

**“VICTOR BABEȘ” UNIVERSITY OF MEDICINE AND PHARMACY  
FROM TIMIȘOARA  
FACULTY OF MEDICINE  
DEPARTMENT XVI - BALNEOLOGY, MEDICAL REHABILITATION,  
AND RHEUMATOLOGY**

**NEAMȚU ANDREI CAIUS**



# **PhD THESIS**

**THE IMPORTANCE OF EXERCISE PROGRAMS AND THE  
IMPACT OF TRAINING ADHERENCE IN THE  
MANAGEMENT OF ARTERIAL HYPERTENSION**

**- S U M M A R Y -**

Scientific leader:  
**PROF. UNIV. DR. POPOVICI RAMONA AMINA**

**Timișoara  
2024**



Health is the most precious gift bestowed by the Creator upon the human body, a gift that some, through the unknown paths of time, alter due to daily behaviors, inadequate nutrition, destructive thoughts, and an avalanche of unresolved problems, finding themselves somewhere along the way with a tired, sick, and exhausted body, devoid of its most precious gift.

As the old Latin proverb says, “A healthy mind in a healthy body,” one will benefit most from the life they live when health is a priority, when one cares for both body and mind, because just as an affected mind will make the body sick, a sick body will affect a healthy mind. A healthy mind will retain its gift if the body is also healthy, and vice versa.

Starting from the concept of health and its importance in human life, I chose to direct this research towards methods of restoring it when, unfortunately, disease has affected the body and mind, leaving the patient powerless, with a reduced and doubtful quality of life. Thus, I chose this topic: demonstrating the beneficial effects of physical training on cardiovascular recovery and the quality of life in hypertensive patients, driven by the desire to show that, even for hypertensive patients, physical training is essential and valuable, managing to reduce cardiovascular impairment and improve the quality of life for these patients.

The topic of this doctoral thesis, namely the effects of physical training on cardiovascular recovery and the quality of life in hypertensive patients, is a current and relevant topic in scientific research related to the evolution and prognosis of arterial hypertension and methods of cardiovascular recovery.

The research focuses on demonstrating the benefits that an individualized physical training program produces in hypertensive patients with varying degrees of arterial hypertension included in the study, benefits that will be measured through changes in monitored hemodynamic parameters and their implication on parameters of adherence, arterial elasticity, and stiffness.

Based on the obtained results, an attempt will be made to create individualized physical training programs involved in the cardiovascular recovery of hypertensive patients with varying degrees of arterial hypertension, aiming to improve the quality of life for these patients.

Arterial hypertension represents a global public health challenge due to its widespread occurrence and its connection with cardiovascular diseases. Age is a non-modifiable risk factor, with a high risk of developing arterial hypertension, particularly in older adults. Various factors such as obesity, high sodium, fat, and alcohol consumption, along with low intake of fruits and vegetables, contribute to essential hypertension. Motivating patients to adopt lifestyle changes is challenging but crucial, emphasizing the importance of a trusting doctor-patient relationship. Lifestyle modifications such as weight loss, reduced sodium intake, increased physical activity levels, and limited alcohol consumption are effective in managing blood pressure. Current guidelines recommend regular physical exercise as part of the primary and secondary prevention of cardiovascular diseases. However, little has been discussed about the dose-response effects of strength training in the prevention and treatment of arterial hypertension. Physical exercise improves and maintains health and reduces the risk of chronic diseases in healthy adults, whereas physical inactivity is considered one of the most significant risk factors for chronic diseases. High rates of physical inactivity are associated with individuals with chronic diseases, demonstrating that physical activity programs and nutritional monitoring are necessary for these individuals as part of disease prevention.

The general scientific objectives proposed for fulfillment in this paper are as follows:

1. Establishing the effectiveness of the standardized physical training program on resting and exertional hemodynamic parameters in patients with different degrees of arterial hypertension;
2. Determining the differences regarding the effectiveness of physical training on hemodynamic parameters in patients with varying degrees of arterial hypertension;
3. Determining the differences regarding the effectiveness of physical training on adherence, arterial elasticity, and stiffness parameters in patients with varying degrees of arterial hypertension;

1. Identifying and evaluating risk factors that influence the progression of the disease, subsequently cultivating behavioral habits that will improve the prognosis of hypertensive patients with varying degrees of arterial hypertension, aiming to increase quality of life and improve the mental status of these patients;
2. The role and importance of informed consent regarding the physician's intervention and physical recovery in hypertensive patients.

The research plan was structured around three studies that encompassed three research directions that helped in achieving the proposed general objectives:

1. Study 1: Exploring stiffness within exercise programs for recovery and performance in hypertensive patients;
2. Study 2: The role of adherence to physical training in the context of arterial hypertension therapy;
3. Study 3: The role and importance of informed consent in patients with arterial hypertension.

## **STUDY 1. EXPLORING ARTERIAL STIFFNESS IN EXERCISE PROGRAMS FOR REHABILITATION AND PERFORMANCE IN HYPERTENSIVE PATIENTS**

### **Study Overview:**

This cross-sectional observational study spanned two years, evaluating hypertensive patients selected based on inclusion and exclusion criteria. The study was conducted in three phases: "Time 0" marks the initial evaluation and inclusion of hypertensive patients in the study, followed by three months of physical training. The final phase, "Time +3," corresponds to post-training evaluations. The study focuses on hemodynamic parameters and arterial stiffness metrics such as Pulse Pressure (PP) and Pulse Wave Velocity (PWV).

### **Research Directions:**

**Demonstrating the Effectiveness of Physical Training:** The study examines how exercise impacts adherence and arterial stiffness in hypertensive patients, including those with high-normal and grade 1 hypertension who did not require antihypertensive medication, and patients with grade 2 hypertension under controlled medication.

**Improving Disease Regression:** The study aims to identify and modify risk factors and promote behavioral habits that improve outcomes for hypertensive patients.

### **Objectives:**

- **Assessing the Efficiency of Standardized Training:** The study evaluates the impact of standardized physical training on resting and exercise-induced hemodynamic parameters in hypertensive patients.
- **Determining Efficiency Differences by Hypertension Grade:** The study compares the effectiveness of physical training on hemodynamic and arterial stiffness parameters across different hypertension grades.

### **Materials and Methods:**

The study was conducted between March 15, 2022, and March 15, 2023, within the Integrated Ambulatory of the Clinical Hospital C.F. Timișoara.

### **Research Phases:**

#### **Stage of the Study:**

This corresponds to the "time 0" of the research, during which patients were clinically and biologically evaluated according to the following criteria:

**Diagnostic Evaluation of Hypertension:** Comprehensive assessment to confirm the diagnosis of hypertension.

#### Hemodynamic Evaluation:

- Determination of the following parameters: systolic blood pressure (SBP) in mmHg; diastolic blood pressure (DBP) in mmHg; mean arterial pressure (MAP) in mmHg; pulse pressure (PP) in mmHg; heart rate (HR) in beats per minute.

#### Clinical Examination:

- The following parameters were measured: Body Mass Index (BMI) calculated using the formula  $\text{weight/height}^2$  in  $\text{kg/m}^2$ , waist circumference (in cm).

#### Paraclinical Investigations:

- Electrocardiogram (ECG): A standard 12-lead ECG was performed to identify potential rhythm and conduction disorders, as well as left ventricular hypertrophy changes.
- Standard Chest X-ray (anteroposterior view): Used to identify possible contraindications for exercise testing, assess heart size, detect active or chronic pulmonary processes, and identify pathological processes in the mediastinum and surrounding areas.
- Exercise Testing on an Ergocycle: The hemodynamic response of hypertensive patients to moderate and high-intensity exercise was evaluated.
- Ambulatory Blood Pressure Monitoring (ABPM): Recording hemodynamic parameters obtained with specialized equipment, as described in the following chapter.
- Pulse Wave Velocity (PWV) Determination: Conducted using internationally certified devices.

#### Second Stage of the Study:

- This stage corresponds to the period of physical training in which study participants were enrolled for three months. The physical training consisted of a daily 30-minute exercise session.

#### Third Stage of the Study:

- This corresponds to the "time +3" of the research, representing the end of the study, during which patients were re-evaluated using the same parameters as in the first stage. Participants were divided into two groups:
- Group 1: Patients with systolic blood pressure (SBP) of 130-139 mmHg or 140-159 mmHg, and diastolic blood pressure (DBP) of 85-89 mmHg or 90-99 mmHg. 229 patients remained after exclusions.
- Group 2: Patients with SBP of 160-179 mmHg and DBP of 100-109 mmHg. 120 patients remained after exclusions.

**Training Methodology:** The kinesiology program involved moderate aerobic exercise, conducted 5 days a week for 30 minutes per session, with intensity up to 75% of the maximum achieved during pre-study exercise testing. Initial training was supervised in a medical rehabilitation setting, with subsequent sessions potentially conducted at home.

#### Results and Conclusions:

- Impact on Hemodynamic Parameters: Standardized physical training effectively improved resting and exercise-induced hemodynamic parameters, including SBP, heart rate, and PP, particularly in Group 1.
- Arterial Stiffness: The study demonstrated a significant reduction in PWV, indicating improved arterial compliance and reduced vascular stiffness.
- Smoking Cessation and Cardiovascular Risk: Exercise was associated with significant smoking cessation and reduced total cholesterol levels, body mass index (BMI), and waist circumference. The 10-year absolute cardiovascular disease risk (SCOR) also decreased.
- Long-Term Benefits: The study confirmed that individualized physical training reduces arterial stiffness and improves vascular compliance, significantly altering the 10-year fatal cardiovascular disease risk in hypertensive patients.

- Safety and Efficacy: The three-month program proved safe and effective, with no major incidents or deaths reported. The results suggest that physical training, combined with lifestyle changes, can significantly improve cardiovascular outcomes in hypertensive patients without pharmacological intervention.
- Overall, the study highlights the importance of incorporating physical exercise into hypertension management, emphasizing its role in improving vascular health and reducing cardiovascular risk.

## STUDY 2: THE ROLE OF ADHERENCE TO PHYSICAL TRAINING IN THE CONTEXT OF HYPERTENSION THERAPY

Physical exercise plays a crucial role in controlling blood pressure in patients with hypertension, but adherence to exercise is often low. Adherence and maintenance rates are higher in supervised and organized training programs [226-227]. Lopes et al. highlighted that structured training increases motivation and physical activity in the short term [228]. The aim of the current study is to evaluate the adherence of hypertensive patients to a physical exercise program.

### Material and Method:

A total of 129 patients with moderate-risk hypertension, who had been under medical treatment for at least 3 months, were included. Exclusion criteria were systolic blood pressure over 180 mmHg, diastolic blood pressure over 110 mmHg, additional cardiovascular disorders, musculoskeletal or psychiatric issues that interfere with exercise performance. After a 3-month program, 108 patients completed an adherence questionnaire, with 12 of the initial patients not completing the questionnaire for various reasons (lack of time, moving abroad, etc.).

### Results

A number of 129 patients were included in the study. The inclusion criteria were: patients with high blood pressure with moderate risk and under medical treatment for at least 3 months. The exclusion criteria were systolic blood pressure over 180 mmHg, diastolic blood pressure over 110 mmHg, additional cardiovascular disorders (cardiac failure, heart arrhythmias, cardiomyopathy, congenital heart disorders), musculoskeletal problems that interfere with performance of physical exercise, patients with psychiatric disorders (dementia or other disorders that affect rationality).

**Table 1.** Characteristics of the patients included in the study

Parameters	
Age (mean $\pm$ SD)	61.59 $\pm$ 8.59 years
Gender	
Males (%)	85 (70.8%)
Females (%)	35 (29.2%)
Smokers (%)	39 (32.5%)
BMI (mean $\pm$ SD)	27.50 $\pm$ 4.46 kg/m <sup>2</sup>
SBP (mean $\pm$ SD)	131.96 $\pm$ 6.39 mmHg
DBP (mean $\pm$ SD)	74.17 $\pm$ 10.13 mmHg
HR (mean $\pm$ SD)	67.45 $\pm$ 7.23 bpm

SD: standard deviation; BMI: body mass index; SBP: systolic blood pressure; DBP: diastolic blood pressure; HR: heart rate

The results of the adherence questionnaire are: 51 of 108 patients (47%) agreed about fitting the exercise program performed in the rehabilitation center with their daily program. 76% of the patients agreed about fitting home exercises with their daily program. All patients

considered the exercises of low difficulty. They followed the physical therapist's instructions. 96% of them were confident in the results of rehabilitation. All patients considered the physical exercise pro-gram important for their physical health, while 82% of them also considered the pro-gram important for their mental health. 94% of patients admitted it necessary to continue the physical exercise program after the 3-month study.

### **Discussion**

Our study assessed the adherence to a 3-month physical exercise program in patients with hypertension. Adherence to a long-term program is a key factor in achieving the best results in regards the decrease or maintainer of the systolic and diastolic blood pressure values. We proposed a 10-item questionnaire to be completed by the patients after the 3-month physical exercise program. The program was supervised in the first two weeks; afterwards, the patients performed a home-based exercise program.

Previous studies focused on assessment of physical activity and adherence to guidelines in patients with cardiovascular disease [4,5]. The study of Saida et al. found self-reported long-term exercise adherence in 48% of the participants at 12 months. The major predictors of long-term exercise adherence were participation in sports activities at baseline, high self-rated health and high visual analogue scale rated quality of life [6].

In our study, the promoting factors for a good adherence to rehabilitation were the following: involvement and availability of the patients, living in this city or in nearby villages, the free of charge exercise sessions and finally the quality of physical therapy and the participation of medical staff. Research showed that patients' experiences with exercise can influence their adherence to exercise programs and maintenance after program finishes [7,8].

The lack of validation of the self-made questionnaire can be considered a weak point of the current research. However, we consider this study as a starting point, and we aim to continue the assessment of longer-term physical exercise programs (one year after the start of physical exercise program).

### **Conclusions**

In the current study adherence to a 3-month physical exercise was beneficial for physical and mental health status of patients with hypertension. The assessment of adherence by an easy-to-use tool can provide important data for adapting the rehabilitation program to patients' need and expectations.

## **STUDY 3. THE ROLE AND IMPORTANCE OF INFORMED CONSENT IN PATIENTS WITH ARTERIAL HYPERTENSION: A STUDY**

### **Motivation, Aim, and Objectives**

Informed consent is one of the most debated issues in current biomedical ethics and cardiology practice. The requirements for informed consent have become increasingly stringent, paralleling the rise of autonomy as a dominant principle in biomedical ethics. These requirements must also align with legal standards to be clearer and more specific. However, they can be difficult to achieve, particularly in emergency situations such as primary angioplasty. Given the complexity of modern advancements in medical treatment, it is challenging even for fully competent patients to provide truly informed consent.

The primary objective of this study was to highlight the importance of patient informed consent and the process of obtaining informed consent from patients admitted to cardiology services.

### **Secondary Objectives:**

To analyze the informed consent forms signed by patients in the cardiology departments of the Institute of Cardiovascular Diseases Timișoara (IBCV).

To assess patients' perception of the risks associated with various treatments for which they have provided informed consent.

To evaluate the level of awareness regarding the importance of signing informed consent forms.

To analyze the informed consent forms used in IBCV in accordance with legal provisions and the requirements of superior authorities.

### **Materials and Methods**

The study was conducted at the Institute of Cardiovascular Diseases Timișoara (IBCV) and involved the analysis of various informed consent forms that can be completed (as needed) by patients admitted to the Cardiology Department.

The forms available to patients include: informed consent forms, patient information sheets attached to the General Clinical Observation Sheet (FOCG) authorized by IBCV, consent forms for medical interventions and treatments, informed consent for new procedures/investigations added during hospitalization, informed consent regarding the processing of personal data for cardiovascular disease registries, consent forms for radiological examinations, patient information sheets regarding anesthesia for surgical interventions, pre-anesthetic questionnaire—Declaration of consent for anesthesia, and informed consent forms—Patient consent for blood transfusions/blood products.

Additionally, an oral evaluation of patients' knowledge regarding what they are signing in the informed consent was conducted to determine their understanding of the multiple agreements they provide upon admission.

### **Results**

For this study, 54 randomly selected patients, admitted to the Cardiology Department at the Institute of Cardiovascular Diseases Timișoara, who were conscious and not in critical condition, were included during the period of January-February 2023. The average age of the patients interviewed regarding their knowledge of the informed consent content and understanding of the risks of interventions, treatments, and investigations was 51.7 years  $\pm$  5.6 years, with a minimum age of 42 years and a maximum of 80 years. Most patients were male (31 or 57.40%), from urban areas (37 or 68.51%), with a medium level of education (high school, vocational school, post-secondary) (39 or 72.22%).

94.44% of the patients knew the name of their attending physician or the one who was to perform the invasive intervention (angiocoronary angiography). However, 11.11% of the patients were unaware that they had consented to being photographed for educational purposes, and 50% stated that if they had understood what they were signing, they would not have agreed.

### **Discussion**

A healthcare provider may face civil liability for injuries resulting from the lack of informed consent and failure to meet the standard of care. Medical malpractice laws are specific to each state and can vary by country. The physician exercises clinical skills in diagnosing a condition and determines which medication is indicated and in what dosage. The prescriber must also provide sufficient information to the patient to make an informed decision about whether to take the medication, considering any potential adverse effects or risks associated with the choice. Illegible prescriptions have been a source of legal liability for both pharmacists and prescribers. Therefore, prescribing physicians should address pharmacists' questions to avoid the possibility of patient harm and costly litigation for all parties involved. Patients may be motivated to follow treatment information instructions—examples include cardiac stents and pacemakers. A consumer movement view is that an off-label prescription indicates that it is experimental; in such circumstances, the prescriber must provide complete information to obtain valid informed consent from the patients.

## **Conclusions**

It is crucial for the patient and their relatives to understand the procedures, risks, and benefits of treatments and investigations.

As the complexity of cardiology treatments and interventions increases, meticulous patient information before requesting informed consent is extremely important. Otherwise, merely signing the consent without assessing the patient's understanding of what they are signing may not be feasible and may cause confusion or lead the patient to consider the forms as "just papers to sign" without giving them due importance.

The informed consent forms applied in cardiology services comply with current legal provisions, with some information being universally applicable to medical care and some being specific, such as the processing of personal data for Cardiovascular Disease Registries, patient information sheets on anesthesia for cardiovascular surgical or invasive curative interventions, accompanied by the pre-anesthetic questionnaire and the declaration of consent for general or local anesthesia.

For patients requiring blood transfusions or blood products, it is also mandatory to explain the risks and benefits of the transfusion and alternative treatments and to obtain informed consent before the procedure.

## **GENERAL CONCLUSIONS, ORIGINAL ASPECTS, AND FUTURE RESEARCH DIRECTIONS**

- The standardized physical training program applied to hypertensive patients in both groups proved to be effective on hemodynamic parameters at rest and during exertion, particularly impacting blood pressure and heart rate values.
- Pulse wave velocity (PWV) measured at distal arteries can serve as a reference in evaluating the benefits of physical training programs in hypertensive or cardiovascular risk patients.
- Statistically significant results were observed in both groups concerning the reduction of resting or exertional systolic blood pressure, demonstrating that physical training reduces the average systolic blood pressure in both medicated and non-medicated patients. In contrast, changes in diastolic blood pressure were only observed in the first group, suggesting that diastolic blood pressure is influenced by multiple factors and may not serve as a reliable predictive marker, especially considering its tendency to increase with age.
- Physical training also positively influenced heart rate adaptability, preventing sudden increases in heart rate and blood pressure.
- Individualized physical training led to a reduction in average blood pressure values in hypertensive patients, regardless of medication status.
- Physical training favorably impacts the vascular compliance of elastic arteries, slowing the process of vascular stiffness.
- Physical training has beneficial effects on key associated cardiovascular risk factors:
- Significant smoking cessation was observed in both groups, suggesting that physical exercise may serve as a motivational factor for quitting smoking.
- A significant reduction in total serum cholesterol was noted after three months of physical training, which is particularly important given that the hypertensive patients in the study had already adhered to lifestyle changes for at least three months prior.
- There was a reduction in Body Mass Index (BMI) and abdominal circumference in both groups, likely due to the combined effects of physical exercise and dietary changes.
- A significant reduction in the absolute 10-year risk of fatal cardiovascular disease (SCORE) was observed.

- Standardized and individualized physical training in hypertensive patients favorably influences arterial compliance, as measured by carotid-radial pulse wave velocity (PWVc-r), positively affecting the dynamic dysfunction of the vascular bed (endothelial dysfunction).
- After three months of physical training, a significant decrease in PWV was observed at the carotid-radial level, indicating changes in compliance parameters at distal arteries. Therefore, it can be concluded that individualized and standardized physical training positively affects both vascular compliance and the structural changes associated with arterial stiffness.
- Significant correlations between PWVc-r and total serum cholesterol levels after three months of physical training underscore the importance of exercise in both vascular elasticity and cholesterol management. Reducing serum total cholesterol levels can influence arterial stiffness parameters and endothelial dysfunction.
- Ambulatory blood pressure monitoring (ABPM) and 24-hour pulse pressure measurement are important tools for evaluating and individualizing physical training programs in the rehabilitation of hypertension. This monitoring is crucial for assessing diurnal and rare nocturnal blood pressure spikes over 24 hours.
- ABPM is necessary for placing physical exercises within the optimal range for blood pressure reduction, thereby avoiding significant increases during uncontrolled exertion.
- Results from both groups included in the rehabilitation program demonstrate that controlled and individualized physical training is beneficial and safe, with no major incidents or deaths recorded during the three-month period.
- Determining parameters that directly and indirectly evaluate vascular compliance, specifically PWV and pulse pressure, is crucial for monitoring hypertensive patients in cardiovascular rehabilitation programs.
- A three-month adherence to physical exercise proved beneficial for the physical and mental health of hypertensive patients.
- Evaluating adherence using an easy-to-use tool can provide important data for adapting rehabilitation programs to patient needs and expectations.
- Interdisciplinary collaboration is key to a holistic approach to the treatment and recovery of hypertensive patients. Each specialist, including the physical medicine and rehabilitation physician, occupational therapist, physical education instructor, nurse, psychologist, and cardiologist, contributes to comprehensive and personalized treatment. Effective communication between patients and the medical team is vital for the success of this process, ensuring careful monitoring and constant adjustment of the treatment plan based on each patient's progress.
- Effective communication in the patient-medical team relationship is fundamental to the success of the recovery process. By ensuring an open and continuous dialogue, the medical team can tailor treatments to meet patients' specific needs, providing both physical and psychological support. This holistic approach ensures a complete and sustainable recovery, significantly improving the quality of life for patients with various conditions, particularly hypertension.
- Open communication, active listening, and clear information exchange increase trust, satisfaction, and collaboration in the medical care process. It is important to adapt communication levels to the patient's educational background.
- Developing and maintaining a therapeutic relationship based on trust, respect, and empathy is crucial for ensuring quality care. The physician and medical team must demonstrate empathy and openness to address patients' needs and concerns.

- Through well-coordinated physical therapy programs, emotional support, and ongoing education, the medical team can help patients effectively manage their condition and improve their overall health. The commitment and cooperation between patients and healthcare professionals are fundamental to achieving these goals and ensuring a healthy, balanced life.
- The benefits of individualized physical therapy programs are numerous, including improved physical and mental health, reduced blood pressure, and prevention of complications. By tailoring exercises to each patient's specific needs and providing continuous monitoring, these programs help achieve optimal health and maintain an active lifestyle. Patient education and involvement in their recovery process are essential for long-term success.
- Informed consent is a critical aspect of hypertensive patient care, both in the context of medication therapy and initiating a physical exercise program or participating in a research study. Ensuring that the patient is fully informed and has given consent freely is crucial for respecting their autonomy, improving treatment adherence, and ensuring the success of therapeutic interventions. Informed consent should be seen not as a mere formality but as a dynamic process that facilitates a partnership between the physician and the patient, contributing to quality care and better clinical outcomes.

### **ORIGINAL ASPECTS**

The unique contribution of this research lies in demonstrating the effectiveness of a physical training program in hypertensive patients with varying degrees of hypertension, with and without antihypertensive medication, on arterial elasticity and stiffness parameters, as well as cardiovascular risk factors, particularly smoking. The results demonstrated the effectiveness of physical training as a motivational factor for smoking cessation, aimed at improving these patients' quality of life.

The questionnaire designed for the second study is also a unique contribution to this research. The first five questions address factors related to the training sessions, two questions focus on the importance of physical exercise for patients' health and self-esteem, one question evaluates adherence to the exercise program, and the final two questions assess the improvement in patients' physical capacity after rehabilitation and their overall satisfaction with the physical activity program.

### **FUTURE RESEARCH DIRECTIONS**

The positive results obtained in this research have generated new research directions, such as monitoring the evolution of hypertensive patients with masked hypertension or white-coat hypertension, who have cardiac impairment, over a fixed period. This would involve documenting the level of physical exertion they can sustain and the degree of improvement in existing cardiac conditions following inclusion in a physical training program, with the goal of improving their quality of life.

Other research directions stemming from the current study include the long-term follow-up of hypertensive patients with masked or white-coat hypertension who have cardiac involvement, monitoring their physical exertion capacity, and assessing the degree of improvement in cardiac conditions because of participating in a physical training program, all with the aim of enhancing their quality of life.