

Research article

Adherence to physical exercise program in patients with hypertension

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Citation: Neamtu A.C., Amaricai E., Olariu T., Iurciuc S. - Adherence to physical exercise program in patients with hyper-tension
Balneo and PRM Research Journal
2024, 15(2): 696

Academic Editor(s):
Constantin Munteanu

Reviewer Officer:
Viorela Bembea

Production Officer:
Camil Filimon

Received: 01.03.2024
Published: 21.06.2024

Reviewers:
Cristina Popescu
Simona Stoica

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Abstract: The study aims to assess adherence to a physical exercise program in patients with hypertension. 120 hypertensive patients were included in a 3-month physical exercise program (first 2 weeks, 10 daily sessions, under the supervision of a physical therapist in a rehabilitation center, continued at home, 5 sessions per week). After the 3-month exercise program 108 patients completed an adherence questionnaire. All patients considered the physical exercise program important for their physical health; 82% of them also considered the program important for their mental health. 94% of patients admitted as necessary to continue the physical exercise program after the end of the study. The lowest percentages of patients (47%) admitted the fitting of the physical exercise sessions performed in a rehabilitation center with their daily program. Adherence to a 3-month physical exercise was beneficial for physical and mental health status of patients with hypertension. The promoting factors for a good adherence to rehabilitation were involvement and availability of patients, living in the city or nearby villages, free of charge exercise sessions and quality of physical therapy. The assessment of adherence by an easy-to-use tool can provide important data for adapting the rehabilitation program to patients' need and expectations.

Keywords: hypertension; physical exercise; adherence.

1. Introduction

Physical exercise has an important role in controlling blood pressure in patients with hypertension. However, adherence to exercise is extremely low [1]. When referring to exercise training programs, higher adherence and maintenance rates were recorded for supervised training programs and an organized setting with defined training timetables [2].

The review of Lopes et al. showed that structured training improves motivation for performing exercise and increases physical activity in the short-term follow up [1]. Andjelkovic M et al. noticed that when counselling patients above 65 years with hypertension about a healthy lifestyle and self-care by their physician the healthy lifestyle increased. The study showed that the less educated elderly patients were more adherent to the healthy lifestyle than those with more education [3].

The survey performed in Japan by Nishigaki et al. on 881 patients and 541 physicians reported that 68.9% of the physicians identified failure to increase exercise (to perform

aerobic exercise for more than 30 minutes a day) as a reason for low hypertension treatment success rates in their hypertensive patients [4].

The current study aims to assess the adherence to a physical exercise program in patients with hypertension. Our research is focused on a Romanian population from the Western part of the country. As in the above-mentioned studies, we target a certain population (Romanians in our case) diagnosed with hypertension.

2. Materials and Methods

2.1. Participants

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, cardiomyopathies, congenital heart disorders), musculoskeletal problems that interfere with performance of physical exercise, patients with psychiatric disorders (dementia or other disorders that affect rationality due to the fact that these patients are not able to follow and perform adequately the physical exercise program).

Participation in the study was voluntary. Written informed consent was obtained from all the participants. The study was approved by the Ethics Committee of "Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania, and was in accordance with the Helsinki Declaration (No. 32/15.06.2023).

120 patients were included in a physical exercise program. The characteristics of the patients included in the study are presented in Table 1.

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 ²
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

2.2. Physical exercise program

The physical exercise program was started in a rehabilitation center (first 2 weeks, 10 daily sessions, 30 minutes per session) under the supervision of a physical therapist. After 2 weeks it was continued at home (5 sessions per week, 30 minutes per session). The entire duration of the physical exercise program was of 3 months. The program included exercises without weights: mobilization of the upper extremities with breathing (sitting on a chair flexion of the upper extremities with inspiration and then back to the initial position with expiration; abduction of the upper extremities with inspiration and then back to the initial position with expiration; the same exercises in standing; 5 repetitions for each exercise), movements of the head with breathing (extension with inspiration, flexion with expiration, 10 repetitions; right and left lateral movements, 10 repetitions), semisquads (with the support of hands on a chair, starting with 5 repetitions and then progress gradually to 10 repetitions), walking. The aerobic training was performed 5 sessions per week. 2 of these sessions also included strengthening exercises. This type of exercises used low weights (1-2 kg) and targeted arm strengthening and breathing increase (flexion and extension of the elbows with dumbbells in the hands, 10 repetitions; sitting on a chair, lifting the upper extremities with dumbbells in the hands with inspiration and back to the initial position with expiration, 10 repetitions; supine, with

dumbbells in the hands, arms in abduction, extension of the elbows with inspiration, then flexion of the elbows with expiration, 10 repetitions). The entire physical exercise program was of low intensity.

2.3. Assessment

After the 3-month exercise program the patients completed an adherence questionnaire (Table 2). The questionnaire represents the authors' personal contribution. The first five questions are addressed to factors related to the training sessions, two questions address the importance of physical exercise for patients' health and self-esteem and a question regarding the follow-up of the physical exercise program. The last two questions evaluate the level of improvement in the patients' physical capacity after rehabilitation, as well as the patients' overall satisfaction with the physical activity program. These are measured using a scale ranging from 0 (minimum) to 10 (maximum). High improvement and high satisfaction responses are considered for responses equal to or higher than the median [5].

Table 2. Adherence questionnaire to physical exercise program in patients with hypertension

	Always 5	Often 4	Sometimes 3	Rarely 2	Never 1
1. Did the physical exercise sessions in the rehabilitation center fit your daily program?					
2. Did the home physical exercises fit your daily program?					
3. Do you consider the physical exercise program easy to perform?					
4. Did you follow the instructions of the physical therapist during the sessions in the rehabilitation center?					
5. Were you confident in the results of the physical exercise program?					
	Strongly agree 5	Agree 4	I don't know 3	Disagree 2	Strongly disagree 1
6. Do you consider the physical exercise program important for your physical health?					
7. Do you consider the physical exercise program important for your mental health?					
8. Do you consider necessary to continue the physical exercise program after the end of this study?					
9. In what degree do you consider that the physical exercise program improved your physical health status? Scale: 0-10 (0=not at all, 10=very much)					
10. What is your level of satisfaction with the physical exercise program? Scale: 0-10 (0=very unsatisfied, 10=very satisfied)					

2.2. Statistical analysis

The statistical analysis was performed using the MedCalc version 17.8. Descriptive statistics were calculated for patients' characteristics as mean and standard deviation. The questionnaire scores were expressed as median and interquartile range. Before statistical applications, the normal distribution of values in this study was verified by the D-Agostino–Pearson normality test. For the correlations, for testing the relationship between variables, we used Pearson correlation. A *p* value less than 0.05 was considered statistically significant.

3. Results

108 patients completed the adherence questionnaire. 12 of 120 patients from the start of the study did not complete the questionnaire due to different reasons (lack of time, moved abroad, loss of contact with them by phone or email).

The results of the adherence questionnaire are presented in Table 3. 51 of 108 patients (47%) agreed about fitting of the exercise program performed in the rehabilitation centre with their daily program. 76% of the patients agreed about fitting of the 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 program important for their physical health, while 82% of them also considered the program important for their mental health. 94% of patients admitted it necessary to continue the physical exercise program after the 3-month study.

Table 3. Results of the questionnaire regarding the adherence to physical exercise program

Question	Median (IQR)
1. Did the physical exercise sessions in the rehabilitation center fit your daily program?	2 (5-5)
2. Did the home physical exercises fit your daily program?	4 (5-5)
3. Do you consider the physical exercise program easy to perform?	5 (5-5)
4. Did you follow the instructions of the physical therapist during the sessions in the rehabilitation center?	5 (5-5)
5. Were you confident in the results of the physical exercise program?	5 (5-5)
6. Do you consider the physical exercise program important for your physical health?	5 (5-5)
7. Do you consider the physical exercise program important for your mental health?	4 (5-5)
8. Do you consider necessary to continue the physical exercise program after the end of this study?	5 (5-5)
9*. In what degree do you consider that the physical exercise program improved your physical health status?	7 (7-9)
10*. What is your level of satisfaction with the physical exercise program?	8 (8-9)

IQR interquartile range; the scores range from 1 (never, strongly disagree) to 5 (always, strongly agree); * scores range from 0 (minimum) to 10 (maximum)

Table 4 includes the correlations between the items of the adherence questionnaire and patients' age. Significant direct correlations were recorded between patients' age and fitting of the physical exercise sessions in the rehabilitation center in the daily program, and respectively fitting of the home physical exercises in the daily program.

Table 4. Correlations of adherence questionnaire items and patients' age

Adherence questionnaire item	Age	
	r	p
Fitting of the physical exercise sessions in the rehabilitation center in the daily program	0.66	<0.0001
Fitting of the home physical exercises in the daily program	0.64	<0.0001
Easy to perform	-0.08	0.4
Following the instructions of the physical therapist	-0.02	0.81
Confidence in the results of the physical exercise program	0.03	0.71
Importance of the physical exercise program for the physical health	-0.07	0.42
Importance of the physical exercise program for the mental health	-0.08	0.39
Necessity to continue the physical exercise program after the 3-month study	-0.01	0.87
Improvement of physical health status after physical exercise program	0.01	0.91
Level of satisfaction with the physical exercise program	-0.01	0.85

r: rank correlation coefficient. The bolded p-values indicate significant differences.

4. 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 what regards the decrease or maintenance 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 [6,7]. 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 [8].

Our research showed that less than half of the patients considered that the supervised sessions (performed in a rehabilitation center) were adequately matched with their daily program. This may be because some of the subjects were still working. The age ranged between 48 and 75 years old, with 52 of 108 being still employed.

In the current 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 finish [9,10].

The proposed adherence questionnaire could be implemented in clinical settings. It is easy to complete, taking a maximum of 5 minutes. The results of the questionnaire analysis could bring additional data for increasing adherence to physical exercise programs in patients suffering from hypertension with low and moderate risk. The

medicine-based medicine (in our case, the positive effects of medium-term exercise program) will add a more convincing factor for engaging and following a rehabilitation program. In hypertensive patients the physical exercise program should be started under the supervision of a trained physical therapist. The avoidance of risks due to increase of blood pressure during the exercise program must be a mandatory condition for all patients, in every clinical setting. The monitoring of blood pressure during the first sessions (according to the blood pressure values) is easy to perform. Many of the hypertensive patients are used to monitor the blood pressure with the use of wrist bracelets.

When considering the Health belief model [11] in order to assess the adherence to physical exercise program, we had in view the perceived benefits and perceived barriers, as well as cues to action. The perceived benefits were related to the decrease of blood pressure values and a better general health status. Lack of time was the most common perceived barrier to take part in an exercise program. The hemorrhagic stroke due to hypertension in family members or friends was an important cue to action to get engaged in the physical exercise program for longer period.

The lack of validation of the self-made questionnaire and the short-term study can be considered weak points of the current research. However, we consider this study as a pilot one and we aim to continue the assessment of longer-term physical exercise programs (one year after the start of physical exercise program). The present study is the starting point for future directions of our research with the inclusion of a higher number of patients and the validation of the proposed questionnaire. We also envisage the use of an electronic administered questionnaire and the comparison to interviewer-administered paper-adherence questionnaire. The comparison between different types of physical exercise programs (individual versus group programs) with supervision of the specialized medical staff, continued with a home-based exercise program, is another future direction plan.

5. 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.

Author Contributions: Conceptualization, A.C.N., E.A. and S.I.; methodology, A.C.N. and E.A.; validation, A.C.N. and T.O.; formal analysis, A.C.N.; investigation, A.C.N., E.A. and S.I.; writing—original draft preparation, A.C.N. and E.A.; writing—review and editing, A.C.N., E.A., T.O. and S.I.; visualization, T.O.; supervision, S.I. All authors have read and agreed to the published version of the manuscript.

Funding: We would like to acknowledge “Victor Babes” University of Medicine and Pharmacy Timisoara for their support in covering the costs of publication for this research paper.

Institutional Review Board Statement: In conformity with the ethical standards, participation in the study was voluntary, and participants were informed about the testing procedure. All participants in the study consented, in written form, to data processing and the scientific use of data. The study was approved by the Ethical Committee of Victor Babes University of Medicine and Pharmacy, Timisoara, Romania, Ethical Notification No. 32/15.06.2023, and is in conformity with the Helsinki Declaration.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent was obtained from the patients to publish this paper.

Data Availability Statement: Supplementary data available at request.

Conflicts of Interest: The authors declare no conflict of interest.

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