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Jurnal Keolahragaan, 11 (2), 2023, 140-151

Effect of elderly fitness exercise combined with Surya Namaskar Yoga on the youngest and middle old' body mass index and physical fitness

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Received: 5 August 2022; Revised: 29 July 2023; Accepted: 11 September 2023

Abstract: The purpose of this study was to analyze the effect of a combination of fitness exercise for the elderly and Surya namaskar yoga on body mass index and physical fitness of youngest and middle old in Mojolaban District. This research is a quasi-experimental research with one group pretest-posttest design. The research population is the elderly in Mojolaban District. Sampling was done by purposive sampling from 42 elderly integrated healthcare center members. All samples followed the treatment with a frequency of 4x/week for 24 meetings, light intensity (DN elderly 96-112x/minute), 35 minutes. Then measured BMI with the formula Weight (kg)/Height (m2) and physical fitness was measured by the senior fitness test. Normality test using Shapiro Wilk followed by Wilcoxon Signed Rank test. The results of the study based on the Wilcoxon Signed Rank test for the youngest old, the pre-test value of 24.1538 ± SD 4.75014 decreased to 23.8381 ± SD 4.69895 in the post-test with a p-value of 0.01 in the BMI variable. The pre-test value of 10.05 ± SD 1.287 increased to 10.79 ± SD 1.554 in the post-test with a p-value of 0.001 on the physical fitness value variable. The results of the Wilcoxon Signed Rank test for the middle old obtained a p-value of 0.012 for the BMI variable and a p-value of 0.046 for the physical fitness value variable. It can be concluded that there is a decrease in the BMI of the youngest and middle old, as well as an increase in the physical fitness value of the youngest and middle old.

Keywords: elderly fitness exercise, Surya namaskar yoga, body mass index, physical fitness, elderly.

How to Cite: Utami, D. Y., Sumaryanti, S., Arovah, N. I., Graha, A. S., Suherman, W. S., & Putra, F. H. L. (2023). Effect of elderly fitness exercise combined with Surya Namaskar Yoga on the youngest and middle old' body mass index and physical fitness. *Jurnal Keolahragaan,* 11(2), 140-151. doi: https://doi.org/ 10.21831/jk.v11i2.52401

INTRODUCTION

The elderly population is increasing significantly accompanied by progress in the fields of health and education which is marked by an increase in life expectancy. Life expectancy is an estimate of the average length of life of the population with the assumption that there is no change in the pattern of death based on age (BPS, 2020) (BPS, 2020). Based on data from the Central Statistics Agency in 2020, the life expectancy of the elderly in Indonesia in 2020 experienced a significant increase in men (69.59%) and women (73.46%). This shows that the percentage of the population aged 60 years and over is above 7 percent of the total population, so Indonesia becomes a country with an aging population structure if the percentage is above 10 percent (BPS, 2020). Old age is a stage in a person's life experiencing physical, mental, and social setbacks so that they experience certain conditions that cause them to be unable to carry out their daily activities (Nasrulloh et al., 2021). Elderly according to UU no. 13 of 1998 is someone who is at the age of 60 years and over. Aging is the last stage of life that takes place all the time and cannot be avoided.

In the life stage of the elderly, there is a decrease in the body's physiological functions which have an impact on the weakening of the physical condition. Changes that occur in the elderly include: body composition, muscles, bones, joints, cardiovascular system, respiration, and cognition. As they age, the elderly experience altered fat circulation. As men age, the circulation of fat will occur around the trunk

https://doi.org/ 10.21831/jk.v11i2.52401

and internal organs, while in women it occurs around the internal organs (Langhammer et al., 2018). This affects the Body Mass Index (BMI) in the elderly. Body Mass Index (BMI) is one of the parameters to determine nutritional status by comparing weight and height (Kemenkes, 2016). In the elderly, overweight, obesity, and constant BMI often occur which cause sarcopenia, namely an increase in body fat but loss of muscle mass and functional performance is exacerbated by an inactive lifestyle (Mohajan & Mohajan, 2023). The need to measure Body Mass Index (BMI) in the elderly, namely as a parameter to determine a person's weight having a thin, normal, and obese body (overweight) and can determine the value of a person's weight status to the risk of health problems.

The risk of health problems faced by the elderly due to the aging process so that many non-communicable diseases appear. Changes experienced by the elderly in addition to increasing age include a decrease in physical function as indicated by a decrease in muscle mass and strength, an increase in body fat, a decrease in maximum heart rate, and a decrease in brain performance (Levy et al., 2020) . Efforts to maintain and improve physical fitness for the elderly is to do sports. Physical exercise should be a lifestyle for the elderly to reduce some of the physiological changes associated with aging and progressive degeneration (Fragala et al., 2019). The ideal exercise program for the elderly should include components of aerobic exercise, resistance, flexibility, and balance taking into account the intensity, volume, and duration of exercise sufficient to achieve maximum benefit (Galloza et al., 2017) . The type of physical activity that is suitable for the elderly is health or fitness sports (Falck et al., 2019). Physical fitness is defined as movement produced by the body by muscle contractions that increase energy expenditure. The components of physical fitness consist of endurance, strength, flexibility, coordination, and good balance (Bucht & Donath, 2019) . Physical fitness is an important marker for human health in every age group, one of which is the elderly (Sudibjo et al., 2021).

Indonesian Elderly Fitness Gymnastics which has a light to moderate intensity is very suitable for the elderly with easy movements to do. Moderate-intensity exercise is exercise with sequential and rhythmic movements that will help improve physical fitness, brain health and memory (Fujihara et al., 2021). Indonesian Elderly Fitness Gymnastics is carried out in a light way, the movements do not require considerable strength to follow the rhythm of the music, and the movements are easy to do, and avoid jumping and jumping movements. The recommended aerobic exercise for the elderly is carried out in the morning, not more than 60-70% of the maximum heart rate (96-112 times per minute) with a frequency of 3-5 times a week, 1 day of rest, 20-30 minutes according to the ability of the elderly (Kemenkes, 2016). Aerobic exercise that is carried out regularly and measurably can help bone density and strengthen the heart muscle (İmamoğlu et al., 2017). This is very beneficial for the elderly who have experienced bone fragility and weakening of the heart muscle, so that the elderly can achieve physical fitness. The role of exercise in the elderly is to help overcome functional limitations and the risk of falling (Braga et al., 2018). Engaging in physical activity offers a potential solution to counter the issue of declining fitness among the elderly. When exercise lacks adherence to fundamental principles, it may result in health issues, whereas following these principles can lead to a beneficial adaptation process. Exercise acts as a physical stressor, capable of disrupting the body's homeostatic balance (Rismayanthi et al., 2022).

Another recommended aerobic exercise for the elderly is yoga (Chobe et al., 2020) . Yoga practice programs are in high demand because they take up little space, don't require a lot of equipment, and don't have any harmful side effects. There are various types of yoga that are currently popular, namely Surya namaskar yoga. Surya namaskar Yoga is one of the components in Hatha yoga (Stec et al., 2023). Surya namaskar yoga is a form of movement that involves physical body postures in regulating the breath to develop mental focus, mind, body, and spirit (Hishikawa et al., 2019). Surya namaskar yoga provides many benefits, for example, lowering the workload on the heart which causes a decrease in systolic blood pressure, strengthening respiratory muscles, improving diaphragm and lung performance, lowering airway resistance, increasing cardiorespiratory and increasing VO2 max, as well as improving fitness (Bhaskar, 2020; Divya & Ashok, 2019).

Surya namaskar yoga has a positive effect on physiological functions of the body, such as: increasing lung capacity, regulating respiratory rate, increasing muscle strength, cardiorespiratory, and vascular (Bhaskar, 2020) . Surya namaskar yoga can be performed by various age groups. The recommended movement is that children who have active characteristics and high flexibility, as well as teenagers who have an active and healthy metabolic pattern can do 12 to 24 rounds of Surya namaskar

yoga postures followed by yoganidra movements (complete relaxation exercises). Middle-aged people who often experience lifestyle disorders can do 6-12 rounds of Surya namaskar yoga postures followed by yoganidra, pranayama, and meditation. The elderly can practice according to their comfort level both in the number of rounds and in the Surya namaskar yoga postures (Prasanna Venkatesh & Vandhana, 2022) .

Based on the results of field observations conducted on June 9, 2021 in the Mojolaban sub-district, the working area of the Mojolaban Health Center, the elderly who are members of the elderly integrated healthcare center have an age between 60-70 years in line with the percentage distribution of young elderly (60-69 years) of 64.29% and middle aged (70-79 years) by 27.23%. Researchers also conducted interviews with 10 elderly people, it was found that 8 (80%) elderly complained of experiencing significant fatigue due to not doing outdoor activities as usual due to the Covid-19 pandemic which had lasted almost 2 years. The elderly said the lack of physical activity was caused by Enforcement of Community Activity Restrictions (ECAR). The existence of ECAR requires the midwife in charge of conducting health checks in the form of weight, blood sugar, blood pressure, and cholesterol by coming from house to house. The results of the examination showed a significant increase in body weight in the elderly reaching 5-7 kg which increased the status of the Body Mass Index into the category of overweight/obesity. The midwife on duty at the Mojolaban Health Center also said that she had never conducted a physical fitness measurement for the elderly after carrying out fitness exercises for the elderly. In addition, there is no research that examines the effect of exercise programs on young and middle aged elderly and has never held a Surya namaskar yoga exercise program regularly at the elderly integrated healthcare center.

This preliminary study was supported by research conducted by Chowdhury & Chakraborty (2021) , showed that elderly fitness exercise affects blood pressure of hypertensive patients to normal. Elderly fitness also affects the improvement of the quality of life which is very good for elderly people with hypertension (Subha, 2022). The elderly fitness program that is carried out regularly and measurably has an effect on increasing cardiovascular endurance, decreasing nutritional status, and decreasing blood pressure (Yadav et al., 2022) . Some of these studies show that exercise and physical activity in the elderly have a positive impact on health and physical fitness, but there has never been a renewal study that measures the level of physical fitness and body mass index of the elderly so that there are still many elderly who have health complaints.

The government, through the integrated healthcare center's program for the elderly, is reinvigorating sports training and health checks for the elderly. This makes the elderly get motivated to return to their activities safely and comfortably. The combination of Elderly Fitness Gymnastics and Surya namaskar Yoga is expected to improve the quality of life and physical fitness of the elderly. Although the sequence and pattern of movements are easy, many elderly people do gymnastics irregularly and do not follow the correct rules so that it can cause unexpected negative effects. Elderly who have not ideal body weight, decreased memory, and lack of strength so that sometimes they are hampered in carrying out movements due to cognitive and motor skills that are no longer sensitive.

The purpose of this study was to determine and analyze the effect of a combination of fitness exercise for the elderly and Surya namaskar yoga on body mass index and physical fitness of the young and middle old.

METHOD

The research method used is a quasi-experimental research (quasi-experimental) with one group pretest-posttest design. The population in this study is the elderly community in Mojolaban sub-district, Sukoharjo district with a total of 42 elderly men and women. The elderly category namely youngest-old aged 60-69 years and middle old aged 70-79 years (WHO, 1999). Sampling was done by purposive sampling, namely the elderly who attended the posyandu in the Mojolaban sub-district. The young and middle elderly variables are a type of attribute variable that cannot be changed by the reasearcher and the characteristics of the research subjects.

The combination exercise treatment for elderly fitness and yoga suyanamaskar was carried out with a frequency of 3 times a week for 24 meetings, low to moderate intensity (maximum pulse rate for the elderly 96-112 times/minute), 35 minutes of exercise for 8 weeks. Exercise for 17:55 minutes (preliminary exercise for 04:55 minutes, core exercise for 06:22 minutes, transitional movement for

02:58 minutes, cooling exercise for 03:39 minutes). Followed by the Surya namaskar yoga posture starting with Stithi or Pranamasana (prayer posture), Hasta Uttanasana, Padahastasana, Dakashinpad Prasarnasan, Dwipad Prasarnasan, Saashtang Namasakarasan, Bhujangasan, Parvatasan, Dakashinpad Prasarnasan, Padahastasana, back to Stithi.

The research instrument used was Body Mass Index measured by the formula of weight (kg)/height (m^2), while physical fitness was measured by senior fitness test with total scoring technique (making one score). Grouping based on 6 physical fitness component values that have been implemented with a minimum value of 6 and a maximum of 18.

Table 1. Norms of physical fitness instruments for the elderly

No.	Category	Total
1.	Above the average	18—23
2.	Average	12—17
3.	Below the average	6—11

It is called below average if the physical fitness value is in the range of 8 to 11, then the average category is in the range of 12 to 17, and for category above the average score of 18. The series of senior fitness tests include: (1) 30 Second Chair Stand Test, (2) 30 Second Arm Curl Test, (3) 2 Minute Step Test, (4) Chair Sit — and — Reach Test, (5) Back Scratch Test, (6) 8 — Foot Up—and — Go Test.

Before testing the data analysis, it is necessary to test the normality of the data using the Shapiro-Wilk normality test. The Shapiro-Wilk normality test was used when the data was less than 50 samples ($n<50$). The analysis is based on a comparison between the significance value of t with a significance value of 0.05, with the following conditions: (1) If the significance of $t < 0.05$ then H_0 is rejected, which means that the independent variable (free) has a comparative difference to the dependent variable (bound).). (2) If the significance of $t > 0.05$ then H_0 is accepted, namely the independent variable (free) there is no comparative difference to the dependent variable (bound).

RESULT AND DISCUSSION

The results of the study obtained data showing that most of the respondents were youngest old with a percentage of 80.95% and the rest included middle-old adults with a percentage of 19.05%. The average age of the respondents as a whole is 64.45 years, in the youngest old category is 62.3 years, and in the middle old category it is 73.25 years.

Table 1 shows the characteristics of the sample in terms of age and gender categories. There are 10 men with 8 (80%) men being youngest old and 2 people (20%) men being middle old, while women as a whole are 32 people with details 26 people (81.25%) are young elderly and 6 people (18.75%) are middle old. The average age of male respondents is 66.4 years while for female respondents it is 63.84 years. This descriptive analysis explains the results of the research descriptively without any statistical tests which include the discussion of several cross tabulations of both Body Mass Index (BMI) and Physical Fitness Values.

Table 2. Crosstabulation of sample characteristics

		Respondent Age		Total
		Youngest Old	Middle Old	
Gender	Men	8	2	10
	Women	26	6	32
Total		34	8	42

Table 2 shows that 19 youngest old people before doing a combination of elderly gymnastics and Surya namaskar yoga had a normal Body Mass Index (BMI), as well as the middle old who almost all had normal BMI. The number of youngest old who are overweight and obese is 15 times more than the middle old in the same category. After following a combination of elderly gymnastics and Surya namaskar yoga, the Body Mass Index (BMI) experienced a change in the category of the youngest old. There was 1 elderly who changed the category from fat to normal. This indicates a positive change and indicates the effect of the combination of elderly fitness gymnastics and Surya namaskar yoga, but this is different from the middle old who did not experience changes in the BMI category. Statistically descriptive, a change indicates the effect of the treatment undertaken by the respondents.

Table 3. Cross tabulation of body mass index by age category

Body Mass Index (BMI)		Age Category		Total
		Youngest Old	Middle Old	
Pre-test	Normal	19	7	26
	Fat	8	0	8
	Obesity	7	1	8
Post-test	Normal	20	7	26
	Fat	7	0	8
	Obesity	7	1	8

Table 3 shows the physical fitness values which are grouped into three groups but after measuring the fitness values, it turns out that the sample is only in two groups, namely the below-average group and the average group. The results of the cross table show that there is a change in the category from below average to average for both young and middle old. The number of youngest old with an average physical fitness value increased by 7 people on the post test results to 11 people or to 32.4 percent of all youngest old. For middle old, there is an addition of 3 people in the average category so that it becomes 4 people or 50 percent of the total middle old.

Table 4. Cross tabulation of physical fitness by age category

Fitness Value			Age Category		Total
			Youngest Old	Middle Old	
Pre-test	Below average	*Count*	30	7	37
		% *within* Age Category	88.2%	87.5%	88.1%
	Average	*Count*	4	1	5
		% *within* Age Category	11.8%	12.5%	11.9%
Total		*Count*	34	8	42
		% *within* Age Category	100.0%	100.0%	100.0%
Fitness Value			Age Category		Total
			Youngest Old	Middle Old	
Post-test	Below average	*Count*	23	4	27
		% *within* Age Category	67.6%	50.0%	64.3%
	Average	*Count*	11	4	15
		% *within* Age Category	32.4%	50.0%	35.7%
Total		*Count*	34	8	42
		% *within* Age Category	100.0%	100.0%	100.0%

The results of processing research data presented in table 4, Body Mass Index (BMI) and physical fitness show that both variables have a change from pre-test to post-test, both in terms of average value and standard deviation. The Body Mass Index decreased by an average of 0.3157 points and a standard deviation of 1.008 while the value of physical fitness increased by an average of 0.74 points with an increase in the standard deviation of 0.277. It can also be seen that the minimum and maximum values both have changed except for the minimum value for the physical fitness value. Descriptively, this has shown the effect of a combination of fitness exercise for the elderly and Surya namaskar yoga on Body Mass Index (BMI) and physical fitness values, but it is necessary to have a paired t test to confirm the effect by statistically seeing whether there is an average change in the index. Body Mass (BMI) and Physical Fitness Values from before and after the respondents participated in a combination of elderly fitness gymnastics and Surya namaskar yoga.

Table 5. Summary statistics of body mass index and physical fitness score

	N	*Mean*	*Std. Deviation*	*Minimum*	*Maximum*
BMI *pre-test*	42	24.1538	4.75014	16.93	37.70
BMI *post-test*	42	23.8381	4.69895	17.01	36.73
physical fitness values *pre-test*	42	10.05	1.287	8	13
physical fitness values *post-test*	42	10.79	1.554	8	15

Before the data analysis test was conducted, a normality test was first performed on the data difference between the post-test and pre-test scores, both for the Body Mass Index (BMI) and Physical Fitness Values. Because the number of data is less than 50 samples (n<50), then the Kolmogorov-Smirnov and Shapiro-Wilk normality tests are used. The results of the normality test are presented as follows.

Table 6. BMI normality test and physical fitness score

		Kolmogorov-Smirnov[a]			*Shapiro-Wilk*		
		Statistic	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
Youngest Old	BMI difference	.290	34	.000	.477	34	.000
	Difference in Fitness Value	.355	34	.000	.693	34	.000
Middle Old	BMI difference	.347	8	.005	.681	8	.001
	Difference in Fitness Value	.325	8	.013	.665	8	.001

From the results of the SPSS Shapiro-Wilk normality test above, it shows that the results of the normality test for Body Mass Index (BMI) and Fitness Values in the category of youngest and middle old age groups show a p-value of less than 5% so it has a decision to reject H_0 with the conclusion that the data do not follow a normal distribution. Therefore, the paired t test cannot be carried out and a non-parametric test that meets the assumption is not normal, namely the Wilcoxon Signed Rank Test.

The following are the results of the Wilcoxon Signed Rank Body Mass Index (BMI) and Youngest OldPhysical Fitness Values:

Table 7. Youngest old wilcoxon test result rank

		N	*Mean Rank*	*Sum of Ranks*
BMI post-test—BMI pre-test	*Negative Ranks*	24[a]	18.67	448.00
	Positive Ranks	10[b]	14.70	147.00
	Ties	0[c]		
	Total	34		
Fitness Values Posttest – Fitness Values Pretest	*Negative Ranks*	0[d]	.00	.00
	Positive Ranks	13[e]	7.00	91.00
	Ties	21[f]		
	Total	34		

a. BMI Post Test < BMI Pre Test

b. BMI Post Test >Bmi Pre Test

c. BMI Post Test = BMI Pre Test

d. Fitness Values Post Test < Fitness Values Pre Test

e. Fitness Values Post Test > Fitness Values Pre Test

f. Fitness Values Post Test = Fitness Values Pre Test

Table 7 is the initial output before the statistical test on the Wilcoxon Signed Rank test by showing the number of ranks generated when the post-test data is reduced by the pre-test data. Body Mass Index

(BMI) has a negative rank of 24 and a positive rank of 10 which indicates that there are 24 people who experienced a decrease in Body Mass Index and 10 people actually experienced an increase in BMI. The average BMI of the youngest old who experienced a decrease was 18.67 points and the average BMI that experienced an increase was 14.70 points. This condition shows that the combination of fitness exercise for the elderly and surya namaskar yoga not only lowers BMI from those who have an abnormal BMI but also improves posture from those whose BMI can be said to be below normal to close to normal. While the Physical Fitness Value variable has a fairly different rank summary than BMI because there are 21 youngest old whose fitness values remain/stagnant despite doing a combination of elderly fitness gymnastics and surya namaskar yoga. Even so, 13 other young elderly experienced an increase in physical fitness scores with an overall average of 7.

Then we enter the results of the Wilcoxon Signed Rank statistical test using the Z test statistic. The following are the results of the Wilcoxon Signed Rank statistical test of the two variables in the youngest old category:

Table 8. Wilcoxon signed rank youngest old test statistics

	BMI post-test—BMI pre-test	Fitness Values post-test – Fitness Values pre-test
Z	-2.573[b]	-3.213[c]
Asymp. Sig. (2-tailed)	.010	.001

Based on the calculation results of the Wilcoxon Signed Rank test as shown in table 8, the Z value is -2.573 with a p-value of 0.01 for the Body Mass Index variable and -3.213 with a p-value of 0.001 for the Physical Fitness Value variable. Because the p-value of both variables is smaller than = 0.05, the decision is to reject H_0 which means that there is a decrease in Body Mass Index (BMI) and an increase in Physical Fitness Value in youngest old after doing a combination of fitness exercise for the elderly and surya namaskar yoga. This is in accordance with the theory that exercise intervention can reduce body weight, Body Mass Index (BMI), and visceral fat, and increase lean body mass in someone who is overweight and obese (Lee et al., 2018).

Table 9. Wilcoxon middle old test result rank

		N	*Mean Rank*	*Sum of Ranks*
BMI post-test—BMI pre-test	*Negative Ranks*	8[a]	4.50	36.00
	Positive Ranks	0[b]	.00	.00
	Ties	0[c]		
	Total	8		
Fitness Values Posttest – Fitness Values Pretest	*Negative Ranks*	0[d]	.00	.00
	Positive Ranks	4[e]	2.50	10.00
	Ties	4[f]		
	Total	8		

a. BMI POST TEST < BMI PRE TEST

b. BMI POST TEST > BMI PRE TEST

c. BMI POST TEST = BMI PRE TEST

d. Fitness Values Post Test < Fitness Values Pre Test

e. Fitness Values Post Test > Fitness Values Pre Test

f. Fitness Values Post Test = Fitness Values Pre Test

Table 9 also explains the number of ranks generated when post-test data is subtracted from pre-test data. The Body Mass Index (BMI) of the middle old has a negative rank of 8 and neither has a positive rank nor a fixed/stagnant rank, which indicates that there are 8 middle old all experiencing a

decrease in Body Mass Index with the average BMI rank of the middle old being 4.50 points. This condition shows that the body performance of the middle old when given physical activity in the form of a combination of elderly fitness gymnastics and surya namaskar yoga directly reduces BMI and also improves posture. On the other hand, the Physical Fitness Value variable does not have a negative rank and only has a positive rank and a stable/equally strong rank, namely 4 elderly in each rank. Although the overall middle old experienced a decrease in BMI, not all of them experienced an increase in physical fitness scores, so it can be concluded that it is not easy to change the physical fitness of the middle old with physical activity mainly with a combination of elderly fitness gymnastics and Surya namaskar yoga. This is also in line with the theory which states that age affects the development and changes in a person's physical abilities, so it can be concluded that the middle old have fewer changes than the youngest old in terms of physical fitness.

Then we enter the results of the Wilcoxon Signed Rank statistical test using the Z test statistic. The following are the results of the Wilcoxon Signed Rank statistical test of the two variables in the middle old category:

Table 10. Wilcoxon signed rank middle old test statistics

	BMI post-test—BMI pre-test	Fitness Values post-test – Fitness Values pre-test
Z	-2.521[b]	-2.000[c]
Asymp. Sig. (2-tailed)	.012	.046

The Wilcoxon Signed Rank test results in table 10 obtained a Z value of -2.521 with a p-value of 0.012 for the Body Mass Index variable and -2,000 with a p-value of 0.046 for the Physical Fitness Value variable. Because the p-value of the two variables is smaller than = 0.05, the decision is to reject H_0 which means that there is a decrease in Body Mass Index (BMI) and an increase in Physical Fitness Value in the middle old after doing a combination of fitness exercise for the elderly and Surya namaskar yoga. Even so, the middle elderly are very vulnerable to doing physical activities that they do not normally do in their daily lives so that they do not get maximum results, stagnate or even get injured. So the results of this statistical test are in line with the theory which states that the decline in health parameters in the form of decreased physical fitness, increased health complaints, and increased Body Mass Index scores due to increasing age (age range 33-77 years) (Tittlbach et al., 2017).

In spite of their age, the elderly still engage in activities that involve movement, such as shopping for daily necessities, visiting health centers for check-ups, and pursuing leisure activities. According to activity theory, staying active and contributing to the community are vital for achieving successful aging. However, various reasons lead many elderly individuals to become passive and discontinue their activities. Health issues restrict their mobility, and environmental obstacles further complicate their movements. Before experiencing a stroke, many elderly enjoyed going out, but after the illness, they often face instability, as their wheelchairs struggle to navigate uneven terrain. While daily activities and moving around were once effortless for them, it becomes more challenging for elderly individuals with reduced physiological and mental functions (Rismayanthi et al., 2022).

The primary reason for elderly patients visiting the Emergency Department (ED) was medical causes, accounting for 80.6% of cases, and this proportion increased with advancing age. While this study did not delve into the specific underlying diseases, it has been previously reported that elderly individuals typically have an average of four to five diseases, which might explain the rise in medical conditions with increasing age. Moreover, the decline in organ function associated with aging, including respiratory, cardiovascular, and digestive systems, along with weakened immunity and nutritional imbalances, may contribute to the occurrence of medical events. On the other hand, certain activities such as sports participation and driving tend to decrease with age, potentially leading to a corresponding decrease in non-medical diseases among older individuals.

Despite the decline in non-medical events, the likelihood of fractures in the femur neck, vertebrae, and wrist increases due to trauma resulting from osteoporosis, which becomes more prevalent with age. This trend is reflected in the higher ratio of admissions for orthopedic surgery with advancing age. According to age-specific osteoporosis tests conducted in Australia, age-related osteoporosis was found in 20% of patients aged 50 to 59 years, 46% of patients aged 60 to 69 years, 59% of those aged 70 to 79

years, and 69% of patients aged over 80 years. Additionally, in Korea, the prevalence of osteoporosis increases with age, with a higher prevalence among women than men (Lee et al., 2018).

It is important for older adults to have good physical and cognitive abilities to be considered as elderly individuals with a good quality of life. One way to achieve quality aging is through exercise. Exercise plays a crucial role in maintaining overall health, especially in the elderly. Numerous studies indicate that regular exercise can reduce the risk of heart disease, stroke, hypertension, diabetes, osteoporosis, and other health issues in older individuals. Additionally, exercise can help improve sleep quality and reduce depression levels in the elderly. Before engaging in exercise, older adults are advised to consult with a doctor and pay attention to exercise principles such as intensity, duration, and frequency (Putra & Suharjana, 2018).

The study findings indicate that engaging in low-impact aerobic exercise can be advantageous for older individuals. Research demonstrates that long-term exercise routines incorporating weight training, balance exercises, and functional training offer significant benefits for seniors (Grgic et al., 2020). The adoption of a combination of exercise habits should begin as early as the pre-elderly age, around 45 to 59 years old, to maintain consistent healthy behaviors throughout life (BPS, 2020). Starting with flexibility exercises is recommended. The concept of flexibility training has remained unchanged since ancient times, aiming to optimize joint mobility and range of motion (Bucht & Donath, 2019). For older adults, one of the main challenges in their daily activities is the risk of falling, especially when navigating stairs and inclines (Rismayanthi et al., 2022).

From the discussion above, it can be concluded that the elderly must have a healthy lifestyle by maintaining physical fitness, so regular, measurable physical activity or exercise is needed, a healthy and nutritious diet, and adequate rest to have an ideal Body Mass Index (BMI) (Cancello et al., 2019). To prevent and avoid the effects of secondary disability due to obesity and stimulate healthy aging, the elderly should be motivated to increase physical activity and maintain a healthy weight (Şavkın et al., 2020). Elderly who regularly participate in exercise have good physical fitness and increased VO2 max compared to those who do not participate in exercise (Laddu et al., 2020). Gymnastics is also an alternative physical activity that is effective, safe, and important for the elderly because they do exercise regularly and regularly so that the elderly can enjoy their lives and maintain their health (Hetal & Ashok, 2020). In addition to participating in gymnastics, the physical fitness of the elderly must be followed by a healthy lifestyle, adequate rest, and not smoking (Kusumah et al., 2021).

Regular physical activity in the form of gymnastics and yoga can increase the body's physical endurance and keep all the muscles of the body trained. The benefits of physical activity for health are as promotive, preventive, curative, and rehabilitative efforts (Putra & Suharjana, 2018). The positive impact of an increase in organ function in the form of heart rate at rest should decrease. The minimal effect obtained by participating in elderly fitness gymnastics is that the elderly will feel always happy, joyful, sleep quality is better, and the mind remains fresh (Shree Ganesh et al., 2021).

CONCLUSION

The findings of this research lead to the conclusion that an effective exercise program for the elderly should include aerobic exercises, resistance training, flexibility exercises, and balance training in the form of a combination of senior fitness gymnastics lasting for 17 minutes and 55 seconds, followed by the Surya namaskar yoga postures starting with Stithi or Pranamasana (prayer posture), Hasta Uttanasana, Padahastasana, Dakashinpad Prasarnasan, Dwipad Prasarnasan, Saashtang Namasakarasan, Bhujangasan, Parvatasan, Dakashinpad Prasarnasan, Padahastasana, and back to Stithi. The exercise program should consider a frequency of 3 times per week for 24 sessions, with low to moderate intensity (maximum pulse rate for the elderly 96-112 times/minute). Before starting any physical activity or exercise routine, it is impotant to take certain precautions and considerations into account exercise principles like intensity, duration, and frequency.

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