderly. Strength training can be done using weights, either using your own body weight (Pilates, body weight training) or external weights (using a set of dumbbells, barbells, and gym machines). Strength training should be chosen based on safety, comfort, and security.

Keywords: Strength Training, Formulation, Elderly

INTRODUCTION

The elderly is an abbreviation for advanced age. The elderly are one of the stages of development of living beings as a result of the aging process. The aging process is natural and will be experienced by each individual. According to the World Health Organization (WHO), lansia are people who have reached the age of 60 years or older. Lansia are a group of people who have entered the final stage of human life. In this group, the aging process has occurred (Afriansyah et al., 2019). The physical condition of a person who has entered old age (elderly) will experience a decline. The elderly will also experience physical changes characterized by decreased hearing, deteriorating vision, and decreased muscle strength, resulting in slow movements. Physical changes in the elderly result in physical mobility disorders that can limit the independence of the elderly in carrying out daily activities.

The aging process can be mitigated by engaging in physical exercise. One of the health problems in the elderly is cognitive decline. Cognitive impairment is a serious problem because it makes it difficult for the elderly to perform daily activities independently. Cognitive function is influenced by one factor, namely physical activity (Ningrum et al., 2023). Recommendations for physical activity for the elderly must be tailored to their abilities and conditions. Based on WHO recommendations for physical activity for the elderly (Kemenkes, 2018): (1) A minimum duration of 150 minutes for moderate physical exercise or 17 minutes for vigorous physical exercise per week, (2) Each practice, supervisor, or elderly person concerned must ensure that the duration lasts at least ten minutes. If participants are already accustomed to the recommended duration, then they should engage in moderate-intensity exercise for 300 minutes or vigorous-intensity exercise for 150 minutes per week. (3) Most older adults have difficulties with body coordination, so they need balance training sessions at least three times a week, while muscle training is recommended at least twice a week.

Physical activity or exercise must be designed with the right dosage. Exercise is like medicine; the dosage and type of medicine must be appropriate. Medicine with an insufficient dosage cannot cure the disease, while an excessive dosage can cause an overdose. Exercise must also be appropriately measured. If the dosage is insufficient, it cannot improve fitness or health levels, while an excessive dosage can lead to overtraining. The dosage of exercise for fitness must meet the FITT components (Suharjana, 2013). FITT stands for Frequency, Intensity, Time, and Type. First, exercise should be performed 3–5 times a week. Second, the intensity should be moderate, not too light and not too heavy,

as evidenced by the ability to speak fluently during exercise. If speech is interrupted (talk test), it is a sign that the intensity is excessive. Third, the time/duration required for exercise is 30-45 minutes, excluding warm-up and cool-down. Fourth, the correct type of exercise involves rhythmic, continuous movements that engage large muscle groups (e.g., legs and arms).

The development of physical activities for older adults also requires several other considerations, such as the main fitness components that must be developed, health conditions commonly experienced by older adults, and mental and social health. Physical changes in older adults result in physical mobility impairments that can limit their independence in performing daily activities. The risk of falling in older adults increases as their physical condition declines. Balance disorders are a major cause of falls in older adults. Data show that more than 80% of older adult patients are hospitalized due to falls, and more than 50% of these patients die within 1 year of being hospitalized (Oddsson et al., 2004). The good news is that the risk of falling is the most preventable threat. Based on these cases, strength and balance training should be provided to the elderly. Strength training is very important, but other aspects of training the elderly must also be considered, such as making it enjoyable and including psychological or social aspects.

This study will explore strength training methods for older adults. The exploration will be conducted by reviewing and analyzing articles on strength training for older adults in reputable international journals and accredited national journals. The results of the exploration of these articles are expected to reveal the models or applications of exercises that have been carried out and to identify other aspects that can be developed to formulate the right approach to improving the fitness of the elderly, especially their strength, in a way that is enjoyable and encompasses psychological and social aspects, thereby improving their quality of life. The results of this literature review are expected to broaden the knowledge or understanding of strength training among the elderly. Strength training is not limited to lifting dumbbells, barbells, and gym machines at fitness centers; many methods and models of strength training can be done. Ultimately, the elderly can choose a strength training formulation that is appropriate, safe, easy, and enjoyable.

METHODS

This study employed a systematic literature review method using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta Analyses) guidelines (Page et al., 2021) as a framework for identifying, collecting, and analyzing literature related to injuries in the context of physical education. The first step is to determine the topic of the article to be used, namely, strength training and well-being for the elderly. Search for articles through Mendeley Cite. The process of identifying articles relevant to this study is listed in the following chart.

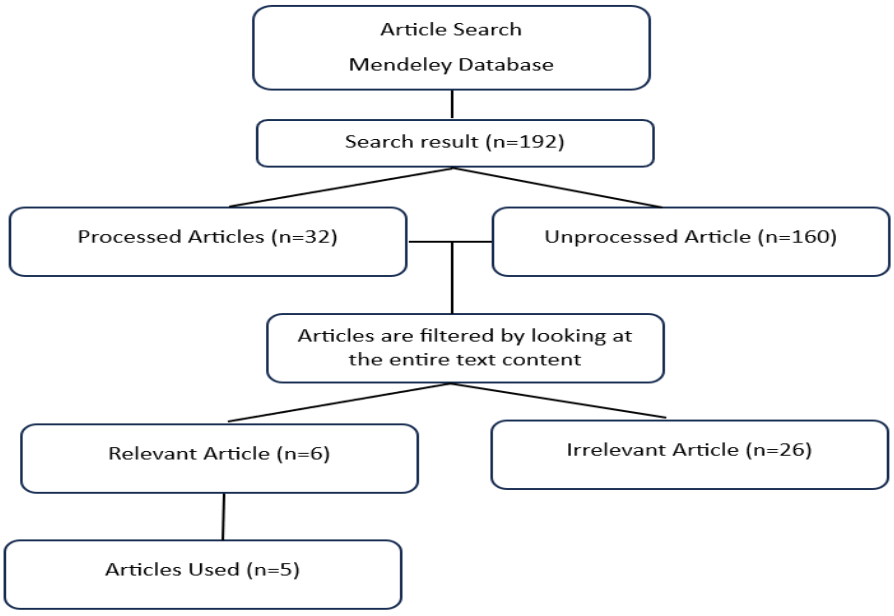

Figure 1. Diagram of the process for identifying relevant articles

RESULTS AND DISCUSSION

Relevant articles were identified by selecting articles that matched the chosen theme, namely, strength training and quality of life in older adults. The five selected articles are shown in Table 1 below.

Table 1. Selected Aticles

No	Author	Title	Journal Name Vol/No/Year	Result
1	(Päivärinne et al., 2018)	The Effect of Eight Weeks of Pilates Training on Functional Indicators and Postural Abnormalities in Older Men	Scandinavian journal of medicine & science in sports 28/4/2018	Pilate's training has been linked to enhanced functional indicators and a reduction in abnormalities. Given the numerous benefits associated with Pilates, integrating it into public health exercise programs can prove to be a valuable addition. By making Pilates more accessible to a wider population and incorporating it into these programs, we can effectively enhance individuals' motivation to engage in physical activity. As a result, this will lead to an improved standard of living and overall quality of life for the population.
2	Genchun et al., 2025	Effect of progressive resistance training on inflammatory markers, motor function, and quality of life in the elderly after total knee arthroplasty	*Chinese Journal of Health Management (2 025)*	Progressive resistance training can effectively reduce the inflammatory response in the elderly after total knee arthroplasty, enhance lower limb muscle strength and knee joint function, and improve the quality of life.
3	(Klimavičiūtė et al., 2024)	The Effect of Strength Training on the Quality of Life and Cognitive Functions of Elderly People	Baltic journal of sport & health sciences 132(1) 2024	The study found that regardless of the type of strength training, the quality of life of the elderly did not improve. Both types of training resulted in statistically significant improvements in cognitive inhibitory function in older adults.
4	(Sánchez-roa & Reina-monroy, 2024)	The Effect of Physical Exercise on Functional Capacity and Perception of Well-Being in Older Adults	*Physical Education Theory and Methodology (2 024)*	The findings of this study show that eight weeks of physical exercise based on strength training with affordable means (own body weight, elastic bands, and dumbbells) with a frequency of 3 days a week, contribute to improving the functional capacity of strength and flexibility in upper and lower limbs, and cardiorespiratory endurance in older females. This intervention was also found to have a positive impact on quality of life, as well as on the perception of well-being.
5	(Kimura et al., 2007)	The influence of short-term strength training on health-related quality of life and executive cognitive function	*Journal of Physiological Anthropology (2010) 29(3) 95-101*	The strength training program was designed to strengthen the large muscle groups most important for functional activities and to improve balance. The effects of the intervention on the eight dimensions of the SF-36 in the control and training groups were analyzed. Only the mental health scale of the SF-36 was

No	Author	Title	Journal Name Vol/No/Year	Result
				significantly improved for the training group compared with controls after 12 weeks. Task-switch reaction time and correct response rate remained unchanged. Short-term strength training might have modest positive effects on HRQOL, although this training period may not be sufficient to affect executive function in relatively healthy older people.

There are many articles on strength training for older adults, but fewer articles discuss its effects on quality of life. Many articles focus on the effects of strength training on muscle function alone, without touching on other aspects of older adults' quality of life. The results of the identification of articles on strength training and the quality of life of the elderly were narrowed down to five articles in Table 1. Based on the literature results in these five articles, it can be seen that strength training has a positive effect on the quality of life of the elderly, with only one article mentioning that strength training does not affect the quality of life of the elderly. This may be due to several factors, one of which is the selection of the strength training model.

Based on a review of the literature, it can be seen that there are various types of strength training. Strength training can be done using weights, either using your own body weight (Pilates, body weight training) or using external weights (using a series of dumbbells, barbells, and gym machines). This model or type of weight training is in accordance with the statement (Apriyanto, K. D et al., 2018) that weight training can be done using external weights, namely free weights such as dumbbells, barbells, medicine balls, kettlebells, or using machine weights, and can also be done using one's own body weight.

The results of the literature review also show that other exercise models can be incorporated into strength training programs to further improve the physical quality and quality of life of older adults. Exercise programs to improve cardiopulmonary fitness, balance, coordination, and psychological well-being in older adults. Older adults can choose a combination of exercises to improve their quality of life. Research states that combining both aerobic and resistance exercises into a routine offers a comprehensive approach to health. This combination can improve physical function, enhance cognitive clarity, and boost emotional well-being. The resulting improvements in quality of life, lower risk of chronic diseases (such as heart disease, diabetes, and hypertension), and reduced risk of falls are invaluable in maintaining the independence of elderly individuals (Mazreno & Taghian, 2024). This is reinforced by the WHO's recommendations for physical activity for the elderly (Ministry of Health, 2018): (1) A minimum duration of 150 minutes for moderate physical exercise or 17 minutes for vigorous physical exercise per week, (2) Each practice, supervisor, or elderly person concerned must ensure that the duration lasts at least ten minutes. If participants are already accustomed to the recommended duration, then make it a habit for seniors to exercise at moderate intensity for 300 minutes or at vigorous intensity for 150 minutes per week. (3) Most seniors have difficulties with body coordination, so they need balance training sessions at least three times a week, while muscle training is needed at least twice a week.

A literature review shows that strength training can be done 2-3 times per week. Selecting strength training with a frequency of 2-3 strength training sessions per week is appropriate for increasing strength in older adults (Tøien et al., 2025), (Nurhadi & Prihatanta, 2025). Another recommendation for selecting training sessions is to take a break from strength training the next day (not done two or more days in a row)

Recommendations for exercise intensity selection can start from low-moderate intensity (60-85% RM). Intensity can be increased gradually by observing improvements in the physical condition of the elderly. Selecting heavy weights at the beginning of training is not recommended because it will tend to focus on heavy weights, thereby neglecting the focus on correct technique and progressive loading. This intensity determination is in line with research showing that strength training in older adults (>60 years) increases muscle strength by increasing muscle mass, motor unit recruitment, and

activation rate. Muscle mass can be increased through training at an intensity of 60% to 85% of an individual's maximum strength (Mayer et al., 2011).

Based on a series of discussions, it can be concluded that strength training programs for older adults to improve their quality of life need to consider the frequency per week, intensity of strength training, type of strength training chosen, and duration. Older adults must be able to assess their abilities and choose the type of strength training that suits their needs. Strength training should be selected based on safety, comfort, and security for the elderly. Variation in exercises can also increase the motivation of the elderly to participate in strength training programs.

CONCLUSION

Theoretical studies on strength training to support healthy aging indicate that strength training not only builds muscle but also improves the quality of life for older adults. It is important to consider training models or designs that are safe, engaging, and easy for older adults to perform. Strength training programs should consider the frequency, intensity, duration, and type of strength training selected. Strength training can be performed 2-3 times per week. The intensity of the training can start at a low-moderate level (60-85% RM). The intensity can be gradually increased as the physical condition of the elderly improves. Strength training can be done using body weight (Pilates, body weight training) and external weights (using a series of dumbbells, barbells, and gym machines). Strength training is selected according to the safety, comfort, and security of the elderly. Exercise variety can also increase the motivation of the elderly to participate in strength training programs.

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