

The Effectiveness of Physical Activities on Fatigue In The Elderly: A Systematic Review

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ABSTRACT

Fatigue is a common symptom reported by the elderly, and the elderly with lower levels of physical activity tend to feel tired. Physical activity is one of the strategies to maintain and regain age-related physical function, but in fact, many elderly people don't do physical activity regularly. The purpose of writing this article is to analyze the effectiveness of physical activity on fatigue in the elderly. The method in preparing this Systematic review is based on literature studies from various electronic databases including Scopus, Proquest, CINAHL, MEDLINE, and ScienceDirect by conducting a comprehensive review using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The keywords used are "effectiveness and "physical activity" AND "fatigue" AND "elderly". There are 9 original articles with 6 articles using the Randomized Control Trials (RCTs) research method, 2 articles using the quasi-experimental method, and 1 article using the prospective cohort method according to the inclusion criteria. This systematic review shows the effectiveness of various physical activities on reducing fatigue in the elderly, this systematic review can be used as evidence when doing a combination of joint activities and self-exercise at home as a good choice physical exercise intervention for the purpose of reducing fatigue in the elderly.

Keywords: Effectiveness, Physical Activity, Fatigue, Elderly

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BACKGROUND

The aging process causes a decline in a person's physical capacity to maintain fitness, this can cause various complaints such as fatigue, pain, sleep disturbances, and gastrointestinal and psychological symptoms, moreover, these symptoms often occur simultaneously and are related to one another. (Mun et al., 2016). Fatigue is a common symptom reported by the elderly, and older people with lower levels of physical activity are more likely to feel tired. Higher levels of fatigue are also associated with lower physical functioning (Glynn et al., 2020). A survey at the University Hospital of Toulouse, of 1500 beds found that nearly 650 beds were occupied by seniors aged 70 years or over and nearly 20% of them lost their independence due to weakness (Vellas and Fleck, 2014). This is supported by the study found nearly 30 percent of participants in the Chinese study population had experienced fatigue, and that fatigue was associated with age (Lin et al., 2015).

The benefits of physical activity for the elderly, namely increased fitness, fat presentation decreased, knee extensor strength, knee flexors, and leg pressure increased. There are various kinds of physical activity to improve fitness in the elderly, whether it is done alone or in groups, group physical activity that can be done by the elderly is gymnastics, while activities that can be done independently are such as home-based exercise training. Movement Gymnastics for the elderly is an exercise that is adapted to the anatomical and physiological conditions of the elderly body, Aerobic exercise for the elderly provides an increase in overall physical fitness as indicated by an increase in endurance, strength and flexibility (Prasetyo *et al.*, 2017). Home-based exercise training allows a wider choice of activities to be offered to elderly individuals who have difficulty attending therapy, given social factors (social awkwardness doing group activities), physical limitations, little time to exercise due to family or work responsibilities, accessibility (lack of access to transportation to therapy sites) and lack of motivation are obstacles for the elderly in doing physical activity (Tanaka et al., 2016).

Physical activity is one of the strategies to maintain and regain physical function related to age, but in fact, many elderly people do not do physical activity regularly, this is influenced by various reasons including the time and money needed for transportation to and from the training site. Compared to home-based programs, home exercise programs are cheaper and do not require transportation, making it easier for seniors with mobility impairments, however, participant exercise compliance will be difficult to monitor (Meng et al., 2020). The various beneficial effects of physical activity whether done collectively or individually can, in turn, contribute to a higher level of mental health, besides physical activity can help to contribute to an increase in a higher quality of life and reduce fatigue. (Department of Health, 2011). Based on the above background, the authors are interested in finding and observing in-depth the effectiveness of physical activity on reducing fatigue in the elderly

METHODS

This Systematic Review is compiled based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The databases used are Scopus, Proquest, CINAHL, MEDLINE, and ScienceDirect limited to publications for the last 5 years from 2016 to 2020, full-text articles, and in English. The keywords used in article searches are "effectiveness" and "physical activity" AND "fatigue" AND "elderly". After several articles were found, the authors conducted an analysis and synthesis of the articles according to the specified inclusion and exclusion criteria. The inclusion criteria for

systematic review in are (1) elderly who do not have heart disease (2) elderly without balance disorders, (3) elderly without paralysis, (4) elderly who do not use walking aids, (5) elderly who do not use assistive devices hear. The exclusion criteria in this systematic review were (1) elderly with heart disease, and (2) elderly with balance disorders, (2) elderly suffering from COPD, cancer, stroke, (3). The article search process was carried out in September - October 2020. The search for articles used keywords that had been determined by the compilers and provided limits on inclusion and exclusion criteria. The data obtained is then selected one by one by the compiler to determine the suitability of the desired articles and delete the same articles. After obtaining the appropriate articles, the articles are analyzed one by one and grouped to get the results. The next step is to discuss based on the points obtained from the selection results.

RESULTS

The article search results found 196 articles consisting of 24 from Scopus, 27 from Proquest, 80 from MEDLINE, 34 from CINAHL, and 31 from ScienceDirect. The process of reviewing the selected articles consists of three stages, namely reviewing the title, reviewing the abstract, and reviewing the research content. 38 were selected to be reviewed from the research content, and 29 of the 38 articles were excluded because they were not original articles, in the form of a qualitative study of respondents who were athletes, elderly patients with COPD, cancer, and diabetes. 9 articles according to inclusion and exclusion criteria were retained. The process of extracting and filtering articles is summarized in the figure.

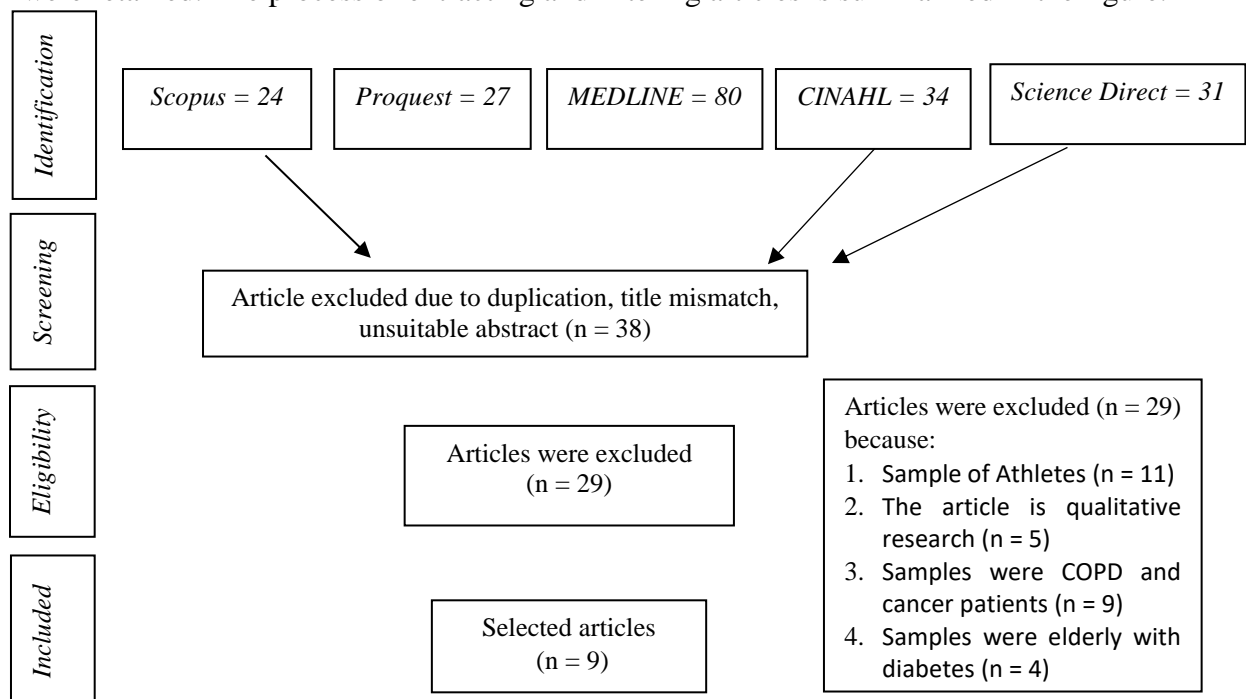


Figure 1. Flow diagram and article selection

The research articles are limited from 2016 to 2020. 1 article was published in 2016, 3 articles were published in 2017, 1 article was published in 2018, 2 articles were published in 2019 and 2 articles were published in 2020. The research design used was 6 articles using the RCT design, 2 articles using the Quasy experiment, and 1 article using the prospective cohort design. The population in this study were 23-1591 respondents. The age of the respondents is 60 - 79 years. The locations in this study are multi-regional or various

countries, namely Korea, China, the United States, Sweden, Brazil, and Japan. Of the 9 articles that discussed physical activity in the elderly, the frequency of implementation was at least 2 times per week and the most frequent was 4 times a week. The fastest time duration is performed for 27 minutes and the longest is done for 60 minutes. The fastest duration of intervention was 8 weeks and the longest was up to 24 weeks. The results of the review showed that 9 articles stated that physical activity affected reducing weakness and fatigue in the elderly. The results of this study can be seen in table 1.

Table 1 Characteristics of research articles

No.	Article Title, Researcher Name, Year	Design, Samples, Variables, Instruments, Analysis	Result
1	Effects of home-based exercise on sarcopenia among community-dwelling elderly adults: Body composition and functional fitness (Hong et al., 2017)	Design: Randomized, controlled trial Sample: 23 seniors Independent variable: Home-based exercise Dependent variable: Body composition and functional fitness elderly adults Instruments: The Senior Fitness Test (SFT) Analysis: Two-way repeated measures ANOVA	Tele-exercise can be a new and effective method of intervention to increase skeletal muscle mass and physical function of the lower limbs from the perspective of improving sarcopenia among the elderly
2	Effects of concurrent aerobic and resistance exercise in frail and pre-frail older adults A randomized trial of supervised versus home-based programs (Meng et al., 2020)	Design: A randomized trial Sample: 146 elderly Independent variable: concurrent aerobic and resistance exercise Dependent variable: frail and pre-frail older adults Instruments: TUG (time and up go test), 6 MWT (six-minute walking test) Analysis: Mixed model repeated-measures analysis	After 3 months of supervised exercise or home training, the average number of weakness criteria was met and the percentage of fat decreased significantly. Knee extensor strength, knee flexor, and leg pressure were significantly increased in the supervised exercise group. In the home gymnastics group, the strength of all tested muscle groups increased significantly, except for the strength of the pressure of the limbs.
3	Effects of Caloric Restriction on Cardiorespiratory Fitness, Fatigue, and Disability Responses to Aerobic Exercise in Older Adults With Obesity (Nicklas et al., 2019)	Design: Randomized controlled trial Sample: 180 seniors (65–79 years) Independent variable: Caloric restriction and aerobic exercise Dependent variable: Cardiorespiratory Fitness, Fatigue, and Disability Instruments: Fitness was assessed using the Short Physical Performance Battery (SPPB), disability was measured using a 19 item questionnaire, fatigue was assessed using the Vitality domain on the 36 item questionnaire Medical Outcome Study (SF-36) Analysis: Paired t-tests	There is an increase in cardiorespiratory fitness by combining aerobic exercise with moderate CR. all groups reported significantly reduced fatigue after the intervention, more fatigue when one dose of CR was added to exercise

No.	Article Title, Researcher Name, Year	Design, Samples, Variables, Instruments, Analysis	Result
4	Moderate - to - high-intensity exercise with person-centered guidance influences fatigue in older adults with rheumatoid arthritis(Kucharski et al., 2019)	Design: Randomized controlled trial Sample: 74 elderly Independent variable: Moderate - to - high-intensity exercise Dependent variable: Influences fatigue Instruments: Multidimensional Fatigue Inventory (Swedish version) (MFI-20) Analysis: Comparisons between groups were performed using the Mann-Whitney U test for non-parametric variables using the t-test for parametric variables using GraphPad Prism, for group comparisons the Wilcoxon signed-rank test was used.	Moderate high-intensity, guided training can reduce fatigue
5	Effects of a 12-Week Exercise Training Program on Physical Function in Institutionalized Frail Elderly (Ferreira et al., 2018)	Design: Randomized Controlled Trial Sample: 37 Seniors aged 60 years and over Independent variable: 12-Week Exercise Training Program Dependent variable: Physical Function, Frailty Instruments: Timed Up And Go Test (TUG), frailty was identified based on the criteria described by Fried et al., Which included unintentional weight loss, reports of fatigue, reduced walking speed, muscle weakness, and low physical activity in the elderly. Analysis: ANCOVA	A 12-week training program for frail elderly residents in a long-term care facility is efficient in increasing muscle strength, speed, agility, and appreciable reversal of weakness.
6	Impact of Baseline Fatigue on a Physical Activity Intervention to Prevent Mobility Disability (Glynn et al., 2020)	Design: Prospective cohort Sample: 1591 respondents aged 65 years or older who underwent structured physical activity intervention and health education (HE) for an average of 2.6 years. Independent variable: Physical Activity Intervention Dependent variable: Baseline Fatigue Instruments: Fatigue was assessed using a modified version of the Exercise-Induced Feelings Inventory MMD was defined as the inability to walk 400-m, PMMD was defined as two consecutive walking failures Analysis: Characteristics of participants based on fatigue status used the t-test for continuous measurement and the χ^2 test for categorical variables. Cox proportional hazard model is used for risk analysis of major mobility disability	The intervention of moderate-intensity physical activity in the long term is very effective in maintaining mobility in the elderly with higher levels of basic fatigue

No.	Article Title, Researcher Name, Year	Design, Samples, Variables, Instruments, Analysis	Result
		MMD and persistent major mobility disability (PMMD)	
7	An individualized exercise program with and without behavioral change enhancement strategies for managing fatigue among frail older people (Liu et al., 2017)	Design: Quasi-experimental Sample: 79 elderly with fatigue Independent variable: exercise program with and without behavioral change enhancement strategies Dependent variable: Managing fatigue Instruments: Functional mobility was assessed through the Timed-up-and-Go test Analysis: ANOVA	Combined interventions have the potential to increase trainee compliance by increasing their attendance at training sessions and exercises that they organize themselves A reduction in fatigue was identified in all groups,
8	Community Capacity Building Exercise Maintenance Program for Frail Elderly Women (Hong and Jun, 2017)	Design: Quasi Experiment Sample: 45 elderly women aged 70 years and over Independent variable: Community Capacity Building Exercise Maintenance Program Dependent variable: Frail Elderly Women Instruments: The Senior Fitness Test (SFT) Analysis: t-tests, Chi-square test, and Fisher's exact test	In this study, the experimental group that received the CCBEMP intervention had a better chance of muscle strength, static balance, muscle endurance, body fat percentage, self-efficacy, and health-related quality of life compared to the control group. Therefore, CCBEMP intervention can be utilized in various fields as a tool to help frail elderly people.
9	Effect of a simple an adherent home exercise program on the physical function of community-dwelling adults sixty years of age and older with pre sarcopenia or sarcopenia (Maruya et al., 2016)	Design: Randomized, controlled trial Sample: 52 seniors aged 60 years and over Independent variable: Simple an adherent home exercise program Dependent variable: Physical function Instruments: The following assessments of physical functions were performed: handgrip strength, duration of single-leg standing, comfortable and maximum walking speed, and knee extension strength. Knee extension strength was measured using a hand-held dynamometer Analysis: ANOVA	A 6 month home exercise program improves physical function in community-dwelling individuals with pre-sarcopenia or sarcopenia

DISCUSSION

This systematic review was compiled based on the identification of 6 articles with RCTs, 2 Quasy experimental methods, 1 prospective cohort method to analyze the effectiveness of physical activity to reduce fatigue in the elderly. Increasing skeletal muscle mass and physical function of the lower limbs from the perspective of improving sarcopenia in the elderly is a benefit of home-based exercise training.(Hong et al., 2017)The same result is also supported by a study conducted in China which showed an increase in muscle strength in the home-exercise group. The study also explained that consistent walking exercise for 30 minutes per day carried out for 3 months under the supervision of researchers had

significant results on fitness and fatigue, decreased fat presentation, knee extensor strength, knee flexors, and leg pressure increased in the supervised group.(Meng *et al.*, 2020). The benefits of physical activity in the form of walking exercise from the above research are in accordance with the benefits of exercise on the musculoskeletal system where muscles that are actively contracting during exercise require more blood than at rest, this has an impact on the burning results obtained are energy and not accompanied by the formation of lactic acid. but gas CO₂ and H₂O. Both the rest of the combustion comes out through sweat or urine and in the form of CO₂ air that is excreted through the lungs. Theoretically, aerobic exercise does not cause lactic acid, which means it does not cause fatigue. This research is supported by a study in the United States which explains that fatigue is reduced and fitness increases after exercising 4 times a week for 3 months.(Nicklas *et al.*, 2019). The results of research from various countries show that high to the moderate-intensity physical activity carried out with guidance is effective in improving fitness and reducing fatigue in the elderly (Kucharski *et al.*, 2019).

The duration and frequency of interventions from physical activity largely determine the success of the intervention to gain physical fitness and reduce fatigue in the elderly. nine articles showed significant results on the fitness of the elderly. The duration, frequency, and duration of interventions provided in 9 articles are following the guidelines of the Physical Activity Guidelines for America, namely 150 minutes of activity (2 hours 30 minutes) of moderate-intensity activity (for example, regular walking) per week.(Anton *et al.*, 2014), These guidelines are relevant for all healthy adults aged 65 and over, are also relevant for individuals in this age range with a chronic non-communicable disease condition (WHO, 2019). With physical activity expected the elderly have better levels of fitness and physical function, and the incidence of risk factors for chronic disease and non-communicable diseases is lower than those who are not active. physical fitness is useful to make it easier for the elderly to carry out normal daily activities, safely and independently, without excessive fatigue, these benefits can provide cost savings for health and social care services (Department of Health, 2011). Physical activity is very effective in increasing fitness and reducing fatigue in the elderly, both done together and independently. Modification of research interventions varied, including physical activity accompanied by health education, cognitive therapy, and physical activity under the supervision of a professional trainer. Physical activity besides being physically beneficial can also be beneficial psychologically, maintains the stability of self-control, reduces stress, trains concentration, increases sensitivity, fosters a sense of kinship, and togetherness(Timmons *et al.*, 2018). Other benefits besides physical fitness and decreased fatigue are improved cognitive function, social interaction, and emotional stability in the elderly which increases after physical activity (Fernández-García *et al.*, 2020).

CONCLUSION

A current systematic review shows the effectiveness of various physical activities on reducing fatigue in the elderly. From published data, it can be concluded that physical activity with a frequency of at least 2 or 4 times a week with a duration of 27 to 60 minutes per session for 2 months or more is significant in reducing fatigue in the elderly. This systematic review can be used as evidence when doing a combination of joint activity and home exercise as a good physical exercise intervention to reduce fatigue in the elderly.

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