

## Case Report

PACNJ

**Ba Duan Jin Gymnastics to Overcome Activity Intolerance and Quality of Life in Coronary Artery Disease Patient: A Case Report****Diana Kusuma Astuti<sup>1</sup>, Theresia Eriyani<sup>2</sup>, Dyah Setyorini<sup>2</sup>**<sup>1</sup>Faculty of Nursing, Universitas Padjadjaran, Indonesia<sup>2</sup>Departement Fundamental of Nursing, Faculty of Nursing, Universitas Padjadjaran, Indonesia

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## ABSTRACT

Handling activity intolerance is a significant problem in patients with coronary artery disease (CAD) or cardiovascular disease. Activity intolerance and cardiovascular problems can be treated by exercising according to the prescription. One of the sports that can be applied is ba duan jin gymnastics. This mixed ba duan jin gymnastics can reduce fatigue, improve quality of life, and improve cardiorespiratory function. This case report aimed to see the progress of the quality of life and fatigue in a patient who was given the ba duan jin gymnastics intervention. This study used a case report approach with a nursing care approach and ba duan jin gymnastics intervention. The sample of this study is one person diagnosed with coronary artery disease, unstable angina pectoris Canadian Cardiovascular Society (CCS) III with complaints of fatigue during activities, feeling weak, quickly tired, and short of breath when walking long distances who was treated in a hospital in Bandung. The results of this study are that there is an increase in quality of life and a decrease in fatigue after two days of intervention. Ba duan jin gymnastics can be another intervention to overcome the problems of activity intolerance, fatigue, and improve the quality of life in patients with coronary artery disease, but it needs to be implemented longer to see a more visible effect

## Introduction

Coronary Artery Disease or Coronary Heart Disease or also known as Coronary Artery Disease (CAD), is a cardiovascular disease which is a cardiovascular disease that occurs due to blockages in the coronary arteries due to fat or atherosclerosis (Hinkle & Cheever, 2018). In addition, cardiovascular disease is also the leading cause of death in the world, namely 17.9 million people (WHO, 2021) and the cause of loss of Disability Adjusted Life Years (DALYs) globally, namely 2,228 per 100,000 population (Khan et al., 2020). Developing countries dominate the prevalence of CAD globally (Ralapanawa & Sivakanesan, 2021). In Indonesia, coronary heart disease is around 1.5% in all age ranges, and West Java province is included in the top 10 provinces with the highest population experiencing heart disease (Kemenkes RI, 2018).

The high prevalence of CAD is triggered by two risk factors, namely modifiable risk factors and non-modifiable risk factors. Modifiable risk factors include increased serum lipids/fats, increased blood pressure, tobacco use, physical activity, obesity, diabetes, metabolic syndrome, psychological states, and increased homocysteine levels, while non-modifiable factors, such as age, gender, ethnicity, family history, and genetics (Hinkle & Cheever, 2018; Lewis et al., 2014). According to research by Rachmawati et al. (2019), modifiable risk factors that are very influential come from a history of hypertension, diabetes mellitus, and lack of physical activity (Rachmawati et al., 2021).

CAD that is not handled correctly can cause chronic stable angina and acute coronary syndrome, which, if left untreated, can lead to heart failure (Lewis et al., 2014). CAD can also affect the quality of life, including physical, psychological, and social aspects (Santoso et al., 2017). Physically, CAD can cause chest pain, shortness of breath, decreased physical function, and restrictions on daily activities due to activity intolerance (Rosidawati et al., 2016). When viewed from a psychological aspect, CAD can cause stress, mood swings, anxiety, and depression that occur due to changes in roles and

physical functions (Srivastava et al., 2017). The impact of quality of life on social aspects includes disruption of social interactions, hobbies and activities, and resignation from the workplace (Improve Heart Health, 2009 in Santoso et al., 2017) so that the quality of life in CAD patients can be said to be poor (Sajobi et al., 2018; Srivastava et al., 2017).

The problem that often occurs in CAD patients is activity intolerance. This problem was also the most common in November, which occurred in the Aglonema room at RSUP Dr. Hasan Sadikin Bandung because 17 patients who were treated in the Aglonema room complained of getting tired quickly when on the move, and ten patients complained of weakness. Activity intolerance is insufficient energy to perform or complete necessary or desired daily activities (Herdman et al., 2021; PPNI, 2016). This energy insufficiency is affected by cardiac metabolic processes that change from aerobic to anaerobic metabolism. It happens because of a blockage in the coronary arteries, so the heart becomes deprived of oxygen (Hinkle & Cheever, 2018). In addition, activity intolerance can also be caused by bed rest, weakness, immobility, and a monotonous lifestyle (PPNI, 2016). Significant data from activity intolerance, including complaining of fatigue and heart rate, increased by 20% from a health condition. In contrast minor data from activity intolerance were dyspnea during or after activity, feeling uncomfortable after activity, feeling weak, blood pressure changing >20% from resting conditions, electrocardiogram picture shows arrhythmia during/after activity, electrocardiogram picture shows ischemia, and cyanosis (PPNI, 2016).

The problem of activity intolerance can be overcome by doing sports. Patients with heart disease, when doing sports, must pay attention to several conditions to prevent recurrent heart attacks. Exercise prescribing in patients with heart disease is adapted to exercise prescribing based on FITT. FITT prescription in patients who have cardiovascular disease, which includes a frequency of at least three times a week, is recommended five days a week, mild to moderate intensity, for 20-60 minutes, with the type of

movement of the arms, upper extremities, lower extremities, upright and supine cycles, rowing, elliptical, stair climbing, and the treadmill (Axtell, 2018). One of the sports that can be done is the ba duan jin gymnastic. This gymnastics is a sport with a moderate intensity performed two times a day for approximately 10-20 minutes per session. The intensity of this exercise is moderate (Chen et al., 2020) and the movements include the upper and lower limbs, adjustments, and breath. This exercise is compatible with exercise prescriptions for heart disease. This ba duan jin exercise can reduce fatigue, improve quality of life, improve functional abilities, improve physical, emotional, and mental conditions, and improve cardiorespiratory fitness in patients with heart disease (Chen et al., 2018; Chen et al., 2020; Liao et al., 2015; Yang et al., 2022). However, this exercise must pay attention to the New York Heart Association Classification (NYHA) because what is allowed is NYHA I and NYHA II. Patients who are given ba duan jin gymnastics in this research is patient in the NYHA II category so that the intervention of ba duan jin gymnastics blend could be carried out. This ba duan jin gymnastics has yet to be implemented in the Aglonema room of RSUP Dr. Hasan Sadikin because the interventions provided were only in the form of energy management and energy conservation. This case report aimed to see the progress of the quality of life and fatigue in a patient who was given the ba duan jin gymnastics intervention.

## Method



This research is a case report designed with a nursing care approach focusing on the main nursing problem, activity intolerance. This study's respondents were men with coronary artery disease and NYHA II scores who were treated in the Aglonema room at RSUP Dr. Hasan Sadikin. The data collection techniques included observation, interviews, physical assessment, supporting examinations, and patient medical record data.







The Piper Fatigue Scale (PFS) is used, while the quality of life instrument uses the Minnesota Living with Heart Failure

Questionnaire (MLHFQ). The selection of the PFS questionnaire was based on the fact that it had been tested for its validity index on people with heart disease and the result was 0.83. In contrast, the selection of the MLHFQ questionnaire included question items that followed the perceived impact on patients with heart disease and included physical, emotional, and general dimensions. This questionnaire has also been tested for validity with an index of 0.98 (Chen et al., 2018). This questionnaire was given at the beginning and the end of the intervention.

The interventions provided include energy management (PPNI, 2018) by identifying impaired body functions that result in fatigue, monitoring physical fatigue, and suggesting gradual activity. This intervention was carried out on November 23-25, 2022. In addition to energy management, the ba duan jin gymnastics was also carried out two times a day for approximately 10-20 minutes per session, the intensity of this exercise was moderate intensity (Chen et al., 2020), and the movement included the movement of the upper and lower limbs and regulation of breathing. The ba duan jin gymnastics intervention is described in table 1 and carried out for 2 days, November 24-25, 2022. The patient agreed to be given the ba duan jin gymnastics by signing the informed consent. The researcher paid attention to the ethical principles of nursing when carrying out the intervention.

Table 1  
Movement of Ba Duan Jin Gymnastics

Movement	Description
	<ul style="list-style-type: none"> <li>Bring your palms together above your head to re movement strengthens the joints and stretches th</li> <li>Execution duration: at least 60 seconds and durin breath</li> </ul>
	<ul style="list-style-type: none"> <li>Draw a bow to each side, resembling a bling sho</li> <li>Execution duration: at least 90 seconds and durin breath</li> <li>This movement trains the waist and improves th</li> </ul>

Movement	Description
	<ul style="list-style-type: none"> <li>Raising one hand up to regulate the spleen and stomach, and strengthen the abdominal muscles</li> <li>Execution duration: at least 60 seconds and during the movement while taking a breath</li> </ul>
	<ul style="list-style-type: none"> <li>Looking back to relieve fatigue, prevent cramp, and relieve overuse problem</li> <li>Execution duration: at least 60 seconds and during the movement while taking a breath</li> </ul>
	<ul style="list-style-type: none"> <li>Shaking the head and wagging the tongue to relieve stress</li> <li>Execution duration: at least 60 seconds and during the movement while taking a breath</li> <li>This exercise performs the movement by squatting in a low stance, placing the hands on the thighs, with the elbows facing out</li> </ul>
	<ul style="list-style-type: none"> <li>Touching the feet with both hands to clear the heart of its ailments and strengthen the kidneys and loins</li> <li>Execution duration: at least 90 seconds and during the movement while taking a breath</li> <li>This movement session starts with stretching upwards and followed by bending down, with your hands holding your ankles so that sometimes they were partially assisted</li> </ul>
	<ul style="list-style-type: none"> <li>Clench fists and bulge to increase physical strength</li> <li>Execution duration: at least 60 seconds and during the movement while taking a breath</li> </ul>
	<ul style="list-style-type: none"> <li>Shaking the body to ward off all diseases</li> <li>Execution duration: at least 60 seconds and during the movement while taking a breath</li> </ul>

## Results

### Case Presentations

The study was conducted on November 23, 2022. A 45 year old male patient who was diagnosed with coronary artery disease, unstable angina pectoris coronary artery disease, unstable angina pectoris Canadian cardiovascular society III with the main complaint being tired when doing activities. In his current medical history, the patient said he felt weak, quickly tired and a little short of breath when walking long distances and managed to overcome it by staying still and breathing. The patient's previous medical history was taken to the hospital because of heartburn for 30 minutes that did not stop and first appeared at rest. The pain radiates to the back. The patient

described that he had swollen feet before. The patient had a history of heart attack and cardiac catheterization in September 2022 in the three left main vessels. The patient also has a history of high cholesterol, has a history of smoking half a pack a day from a young age and stopped two months ago, namely September 2022 and the patient says he rarely exercises. The patient also said that he did not have hypertension or type 2 diabetes mellitus. The patient said he had no history of hereditary diseases. Psychosocial and spiritual history, the patient considers his illness to be the effect of his lifestyle when he was young and hopes to recover. The patient has no disturbance of self-concept. In the assessment of activity daily living, the disturbances were at activity points, namely fatigue when doing activities so that sometimes they were partially assisted.

The results of the assessment of the patient's general appearance, vital signs, and anthropometry: good appearance, composed in awareness, Glasgow Coma Scale (GCS)

Eye 4 Verbal 5 Motor 6, blood pressure 120/70 mmHg, heart rate 70x/minute, respiratory rate 20x/minute, temperature 36.5oC, weight 58 kg, height 160 cm, body mass index 22.7 kg/m2 (normal). The physical examination carried out focused on the respiratory, cardiovascular and extremity systems with the results of the examination obtained: on examination of the heart and lungs the shape and shape of the chest were symmetrical, there was no use of additional auxiliary respiratory muscles, normal breathing pattern, the patient said he was not short of breath but when doing activities he gets tired easily and sometimes there is shortness of breath, ictus cordis is not visible, there is no increase in jugular venous pressure, the pulse is strong, capillary refill time is <3 seconds, the acral is warm, there is no cyanosis, there is no tenderness or mass in the chest, vocal fremitus right and left



the same, percussion of the heart border obtained the results: Percussion of the heart border obtained the results of the upper limit: Intercostal Space (ICS) III, lower border: ICS V, left border: ICS V mid clavicle left, right border: linea sternalis dextra, and sonorous sounds were obtained on the right chest and left. Then for the results of the auscultation examination: no additional breath sounds and normal heart sounds (S1 heart sounds followed by S2). The patient also did not show any swelling in the upper and lower extremities and the muscle strength of the right and left upper and lower extremities scored 5. NYHA (New York Heart Association) classification of patients in class II

Based on the results of the study above, two nursing diagnoses were obtained, namely activity intolerance related to an imbalance between oxygen supply and demand marked by patients saying they feel weak, tired and a little short of breath when walking long distances and overcome them by being quiet and breathing, and daily activities partially assisted and the risk of decreased cardiac output is proven by the patient saying that he is weak, there is a history of yesterday's attack accompanied by heartburn spreading to the back, the administration of blood pressure-lowering drugs. The main nursing diagnosis in this case is activity intolerance (PPNI, 2016).

### Supporting Investigation

The results of a chest x-ray examination on November 22, 2022 showed cardiomegaly without pulmonary congestion and no bronchopneumonia. The results of the ECG examination in the patient on November 22 2022 after 4 hours of the onset of the attack, 8 hours after the onset of the attack, and on November 23 2022 obtained the same interpretation of the Electrocardiogram (ECG) results, namely sinus rhythm. Apart from the results of the EKG examination and chest X-ray, the results of blood

laboratory tests on November 24, 2022 showed total cholesterol of 159 mg/dL, High Density Lipoprotein (HDL) cholesterol of 37 mg/dL, Low Density Lipoprotein (LDL) cholesterol of 116 mg/dL. dL, triglyceraldehyde 79 mg/dL, and fasting glucose 77 mg/dL. The abnormal laboratory results are low HDL cholesterol. This indicates the accumulation of fat in the body.

### Intervention Result

The results of the implementation that has been carried out on a man include the implementation of ba duan jin gymnastics which is carried out for 2 days, namely on November 24-25 2022 and is carried out 2 times a day for approximately 10-20 minutes per session while the implementation of energy management is carried out for 3 days, namely November 23-25, 2022. The pre-test and post-test results for measuring the fatigue scale used the Piper Fatigue Scale (PFS) instrument while the quality of life instrument was carried out using the Minnesota Living with Heart Failure Questionnaire (MLHFQ). The results of the pre-test and post-test measurements using the instrument are described in table 2.

Table 2  
Pre-Test and Post-Test Results of Patients Using PFS and MLHFQ Instruments

<i>Pre-Test</i>		<i>Post-Test</i>	
Blood Pressure	Fatigue Scale	Quality of Life	Blood Pressure
137/81 mmHg	4.81	28 (moderate)	137/81 mmHg

Based on table 2, it can be seen that after 4 times doing the ba duan jin gymnastics, there was no change in blood pressure, but there was a decrease in the fatigue scale of 1.24 and an increase in the quality of life from moderate quality of life (28) to good (19). Apart from the results of the pre-test and post-test, the patient's condition is also described in the progress notes in table 3

Table 3  
Patient Progress Records

Variable	Day 1	Day 2	Day 3
Complaints	Fatigue during activities	Fatigue during activities	None
Blood Pressure	120/70 mmHg	137/81 mmHg	137/81 mmHg
Fatigue during activities	Fatigue during activities sometimes occurs shortness of breath	Fatigue during activities but not problems shortness of breath	None
Activity Daily Living	Partially assisted	Performed independently	Performed independently

Based on the development notes contained in table 3 there have been changes related to complaints, fatigue after activities, and daily activities. Apart from that, the patients also said that they were happy after doing the ba duan jin gymnastics and their bodies felt lighter and there were no side effects after doing the ba duan jin gymnastics. The patient's family also participates in implementing of the ba duan jin gymnastics. The patient has also been given a guide leaflet for the implementation of the ba duan jin gymnastics and a video link for an example of the ba duan jin gymnastics.

## Discussion

The main problem experienced by patients is activity intolerance. Activity intolerance is a significant problem in patients with cardiovascular disease or CAD. Activity intolerance is a complex clinical syndrome represented by reduced oxygen intake during physiological stimulation. This is because in patients with heart disease, there is a decreased capacity to supply oxygen, namely a decrease in cardiac function and cardiac output. Other reasons can be due to or accompanied by the inability of skeletal muscles to utilize oxygen delivery which is included in mitochondrial function (McCoy et al., 2017). Activity intolerance is defined as insufficient energy to perform or complete necessary or desired daily activities and this inability is due to fatigue, pain or shortness of breath (Herdman et al., 2021). This incident also occurred in patients who complained of feeling weak, quickly tired and short of breath when walking long distances.

The condition of patients who have a history of smoking half a pack per day and rarely exercise can increase the risk of CAD disease currently experienced by the patient. Lack of exercise is a modifiable risk factor for CAD, so increasing exercise can be an effort to overcome and prevent CAD and cardiovascular disease problems. Regular exercise is effective in the primary prevention of cardiovascular disease with a reduction of about 20% and an increase in life expectancy of 5 years. Exercise can also increase the size of the ducts and the resistance of arteries, arterioles and capillaries, increasing arterial blood supply (Winzer et al., 2018). Another benefit of exercise for cardiovascular disease is improving cardiorespiratory fitness (Axtell, 2018). In secondary prevention, exercise can improve endothelial function and halt coroner stenosis progression, partly through its antiatherosclerotic effects on platelets and leukocytes. Then it can have a vasculogenesis effect at the capillary level, namely the formation of collaterals at the small artery level, which can increase myocardial perfusion in response to exercise (Winzer et al., 2018). So that this exercise can be used in patients to overcome the problem of activity intolerance experienced.

The patient is given the intervention of the ba duan jin gymnastics 2 times a day for approximately 10-20 minutes per session, the intensity of this exercise is moderate (Chen et al., 2020), and the movements include the movements of the upper and lower limbs adjustments, and breath. The provision of this sport is in accordance with the sports prescription which includes Frequency, Intensity, Time, and Type (FITT). FITT prescription in patients who have cardiovascular disease which includes a frequency of at least 3 times a week is recommended 5 days a week, mild to moderate intensity, for 20-60 minutes, with the type of movement of the arms, upper extremities, lower extremities, upright and supine cycles, rowing, elliptical, stair climbing, and the treadmill (Axtell, 2018). The European guidelines on cardiovascular disease prevention in clinical practice (2016 in Larsen, 2017) recommend sports in the form of aerobics and stretching

exercises 3-4 times a week with intervals of 2-3 rounds of 10-12 repetitions at 60-80% of the maximum heart capacity. Other types of exercise that can be done are stretching and aerobic exercises. Based on the prescription, the ba duan jin gymnastics is included in the sports that can be given to patients

Implementing the ba duan jin gymnastics in patients shows a decrease in fatigue scale results and an increase in quality of life. Not only that, the patient also said that the body became lighter and the complaints felt decreased. These results follow previous research stating that the ba duan jin gymnastics can reduce fatigue and improve quality of life after the 12th week of intervention (Chen et al., 2018). The mechanism of ba duan jin gymnastics to reduce fatigue is related to improving the patient's cardiorespiratory function such as LVEF, cardiac output, and stroke volume, and reducing resting myocardial oxygen consumption (Wang et al., 2015) and in a recent study, 12 studies stated that the ba duan jin gymnastics has a positive effect on cardiorespiratory function (Wang & Xu, 2022).

The increase in quality of life that has occurred is also in line with previous research which stated that there was an increase in quality of life after being given ba duan jin gymnastics (Chen et al., 2020; Liao et al., 2015; Yang et al., 2022) Based on the results of previous meta-analysis studies, there were six studies that also provided significant results on quality of life (Zou et al., 2017). Patient acknowledgment that no side effects were felt after doing gymnastics was supported by the research of Feng, et al (2021) which revealed that there were only two studies out of 47 studies that gave side effects in the form of muscle pain, palpitations, dizziness, knee pain, back pain, fatigue, dizziness, shoulder pain, and shortness of breath (Fang et al., 2021).

The limitations of this study were during this implementation, including the implementation of a fairly short span of 2-3 days and pharmacological management was still given during the implementation of the intervention to allow the risk of bias.

## Conclusions

The development of patients who were given the ba duan jin gymnastics intervention had a positive effect, namely in the form of a decrease in the fatigue scale and an increase in quality of life. Other results were given in the form of a decrease in complaints of fatigue when doing activities, the body felt lighter and there were no side effects after doing the ba duan jin gymnastics. However, the effect of this exercise needs to be seen further with a more extended implementation time. Suggestions for future researchers can implement ba duan jin gymnastics for a longer period time and see the cardiorespiratory effects experienced by patients. Ba duan jin gymnastics can also be applied in a clinical environment by taking into account the indications and contraindications for carrying out Ba Duan Jin gymnastics and can be applied in Dr. Hasan Sadikin Bandung.

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