

BALANCE TWELVE EXERCISE WITH HATHA YOGA MAXIMIZES DYNAMIC BALANCE AND LOWERS ELDERLY ANXIETY

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ABSTRACT

Introduction: The elderly experience physiological changes balance and anxiety disorders, important provide a combination exercise program can maximize balance while reducing anxiety.

Purpose: Find the combination of balance twelve exercises with hatha yoga that maximizes dynamic balance and reduce anxiety in the elderly.

Method: Experimental research, pretest and posttest control group design. Research sample amounted 28 elderly. Group 1 given hatha yoga, and Group 2 given a combination of balance twelve exercises with hatha yoga. Training for 6 weeks with a frequency of 3 times a week. Measurement of balance with the Berg balance scale, and measurement of anxiety with the Hamilton anxiety rating scale.

Results: Results of the balance value of Group 2 $p > 0.000$ with a mean difference and a percentage increase of 6.86 ± 0.663 for anxiety, the results were $p > 0.000$ with a mean difference and a decreasing percentage of 4.64 ± 1.82 . In the balance of Group 1, the results were $p > 0.000$ with a mean difference and a percentage increase of 4.50 ± 0.519 for anxiety, the results were $p > 0.000$ with a mean difference and a percentage decrease of 1.85 ± 0.363 . It can be concluded that the combination of balance twelve exercises with hatha yoga maximizes dynamic balance and reduces anxiety.

INTRODUCTION

In old age, there will be a physical decline, which means that the elderly experience changes that lead to negative changes. One of them is anatomical changes in the musculoskeletal system that occur in the aging process are reduced muscle mass, myofibril degeneration, tendons becoming constricted, and muscle fiber atrophy (Salvatore et al., 2022). Where these anatomical changes have an impact on decreasing muscle strength, resulting in a decrease in the ability of the elderly to

maintain body balance and an increased risk of falling which will increase dependence on the elderly in carrying out daily activities (Priyanto et al., 2016).

One-third of seniors over the age of 65 and half of the elderly over the age of 80 experience falls each year. Meanwhile, in Indonesia, as many as 12.8% of the elderly have fallen in the last two years, of which 7.6% are first-time falls and 5.2% are recurrent falls (Susilowati et al., 2020).

Various complications of falling that can occur in the elderly, including anxiety

syndrome after a fall, the need for both soft tissues or fractures, hospitalization, disability (decreased mobility), decreased functional status / decreased independence, increased use of health care facilities, and even death of patients (Faidah et al., 2020). The main prevention in the management of fall risk is by stabilizing the balance of the body and reducing the level of anxiety, it aims to prevent the occurrence of injuries early due to falls so that the risk of injury and death can be avoided. By providing an exercise program to improve balance in the elderly and reduce anxiety levels, namely by giving a combination of twelve balance exercises with Hatha Yoga.

Exercise is closely related to a decrease in neuroinflammatory factors as well as increasing anti-inflammatory mediators. By exercising there will be a decrease in the hormone glucocorticoid and the release of serotonin monoamine (Sujana et al., 2015). The combination of twelve balance exercises with hatha yoga is a combination of two physical exercises that can reduce anxiety by applying the principle of individualization of training is expected to be able to maximize the results obtained from providing exercise interventions 12 balance exercises. With the practice of yoga in the muscle part, the bones throughout the whole become stronger and more flexible so that the balance of the body is more stable (di Fronso et al., 2021). Physical exercise has low side effects and can provide benefits in reducing both physical and psychological disorders. Physical exercise has antidepressant effects that can lower anxiety resulting.

METHODS AND MATERIALS

The score collection was carried out from May to July 2022 for 6 weeks in Jebres Surakarta with a dose 3 times a week, the exercise was carried out starting with the 12 balance exercise for 30 minutes (Suadnyana et al., 2018) Then continued with hatha yoga for 40 minutes (Ahmad et al., 2021). The research method uses Experimental with Pretest and Posttest Control Group Design designs. Group 1 as the control group was given hatha yoga, and group 2 as the experimental group was given twelve balance exercises with hatha yoga. In the determination of the number of samples using the Pocock formula (2008), it was found that the minimum number of samples in this study was 28 elderly people divided into 2 groups.

Sampling technique with simple random sampling. The inclusion criteria in this study are willing to be a respondent, aged 60-65 years, have a low risk of falling, and the exclusion criteria are the elderly who are on bed rest, have fractures, use aids, and have a history of heart disease and hypertension. To find out whether the combination of twelve balance exercises with hatha yoga can maximize dynamic balance and reduce anxiety in the elderly, a Paired Sample T-test was carried out and to see the characteristics of respondents using the chi-square test The measuring instrument used is the berg balance scale (BBS) transition test to assess dynamic balance and the Hamilton anxiety rating scale (HARS) to assess the transition of anxiety values. The result collection stage begins with conducting a survey and then taking care of the

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permit for taking research results, after obtaining a result collection permit, the background, problem formulation, and purpose of the research are made.

Then a study was conducted by measuring the dynamic balance value and the anxiety value of the elderly in both groups before and after being given exercise. After the result is obtained, it is then analyzed and makes a discussion.

The novelty of this research is research by (Nugraha et al., 2016), which combines 12 balance exercises with a balance strategy exercise on dynamic balance where the 12 balance exercises are superior in increasing dynamic balance by activating feedforward mechanisms in movement strategies, increasing sensory strategies, as well as in research It was explained that depression and anxiety disorders can cause balance disorders which in this study there was no additional exercise that could reduce anxiety. The results of this study have added hatha yoga which can reduce anxiety by combining it with 12 balance exercises so that it maximizes increasing balance and reducing anxiety in the elderly

RESULT AND DISCUSSIONS

This research was conducted on elderly cadres in Jebres Surakarta District, Central Java on April 2- August 10, 2022. The existence of the COVID-19 pandemic (Coronavirus Disease 2019) the government issued a policy of limiting community activities that must be applied to all levels of society so that research was carried out by

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paying attention to the policy, by providing exercises in the form of videos and each sample carried out exercises independently in their respective homes.

With this policy, the research was carried out in a hybrid manner where pre and post-exercise result collection in groups 1 and group 2 was carried out directly located in Jebres Surakarta District with a population of 63 elderly by implementing strict health protocols and for the application of exercises carried out by samples at home respectively guided by exercise videos that had been distributed to all research samples with monitoring for ensuring the sample carries out the exercise in an orderly manner according to the schedule. The pre and post result of the research results were tabulated in Microsoft Excel and then processed using SPSS for windows version 21 which was then poured into the results and discussion. The result that can be presented is as follows.

a. Characteristics of Respondents

Table 1. Characteristics of sample

Characteristics	Group1	Group2	Value p
Man	2	1	0.759
Women	12	13	
Old			0.953
Mean±SD	62.79±1.80	62.57±1.82	
BMI			0.221
Mean±SD	19.85±1.10	20.46±1.70	

The results processing with the Independent T-Test with a meaningfulness limit of $p > 0.05$ were obtained on the sex characteristics of the $p\text{-value} = 0.759$. In the processing of age characteristics result, a $p\text{-value} = 0.953$ was obtained and in the processing of body mass index (BMI)

characteristic result, a p -value=0.221 was obtained. The results showed that there were no significant differences in sex characteristics, age, and body mass index between Group 1 and Group 2. The results of the statistical analysis showed that the sex between the two groups did not have a significant difference, so it did not become a disruptive variable to the effects of the intervention provided.

Balance of person's is influenced by muscle strength, especially the strength of the muscles of the lower limbs, all movements produced are the result of an increase in muscle tension that produces energy so that parts of the body can move at a certain distance. Female muscles are fully formed by the time of stepping into adulthood with proportions in weight and a size of about half of the strength of the male muscles. Male muscle tissue accounts for 43% of total body weight, while in women it is only 36% of total body weight (Squire, 2019).

The increase in a person's age will be followed by a decrease in body functions, one of which is the function of body balance due to a decrease in muscle strength, coordination of the extremities, and a decrease in the coordination of the correct pattern of the path, as well as a decrease in balance control, is the result of a degenerative process due to factors of increasing age that can increase the risk of falling (Thomas et al., 2019).

According to increasing age range experiences anxiety which will have an impact on psychological health, anxiety affects awareness, concentration, gait balance, and information processes necessary for mobilization (Alizadehsaravi et al., 2022). A

person who has a normal BMI tends to have a better static balance value compared to a person who does not have a normal BMI. The balance function of the body involves the activity of muscle strength and the accumulation of adipose tissues. The increase in body mass index will affect muscle strength, so that if the muscles are weak and body mass increases, there will be problems with body balance when standing or walking. Low muscle mass can lead to biomechanical failure of the muscle response and loss of the body's balance mechanisms. A person with a less than normal BMI tends to have a lower balance because the ability to resist the influence of outside forces is lower, making it more difficult to maintain balance (Wells, 2012).

b. Normality Test and Homogeneity Test

The normality test uses the Shapiro Wilk test, while the homogeneity test uses Levene's test

Table 2. Results of normality test and homogeneity test

Variable	Uji Normalitas		Homogenitas
	Value p G1	Value p G2	Value p
Balance			
Pre	0.140	0.241	0.673
Post	0.167	0.332	
Anxiety			
Pre	0.113	0.418	0.751
Post	0.086	0.063	

The results of the test with a meaningfulness limit of $p > 0.05$ showed that Group 1, and Group 2 had normally distributed results. Therefore, the bivariate test used for hypothesis testing of the difference in the mean difference in dynamic equilibrium and anxiety is to use a parametric statistical test. In the homogeneity test using Levene's test, the

results were obtained that the p-value of > 0.05 for dynamic balance and anxiety before exercise which means that the balance and anxiety results before being given exercise are homogeneous.

c. The Difference in The Average Dynamic Balance and Anxiety of the Elderly Before and After Exercise in Both Groups

To test the average dynamic balance and average anxiety of the pre-elderly before and after exercise in Group 1, and Group 2, a paired sample t-test was used because the result was normally distributed.

Table 3. Paired test results t-test differed in the average dynamic balance and anxiety of the Elderly Before and After Exercise in Both Groups

Variable	Pre-Average	Post-Average	Dever ent	%	Nilai p
Balance					
G1	38.29±1.38	42.79±1.31	4.50	10.51	0.000
G2	38.57±1.22	45.43±1.70	6.86	15.50	0.000
Anxiety					
G1	9.21±1.42	7.36±1.44	1.85	20.08	0.000
G2	9.14±1.35	4.50±1.21	4.64	50.76	0.000

Obtained in Group 1 the result of the p-value = 0.000 ($p < 0.05$) which means that there is a significant difference in the dynamic balance value and the anxiety value of the elderly before and after being given hatha yoga practice. In group 3, a p-value = 0.000 ($p < 0.05$) was obtained which means that there was a significant difference in the dynamic balance value and the pre-elderly anxiety value before and after being given a combination exercise of 12 balance exercises with yoga hatha. Table 3 shows that the difference in values and percentages of increasing dynamic balance as well as differences in values and percentages

of decreased elderly anxiety in Group 3 is greater than in group 1.

The mechanism of combining 12 balance exercises with hatha yoga in improving balance is by increasing the strength of the lower extremity muscles and torso extensors, activating the volunteer motion system, improving the automatic postural response system, activating the concept of gait and locomotion, and activating reflex movement by activating the feedforward system that forms a sensory integration system.

The increase in the strength of the lower extremity muscles and torso extensors is obtained when performing single limb stance movements, stance tandems, body circles, and hatha yoga exercises in standing asana sessions, anjaneyasana, and spinal twisting postures, which can increase strength in the muscles of the vastus lateralis, biceps femoris, anterior tiblysts, extensor digitorium longus, rectus femoris, sartorius, vastus medialis, gastrocnemius, extensor-flexor halluces, gastrocnemius, anterior tibial, externus obliquus muscle and extensor muscles of the torso. While performing these exercises the body responds by sending signals through the neuro receptor from the cerebral cortex passed to the post-central gyrus to be processed to produce motoric signals in the pyramidal fibers and end up in the anterior motoric neurons. Then the anterior motoric neuron passes the action potential towards the terminal axon and produces an end plate potential so that the action potential spreads along the muscle membrane and a muscle contraction event occurs (Saud et al., 2022).

Muscle contractions will have an effect in the form of body stability by maintaining the balance of the body through an increase in muscle tension as a response to the nervous system activating muscles to contraction, so that the more muscle fibers that are activated the greater the strength produced by the muscle. This will have an impact on the ability of muscles to resist the force of gravity as well as the ability to maintain a balanced position in various changes in the fulcrum plane (Astuti Suadnyana et al., 2018). The volunteer motion system is activated by moving the single limb stance, single limb with arms, knee marching, tandem stance, and body circles when carrying out the movement, the body will respond by activating the volunteer response, through the feedback system so that the extrapyramidal system of the medial and lateral brainstem deceleration pathways is activated (Sitthiracha et al., 2021).

The medial pathway serves to control posture, extensor synergistic patterns throughout the extremities, and orientation movements of the head and body through the medial brainstem pathways including the medullary reticulospinal, vestibulospinal, and tectospinal. while the lateral pathway activates the excitation of the extensor motor neuron and inhibits the motor flexor of the neuron through the reticular information derived from the tracts pontine reticulospinal and red nucleus of the descending brainstem (Mustafa & Sugiharto, 2020).

The automatic postural response system serves to straighten the body when performing clock reach movements, single

limb stance with arm, balancing wand, and heel to toe and standing asana where the body will respond with impulses from receptors received by the vestibular, visual, and somatosensory. Signals from the retina are transmitted to the brain and processed and provide visual cues. Then the information on proprioceptive from the skin, muscle contractions, and joints will involve sensory receptors sensitive to pressure and motion in the joint tissues, as well as signals obtained through changes in vestibular linear angles. The postural response system automatically functions to straighten the body when performing clock reach movements, single limb stance with arm, balancing wand, and heel to toe and standing asana where the body will respond with impulses from receptors received by vestibular, visual, and somatosensory (Ivanenko & Gurfinkel, 2018).

The concept of gait and locomotion is activated by moving knee marching, heel to toe, and grapevine. This movement activates the muscles that play a role in the concept of gait and locomotion which will provide an increase in stride length and walking speed and aims to improve dynamic control by increasing the mechanoreceptor and proprioceptor strength of the legs by increasing the reaction force of the ground reaction force, which receptor plays a role in the postural control system (Sitthiracha et al., 2021).

Body reflex motion is activated by moving eye tracking, dynamic walking, and stepping exercise which will form a sensory integration system and activate the feedforward system where the feedforward mechanism serves for the correction of

attitudes needed in maintaining balance as movements or changes in the direction of movement take place quickly so that the accuracy of reflex movements in response to disturbances from outside the body will be further increased (Feldman & Zhang, 2020).

Dynamic walking will provide information to semicircular regarding changes in the position of the head in the vestibule tractus before. The vestibulo cerebelum system is useful in regulating the balance between agonist muscle contractions and antagonistic muscles in the back, pelvis, and shoulders as the body changes rapidly (Obeidat & Bell, 2018).

Stepping exercise improves the function of controlling body balance, namely sensory information systems, central processing, and effectors to be able to adapt to environmental changes by activating somatosensory, vestibular, and proprioceptive that maintain an upright body position during walking, as well as carrying out the right road pattern to improve balance (Wahyuni Novianti et al., 2018). The sensory integration system is achieved through eye tracking, dynamic walking, and stepping exercise movements. When doing eye tracking and stepping exercises will activate the vestibulocochlear reflex. Dynamic walking exercises will cause excitation in the vestibular apparatus and stepping exercises to provide additional information on the body's somatosensory. So that a sensory integration system is formed. The sensory integrity system is the optimization of the sensory system's ability of the visual, vestibular, and somatosensory that

cooperate optimally (Feldman & Zhang, 2020). Research conducted by Nugraha et al., (2016) states that 12 balance exercises can improve dynamic balance in the elderly.

The combination of 12 balance exercises with hatha yoga in pre-elderly is an innovation in combination exercises, where this exercise can be used as an exercise of choice that aims to get maximum results in improving dynamic balance. The feedforward effect obtained through eye tracking, dynamic walking, and stepping exercise movements from this training is not possessed by hatha yoga. The combination of 12 balance exercises with hatha yoga can reduce anxiety.

These results are strengthened by research conducted regarding the influence of hatha yoga on anxiety shows that hatha yoga can reduce anxiety by stimulating a decrease in sympathetic nerve activity and an increase in parasympathetic nervous activity which affects the decrease in the hormone cortisol, catecholamine, and lower blood pressure, with a relaxing effect, will help the secretion of the hormone beta-endorphin (Faidah et al., 2020). Stated that hatha yoga can lower anxiety by improving mood with a decrease in cortisol levels after performing hatha yoga exercise (Baklouti et al., 2020).

Sports have only been limited to formal sports without any element of play. Therapeutic sports are a game sports model that has an encouraging nature but still trains physically and provides a positive psychological effect as in the wand balancing exercise in 12 Balance exercise (Amin et al., 2022). Physical therapy is an effective method

of treating depression. They conducted a study aimed at evaluating the impact of physical activity on the effectiveness of recovery from depression and the severity of depressive symptoms. From the study, it is reported that physical therapy has a positive influence on mental conditions, where physical therapy can change the severity of symptoms of anxiety and depressive disorders (Paprocka-Borowicz et al., 2021).

CONCLUSIONS AND SUGGESTIONS

Based on the results of the analysis of research that has been carried out and discussed, it can be concluded that 12 Balance Exercise with hatha yoga maximizes dynamic balance and reduces anxiety in the elderly. As for the suggestions that can be submitted based on the findings and studies in this study, several suggestions are conveyed by the researcher as follows: It is hoped that in addition to doing balance exercises, the elderly also do muscle flexibility exercises on the muscles of the limbs so that it will maximize the function of the limbs as the main support for the body in activities to maximize body balance and it is necessary to do further research by improving some of the things that have become rigidities that have been described in the weakness of this study to get more valid results.

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