

# Implementation of Ergonomic Elderly Gymnastics Decreases Complaints of Elderly Joint Pain in Peguyangan Denpasar – Bali

Ni Nengah Ariati<sup>1\*</sup>, Ida Ayu Eka Padmiari<sup>2</sup>, Pande Putu Sri Sugiani<sup>3</sup>, and  
Ida Ayu Made Sri Arjani<sup>4</sup>

<sup>1,2,3,4</sup> Department Polytechnic of Health, Denpasar, Bali, Indonesia

Email: ariati528@gmail.com, eka\_padmiari@yahoo.co.id,  
psrisugiani@yahoo.com, sri\_arjani62@yahoo.com

\*Corresponding author

## ABSTRACT

The body change in the elder age, such as regressions in physical, psychological, and social that, can give an impact on health problems. Exercising sports such as elderly gymnastics has been proven to prevent or slow down functional loss. Ergonomic elderly gymnastics can improve physical fitness, improve the body's composition and increase the elderly bone mass had also been applied in Banjar Kepuh Peguyangan aimed to reduce pain complaints of the elderly. The implementation of ergonomic elderly gymnastics involves 25 elderly people and pre-elderly. Gymnastics activities were carried out for four weeks with the frequency of exercises three times every week. Pre-data retrieval was carried out before the execution of exercises, and the Post data was taken after four weeks of elderly gymnastics. Data taken include sample identity and pain complaints using the Nordic Body Map questionnaire. The differences between before and after treatment were analyzed by the Different Wilcoxon test at the 5% confidence level ( $\alpha = 0.05$ ). After regularly exercising for four weeks, there was a decrease in pain complaints by 22.8%, with the category mild pain. The Difference test of Wilcoxon had a significant difference in the sample pain complaints ( $P < 0.05$ ) before and after the execution of gymnastics for four weeks. It was recommended that elderly gymnastics activities be carried out regularly because gymnastics sports positively impact the body's health and fitness.

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## 1. INTRODUCTION

The Elderly is the last period in the cycle of human life that everyone will be experienced. In the elder age, the body changes in the form of regressions such as the skin being thinner and not elastic, hair loss and its colors beginning to turn white, the number of muscles decreasing, the heart muscles experience degeneratively, blood vessels experience rigidity (arteriosclerosis), bones become porous (osteoporosis), the memory, vision, and hearing began to decrease, the decline of physical abilities, and a setback of health conditions. The regression experienced by the elderly often causes physical and

psychological problems for the elderly such as depression, excessive anxiety, insomnia, paranoia, and being easily exposed to health problems (Sunaryo et al., 2016).

Based on the 2012 Susenas data, the highest type of health complaint in the elderly is a few kinds of complaints (32.99%) consisting of gout, high blood pressure, rheumatism, low blood pressure, and diabetes (Kemenkes RI, 2013). Rheumatoid arthritis is one of a chronic disease that can cause pain sensation in the elderly (Cooney et al., 2011). In addition, the elderly are very vulnerable to degenerative joints (Fox et al., 2004).

Exercise by doing elderly gymnastics can prevent or

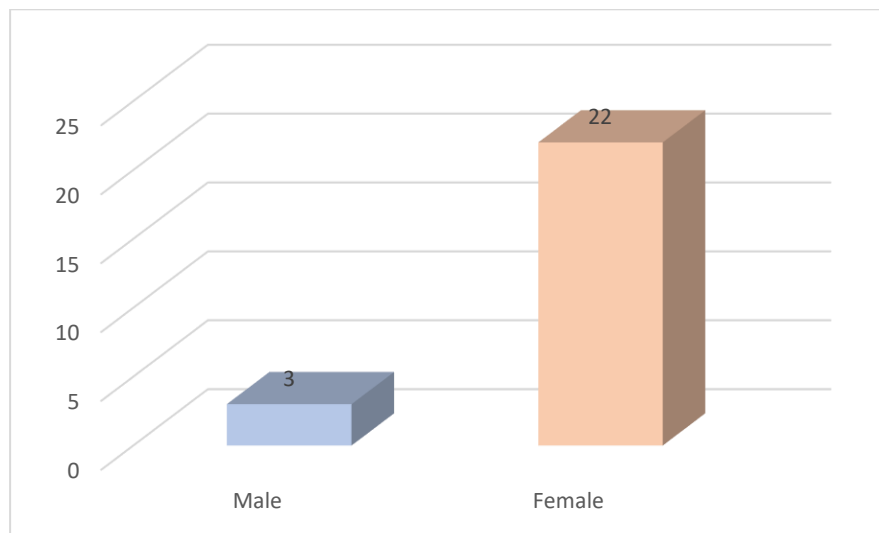


Figure 1. Characteristics of subjects based on gender

slow down functional loss. Various studies show that exercise/sports such as elderly gymnastics can eliminate various risks such as increased blood pressure, diabetes mellitus, joint pain, coronary artery, and accidental (Darmojo, 2011). Huriah et al. (2014) provided therapy for ergonomic exercise activities for the elderly and found that there was a significant effect on reducing joint pain and increasing muscle strength in the elderly in the Puskesmas Kasihan II, Bantul, Yogyakarta. Pranyana et al. (2017) also provided ergonomic exercise therapy for the elderly at the Panti Wreda Dharma Bhakti Surakarta, who found a decrease in pain levels and an increase in the range of motion of the elderly with rheumatism and found that there was a significant effect of ergonomic exercise on reducing pain levels and increasing the range of motion of the elderly.

Elderly people in Banjar Kepuh, Peguyangan Village, complained of joint pain in certain body parts such as the buttocks, calves, and feet so that they often have difficulty getting up when they are in a sitting position. In addition, to anticipate those, some elderly people try to do elderly gymnastics under the supervision and guidance of elderly cadres. Gymnastics activities are carried out only once a week, with a duration of the exercise of fewer than 30 minutes. The initial observations showed that some elderly have difficulty memorizing gymnastic movements, so that the elderly are ineffective in carrying out movements that cause the exercise pulse not to be achieved.

From those descriptions, it will implement the ergonomic elderly gymnastics that have been shown to improve physical fitness and increase the mass of the elderly bone (Ariati et al., 2019). Ergonomic Elderly Gymnastics is an exercise with moderate intensity adjusted to the physical abilities of the elderly so that they are able to perform these movements. The total Ergonomics Approach in the gymnastics design used a participatory approach and appropriate technology. In the participatory approach, it is explained that the movement design is adjusted to the abilities, and the gymnastic music is adjusted to the wishes of the elderly. The appropriate technology in gymnastic movements is made to be simple

and easy to follow, economically not expensive, ergonomically physiological movements so that they will be safe and do not cause injury, energy-efficient, environmentally friendly, and in accordance with local socio-culture.

The purpose of this study was to analyze the differences in elderly pain complaints before and after the implementation of ergonomic elderly gymnastics.

## 2. MATERIAL AND METHOD

This research was an experimental research with the design of the subject (*Treatment by subjects design*) (Nasir, 2003). Gymnastics activities were held for four weeks with exercise frequency three times in one week. The population was elderly in Banjar Kepuh, Peguyangan Village, with 32 people in total. The sample was the entire population that met the inclusion criteria, which was 25 people. The inclusion criteria were set as follows: elderly and pre-elderly who have joint pain complaints and are willing to be sampled in the study. Data taken include sample identity and pain complaints using the Nordic Body Map questionnaire. Wilcoxon's difference test analyzed the differences at a 5% confidence level ( $\alpha = 0.05$ ).

## 3. RESULTS

### 3.1. Characteristics of subjects

The data collection results obtained most of the samples from women, 22 people (88%), and the remaining three people (12%) were men. It is described more in Figure 1.

The subject's characteristics were also seen based on age, weight, height, and body mass index. The data collection for the age and height of the subject was carried out only once, while data collection on body weight, which is needed for the body mass index of the sample, was carried out twice at the beginning and the end. It is presented in Table 1.

Table 1 shows that the average age of the subject was 59.8 years, with the youngest age of 52 years and the oldest at 73 years, while the average subject's height was

154.4 cm after weight measurement before and after four weeks of gymnastics received an average weight loss of 1.5% and an average decrease in the body mass index of 1.8%.

### 3.2 Measurement of pain complaints

The data collection results against pain complaints before and after the application of ergonomic elderly gymnastics are described in Table 2.

Table 2 has shown a decrease in pain complaints by 22.8%. Descriptive analysis by calculating the number of samples based on pain complaints is presented more in Table 3.

According to Table 3 shows the data based on pain complaints. Samples that complained which were mild pain before the exercise gymnastics were all 25 people (100%). After gymnastics for four weeks, the number of samples complaining of mild pain reduced to 22 people (88%), and three other people complained painlessly. Based on the average pain complaint showed a decrease in numbers from 37.7 to 29.1 with the same category, which is mild pain.

The data normality test used the Shapiro Wilk Test at the 5% confidence level ( $\alpha = 0.05$ ) to get most of the data was abnormally distributed ( $p < 0.05$ ), then continued with the Different Test of Wilcoxon ( $\alpha = 0.05$ ), that is presented more on Table 4.

Table 4 shows that there was a significant difference ( $p < 0.05$ ) in pain complaints before and after gymnastics.

## 4. DISCUSSION

The elderly phase will decrease the body's physiological function, which causes physical complaints. One complaint that is often felt by the elderly due to a regression in musculoskeletal function is a pain in certain body parts such as legs, knees, buttocks, thighs, etc. The function of the joint cartilage has decreased so that the cartilage will get thinner and cause joint stiffness. If the joint muscles are used to move, the synovial fluid will keep increasing so that the elderly can do physical activity well. Exercise with gymnastics movements can practice the ability of the joints so that it can reduce complaints, especially pain in the joints (Sudoyo, 2006).

The result of the study was a decrease in joint pain complaints by 22.8%. Before gymnastics, all samples (100%) complained of mild pain, and after gymnastics, there was a decrease in the number of samples complaining of mild pain to 88%, while the rest found it painless (12%). The Different Test Wilcoxon showed a significant difference ( $P < 0.05$ ) in complaints of elderly pain before and after ergonomic elderly gymnastics for four weeks. This ergonomic elderly exercise lasts 30 minutes with a description of 5 minutes of warm-up, 20 minutes of core movement, and 5 minutes of cooling down. The warm-up movement consists of breathing movements, head movements, hands, and static and dynamic stretching aimed at preparing the body for the next activity. The core movement lasts for 20 minutes according to the recommendation of Giriwijoyo (2017)

Table 1. Characteristics of subjects based on age, weight, height, and body mass index before and after gymnastics for four weeks

No.	Description	n	Before		After 4 Weeks		Reduction (%)
			Mean	SD	Mean	SD	
1	Age (year)	25	59,8	5,9	59,8	5,9	-
2	Weight (kg)	25	68,2	9,5	67,2	9,3	1,5
3	Height (cm)	25	154,4	7,2	154,4	7,2	-
4	BMI (kg/m <sup>2</sup> )	25	28,6	3,0	28,1	3,0	1,8

Table 2. Complaints of pain before and after gymnastics for four weeks

No.	Pain Complaints	n	Mean	SD	Reduction (%)
1	Before the gym	25	37,7	3,5	22,8
2	After the gym	25	29,1	4,6	

Table 3. Descriptive analysis of the sample pain complaints before and after gymnastics for four weeks

No.	Pain Complaints	Before		After 4 Weeks	
		n	%	n	%
1	No Pain	0	0	3	12,0
2	Mild Pain	25	100,0	22	88,0
3	Moderate Pain	0	0	0	0
4	Severe Pain	0	0	0	0
	Total	25	100,0	25	100,0

Table 4. Normality test and different blood pressure test data and the sample pain complaints before and after gymnastics for four weeks

No.	Pain Complaints	Mean+SD	p*	Z	p
1	Before the gym	37,7±3,5	0,929	-4,379	0,000
2	After the gym	29,1±4,6	0,032		

\*normal distribution if  $p > 0.05$

that for aerobic endurance, core exercise movements should be done for 15-20 minutes. The core movement is divided into three stages: stage I, which is low impact core movement, stage II is hip movement, and stage III is patting the body. Core movements, stages II and III, are useful for reducing pain complaints because, in these movements, there is a shaking of the hips and buttocks and a patting motion of the limbs to facilitate blood circulation. After the core movement, followed by a 5-minute cool-down in the form of a combination of stretching and light aerobics, which aims to quickly draw back the blood collected in the previously active skeletal muscles to the central circulation and to clean the blood from metabolic waste products in the form of lactic acid that is present in muscle and blood (Nala, 2015). The cooling movement ends with the inhaling motion: inhaling air through the nose and exhaling through the mouth. Extra O<sub>2</sub> is needed after physical activity and is used to oxidize excess lactic acid and meet ATP and creatine phosphate storage reserves (Guyton and Hall, 2015). Another goal of the cooling movement is to return the pulse back to normal near the resting pulse rate.

Physical activity such as elderly gymnastics can positively influence the elderly joints and relieve joint stiffness (Martono, 2009). Ayu and Bambang (2012) provided elderly gymnastics intervention as elderly gymnastics therapy and found that it was effectively overcoming the elderly knee pain in the Rembang Regency Margo Mukti Rehabilitation Unit. Dinianti et al. (2013), in the research entitled *Elderly Gymnastics and Arthritis*, stated that joint pain in the elderly is related to the elderly gymnastics on the recurrence of joint pain by arthritis in UPTD PSLU Tresna Werdha Lampung Province. Sianturi (2018) also provided intervention of gymnastics in the elderly to get a decrease in pain in the elderly before and after being given elderly gymnastics of 8.23%, and elderly gymnastics have a significant effect on the decline in elderly joint pain in the public health center of Medan Tuntungan. Kurnia (2019) also found that gymnastics affected the decline in the complaints of the elderly musculoskeletal in the Village of Nggare Pandeyan Ngemplak Boyolali. Similar research that applied elderly gymnastics and found that it can influence the decline in joint pain in the elderly by Astuti et al. (2020) also found the effect of joint pain changes before and after the elderly gymnastics at the Mandalika Mataram's elderly social house. Most of the elderly complained of medium-level pain before doing exercise (64.51%), and after exercise intervention, the complaints mostly became light (64.51%).

Elderly gymnastics is an alternative medicine that can have a good influence on the age of the elderly in which to train the ability of the elderly joint muscles then they will not get rigid and painful. The pain can be caused by the protective layer of the joints starting to thin out and the bone fluid starting to thicken, causing stiffness and pain when driven. This pain can be reduced by doing physical activities such as ergonomic elderly gymnastics. Ergonomic elderly gymnastics are *designed based on* the physical abilities of the elderly, their movements are simple, and physiologically, there is no forced movement against limbs. The music is used to the tastes and desires

of the elderly so that the elderly become happy to do gymnastics. The enjoyment affects the psychological of the elderly; the elderly can feel their muscles moving and can improve their social lives because when doing gymnastics, the elderly can gather with other fellow elderly people. Ergonomic elderly gymnastics has improved physical fitness and elderly bone mass in Banjar Benaya, Peguyangan Village Denpasar (Ariati et al., 2019).

Improvements with the ergonomics approach seek to make ergonomics interventions acceptable and sustainable without causing significant problems (Manuaba, 2003). A participatory approach involving the elderly and cadres in determining music and composing gymnastic movements can prevent individual arrogance then it will have the same commitment. The commitment of all parties to carry out improvements is the main strength of the ergonomics approach so that the improvements made can be applied continuously. The ergonomics approach to ergonomic elderly gymnastics can create *ENASE* elderly exercise (effective, comfortable, safe, healthy, and efficient) that is similar to creating high productivity (Manuaba, 2000). Productivity in the elderly increases the quality of life to be healthy, and they can optimally interact with society.

## 5. CONCLUSION

1. There was a decrease in the sample complaints of 22.8%, and all samples (100%) complained of pain before the execution of gymnastics. After gymnastics, the number of samples complained of mild pain for four weeks reduced to 88%, and the remaining 12% complained of no pain. Based on the average pain complaint shown, a number decreased from 37.7 to 29.1 with the same category, mild pain.
2. There was a significant difference in sample pain complaints ( $P < 0.05$ ) before and after implementing ergonomic elderly gymnastics for four weeks.

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## CONFLICT OF INTEREST

The author has no conflict of interest regarding all elements in this study.

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