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Original Article

Cardiorespiratory rehabilitation program induces additional benefits to hypertension patients: Evidence for improvement of the effort capacity

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ABSTRACT

Objectives: This study aimed to assess the impact of an eight-week cardiorespiratory rehabilitation program on stabilizing blood pressure values and increasing the patients' exercise capacity by comparing with other rehabilitation programs, such as hydrotherapy recovery, antihypertensive medication, and recommendations for a healthy life.

Patients and methods: The prospective interventional pilot study was carried out with 100 patients (64 females, 36 males; mean age: 46±0.3 years; range, 30 to 60 years) diagnosed with hypertension between January 2023 and February 2023. The patients were divided into four homogeneous groups. An eight-week program was implemented. Group A benefited only from recommendations for a healthy lifestyle. Groups B, C, and D, in addition to the recommendations, benefited from pharmaceutical intervention. Additionally, group C participated in a cardiorespiratory rehabilitation program, and group D participated in a hydrotherapeutic program. Blood pressure values and effort capacity, with the six-minute walk test (6MWT), were registered for all the patients of the groups before the programs and after eight weeks of rehabilitation.

Results: Intragroup comparison between baseline and final assessments revealed statistically significant differences for systolic blood pressure (SBP) and diastolic blood pressure (DBP) (p=0.002, p<0.0001). Intergroup comparisons between baseline and postintervention revealed a significant increase in group A for DBP and a decrease for 6MWT (p=0.03, p=0.02). Group B registered a statistically significant decrease for SBP and an increase for 6MWT (p=0.3, p=0.007). Both groups C and D had significant improvements for SBP, DBP, and 6MWT (p<0.0001). Group C had better achievements for 6MWT (239.8±97.80 *vs.* 321.2±86.66). Group D had the best outcome for SBP and DBP (150.2±6.85 *vs.* 143.9±4.72, 94.24±2.48 *vs.* 90.60±2.08).

Conclusion: Pharmaceutical treatment brings benefit to the patients. Addition of specialized recovery interventions, such as cardiorespiratory or hydrotherapy programs, increases patient's resistance to effort and stabilizes blood pressure values.

Keywords: Antihypertensive, cardiorespiratory rehabilitation, hypertension.

Ontogenetic evolution involves the separation of the cardiovascular system from the respiratory system; thus, at the level of the heart, brachial breathing is replaced by pulmonary breathing. Although the cardiovascular and respiratory systems originate separately during ontogeny, they remain in close dependence during life.[1]

In one of the oldest reports made by the European Heart Network, we realize that almost half a century was needed to gather enough information that proved that physical inactivity is a risk factor for various diseases, including type 2 diabetes mellitus, obesity, and hypertension,[2] which in turn constitute the main cause of cerebrovascular pathologies such as stroke, which is considered the main complication of high blood pressure.[3] Studies from the beginning of the 2000s numerically specified the "dangerous" systolic and diastolic blood pressure values for the occurrence of complications and introduced the term prehypertension.[4-7] Along with the definition and classification of high blood pressure appear the risk factors.[8-11]

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Physical activity in the prevention of cardiovascular risks and diseases are broadly presented in the form of recommendations to perform a minimum of 30 min of physical activity a day, possibly together with the family to increase motivation.[12] The idea of a physical training program appears as a recommendation only for patients with increased cardiovascular risk, particularly for the elderly. The guide manages to encompass the factors involved in causing hypertension, outlining the possibility of reducing them by changing lifestyle and introducing pharmaceutical treatments. Five years later, between 2006 and 2008, studies began to approach another matter, that of hypertension resistant to pharmaceutical treatment, highlighting an acute need for new directions of treatment regarding hypertension. Medication, even along with recommendations for a healthy lifestyle, do not appear to have an effect on 15 to 20% of the hypertensive population, most of whom are overweight.[13] Once again, the lack of physical activity, particularly the lack of acute of specialized physical training programs, is indirectly brought to light.

The recommendations for a healthy lifestyle includes reduction or cessation of four habits (smoking, alcohol and sodium consumption, and unhealthy diet), plus the encouragement of physical exercise, which is generally mentioned last, without emphasizing the fact that the latter one could influence over 50% of the preceding factors.[14] Thirteen years later, the estimation of cardiovascular risks led to the creation of subgroups for the different degrees of hypertensives; those with intermediate or low risk are managed with only lifestyle changes for three to six months, and only then pharmaceutical therapy is added if necessary.[15]

Recent approaches underline the impact of kinesiophobia in cardiac rehabilitation, which is commonly seen among cardiovascular patients.[16,17] There is an acute need to underline the improvements that rehabilitation programs could bring in the life of cardiovascular patients to diminish this fear of physical activity in general.

Recovery specialists recommend dosed physical activity for at least 30 min every day or at least once every two days to have optimal results.[18] Evidence of exercise programs reducing blood pressure values are brought to light by studies from the last five years.[19,20]

This study aimed to implement a cardiorespiratory rehabilitation program in a specialized center that would lead to cardiovascular risk reduction by lowering blood pressure values and increasing effort resistance of hypertensive patients.

PATIENTS AND METHODS

Two hundred seventy-five patients diagnosed with first-degree hypertension were selected from the cardiologist's records between January 2023 and February 2023 in this prospective interventional pilot study. Taking into consideration the risks factors for hypertensive patients, nine demographic and clinical criteria were selected and used to form four homogeneous groups: age, sex, family history of hypertension, smoking, overweight, active or sedentary life during working time and free time, high blood pressure values with difference higher than 10 mmHg between members, and menstruation or menopause for women.

Among them, 115 participants ensured the homogeneity of the group. The others were excluded for various reasons considering exclusion criteria: 43 patients did not fit correctly into the designated group in terms of pharmaceutical treatment, 51 patients had at the time other medication for various minor conditions but which could have interfered with the program and the test, 27 refused the recovery program imposed according to their group, 17 patients did not sign the written agreement of the program, eight patients were in a special physiological period at the time of study (pregnancy or postpartum period), and 14 patients registered a difference in blood pressure readings between arms higher than 15 mmHg (high cardiovascular risk/atheromatous vascular disease). To ensure homogeneity, including from a numerical point of view, the groups were assigned a number of three or four more patients, predictively calculating a possible dropout rate for various reasons; therefore, the data of 100 patients (64 females, 36 males; mean age: 46±0.3 years; range, 30 to 60 years) were statistically processed to complete the entire proposed surveillance, rehabilitation, and testing program.

The homogeneity of the four groups after the nine demographic and clinical criteria previously established was 100%. Each group had 20 patients with a family history of hypertension and five patients without one, 18 smokers and seven nonsmokers, four

normal weight and 21 overweight individuals, six with an active lifestyle and 19 inactive lifestyle, and eight with an active job and 17 with a sedentary job. Four participants registered a difference in blood pressure readings between arms higher than 10 mmHg between members and 21 did not observe such a difference. There were 16 female and nine male participants in each group. Among female participant, four had regular menses, 12 had irregular menses, 10 had early menopause, and six were still menstruating. Written informed consent was obtained from each patient. The study protocol was approved by the University of Medicine and Pharmacy "Victor Babes" Ethics Committee (No: 01). The was conducted in accordance with the principles of the Declaration of Helsinki.

The study was conducted over an 8-week period. Group A was managed only with healthy lifestyle indications. Group B was managed with pharmaceutical intervention and healthy lifestyle indications. Group C was managed with pharmaceutical intervention, along with a kinetic exercise program in a rehabilitation center, and healthy lifestyle indications. Group D was managed with pharmaceutical intervention, along with a hydrotherapy program in a specialized unit, and healthy lifestyle indications. Blood pressure values and the increase in the patients' capacity for physical exercise was compared between the groups.

The recommendation for a healthy lifestyle was part of the nonpharmaceutical interventions for hypertensive patients and comprised the following: reduced sodium and increased potassium intake, expanded physical activity and exercise, weight reduction and diet, reduced alcohol, coffee, and soft drink consumption, and no smoking.[21]

The pharmaceutical administration of antihypertensives was prescribed by the cardiology specialists in coordination with patient's medical particularities and needs. These interventions respected the management of antihypertensive medication from the following three classes: thiazide and thiazide-like agents, angiotensin-converting enzyme inhibitors or angiotensin-receptor blockers, and long-acting dihydropyridine calcium channel blockers.[22]

Cardiorespiratory and hydrotherapy rehabilitation programs were designed respecting three kinetic therapy directions, aimed at controlling blood pressure values by adapting their exercise capacity. First, the effort performed was of medium intensity to stimulate metabolism for all muscle groups and to decrease the peripheral resistance through local skeletal muscle vasodilatation. Second, the rhythm was maintained from slow to moderate by associating general mobilizations with breathing exercises that also have a neuropsychic effect. Third, periods of recovery after effort will be strictly observed in the form of breaks doubled in terms of duration compared to the time of making the effort.

Both implemented programs were divided into three stages of exercise designed individually for each patient and in accordance with their physical-pathological particularities, while maintaining an average of them to avoid differences and to ensure homogeneity. To optimize the results and minimize the risks of quitting the program for objective or subjective reasons, the program was very well dosed (avoided overwork) and varied in design (elimination of boredom).

Cardiorespiratory rehabilitation program had three phases. Phase 1 prepared the body for effort. Analytical gymnastics exercises were performed for 10 to 12 min to mobilize all body segments through free exercises or with the help of predominantly isometric or auxotonic muscle contraction for the upper limbs with the aim of diverting thoracic circulation. For the trunk, circumductions and twists were performed. For the lower limbs, the supine or lateral position was preferred, but with the head slightly raised. Phase 2 included exercise for effort training. Ergo-bike, walking, running on a treadmill (with or without incline), climbing stairs, or playing exercises in circuit form was performed for 20 to 30 min, so that the heart rate, according to the kinetic therapy indications, was between 30% and 80% of the maximum frequency reached during the exercise test. Exceeding this threshold, the patient's body enters anaerobiosis, and as a result, blood pressure values increase. It is recommended to create exercises combined with periods of active pause based on breathing, coordination, or attention exercises performed individually or in a group. Phase 3 was the recovery phase. Exercises of body recovery after exertion through different relaxation techniques was performed for 15 to 20 min. Active relaxation included swings of the upper and lower limbs performed by the patient, free trunk twists, or stretching positions. Passive relaxation included limb shaking done by the physiotherapist. Neuropsychic relaxation was performed

individually or in a group (Schultz, Edmond Jacobson), collective gymnastics (E. Gindler and N. Stoltze, I. Parow method, A. Macango method). Respiratory relaxation included the game between inhalation versus exhalation (with the emphasis on the period of exhalation- deep costal or diaphragmatic inhale hissing or singing exhalation) performed in different positions depending on the patients' tolerance (dorsal recumbency-low tolerance; sitting-semi-sitting in medium tolerance; in standing or walking-high tolerance). Relaxation through occupational therapy was conducted depending on the patient's preferences and hobbies.

The hydrotherapy rehabilitation program also had three phases. Phase 1 was preparing the body for effort. Hydrotherapy and electrotherapy procedures were performed for 10 to 12 min to increase the body's blood-flow. Paraffin or mud application, magnetotherapy, or four-cellular galvanic baths were utilized. Phase 2 included exercise for effort training. Exercise in a pool at different immersion levels was performed for 20 to 30 min. The amount of body weight was progressively reduced by walking from low immersion level to the maximum that the patients felt comfortable. Ideally, it was performed from knee level, where the weight bearing was 75%, passing to the abdomen's level of 50%, and till the chest level of 30%. All other exercise were pursued at least at the inferior sternal level, including walking exercises combined with mobilizations of all limbs. Phase 3 is the recovery phase. Exercises of body recovery through different relaxation techniques were performed for 15 to 20 min. Active relaxation in the pool through various free-swimming techniques or with flotation devices if necessary. Active-passive relaxation through free floating techniques in the pool with or without additional support. Respiratory relaxation represented by the game between inhalation versus exhalation, with emphasis on the expiration period. From orthostatic position by exiting from the pool, reversing the immersion process from deep to surface, deep costal inspiration, wheezing inspiration and diaphragmatic singing expiration were established. Relaxation through occupational therapy in the form of an aquatic game.

The four groups of patients were evaluated before the implementation of the program (baseline evaluation) and at the end of the program after eight weeks (final evaluation) through the blood pressure values (systolic blood pressure [SBP] and diastolic blood pressure [DBP]). A six-minute walk test (6MWT) was conducted, which provided information about the patients' exercise capacity.[23]

The tests used in the study included the two vital systems involved in performing physical effort, the cardiovascular and respiratory systems.[24] We collected data regarding the functional capacity of patients with hypertension to register their evolution. This submaximal test (6MWT) required the patient to move at their own pace for 6 min. Thus, we registered the distance walked in meters, and interpreted the results according to the scales imposed by the test.[25]

The 6MWT test was conducted according to technical applicability criteria to ensure its standardization. All indicators regarding the preparation of the equipment used, the training of the patients, and the testing specialists were strictly followed. Each patient performed the test two times in the same day (with a break of at least 30 min between tests) to ensure the correct understanding and performance of the test. A flat oval treadmill was used for all patients (to avoid slowing down the pace if they had to turn around in case of a linear route) in comfortable ambient conditions. All patients were assessed before the test, encouraged and supported during the test, and the test the results obtained were recorded.[26] There was no case of abandonment of testing due to the medical impossibility of performing the test. A distance <150 m was considered very low resistance, a distance between 150 and 300 m was considered low resistance, a distance between 301 and 425 m was considered moderate resistance, a distance between 426 and 549 m was considered high resistance, and a distance >550 m was considered excellent endurance.

For a more detailed analysis of the exercise capacity of patients affiliated with 6MWT (six-minute walk test), 6MWD (six minutes walking distance) was calculated, which represents the distance that patients should have traveled according to their physiological characteristics, following the application of equations.[27,28] The predictive equation for males was 6MWD (m)=867-(5.71 age, years) + (1.03 height, cm). The predictive equation for females was 6MWD (m)=525-(2.86 age, years) + (2.71 height, cm) – (6.22 BMI [body mass index]). The 6MWD-predictive index was calculated in meters. The predictive index was calculated according to the equations presented above, both before and after the program.

The data were compared with the results obtained by the patients during the actual testing. The 6MWD formula demonstrated the normal/excellent value that patients should reach in accordance with their individual characteristics (sex, age, and height; weight was also calculated for female participants to determine BMI).[29] The possibility of their application was also mentioned in a 2014 article, and the minimum confidence interval for the 6MWT in terms of improving exercise capacity for patients with a 95% confidence limit for the variable was 30±5 m.[30]

Statistical analysis

The GraphPad Prism V.9.0 software (GraphPad Software LLC., San Diego, CA, USA) was used for statistical processing. Descriptive statistics were presented as mean ± standard deviation and as median (interquartile range) according to the assumption of normality. Student's t-test and one-way analysis of variance (ANOVA) were used for the analysis of data exhibiting normal distribution, while the Wilcoxon test and the Kruskal-Wallis test were used for data exhibiting nonnormal distribution. A p-value <0.05 was considered statically significant.

RESULTS

The difference between baseline assessment among the four groups of the study did not register statistically significant values for any parameters

TABLE 1
Intergroup comparisons of SBP, DBP, and 6MWT before and after intervention

	Baseline		Postintervention	
	Median	25th-75th Percentile	Median	25th-75th Percentile
SBP				
Group A	148	143.5-151,5	151	143-157
Group B	150	145-154,5	149	145-154
Group C	151	144-155	144	141-148
Group D	150	144-156.5	143	140-147
p	0.83†		0.002‡	
DBP				
Group A	94	92-96	95	93-97.5
Group B	93	90-95	94	93-96.5
Group C	94	93-96.5	92	90-94
Group D	94	92-96	91	89.5-92
p	0.7‡		<0.0001‡	
6MWT				
Group A	293	194.5-360	277	192-330.5
Group B	275	176-353.5	278	179-355
Group C	184	161.5-334	303	254-404.5
Group D	189	160-355	305	246.5-428-5
p	0.33†		0.06†	
6MWD				
Group A	673.1	632.9-842.8	673.5	632.9-767.7
Group B	670.6	626.1-853.6	670.6	628.5-733
Group C	667.1	620.3-848.4	669.5	627.2-742.6
Group D	688.7	661.6-878.5	693.1	667.9-867
p	0.84‡		0.19†	

SBP: Systolic blood pressure; DBP: Diastolic blood pressure; 6MWT: Six-minute walk test; 6MWD: Six minutes walking distance; p≤0.5 was considered significant; † Kruskal Wallis test; ‡ One-Way ANOVA.

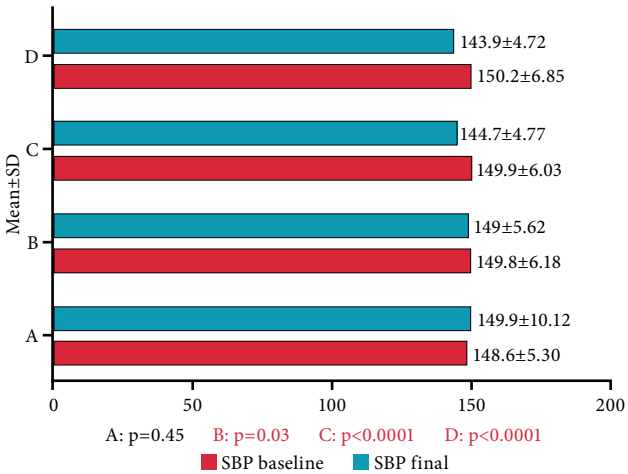

Figure 1. Intragroup comparison of SBP means before and after intervention.

SD: Standard deviation; SBP: Systolic blood pressure; ≤0.5 was considered significant; Student t test.

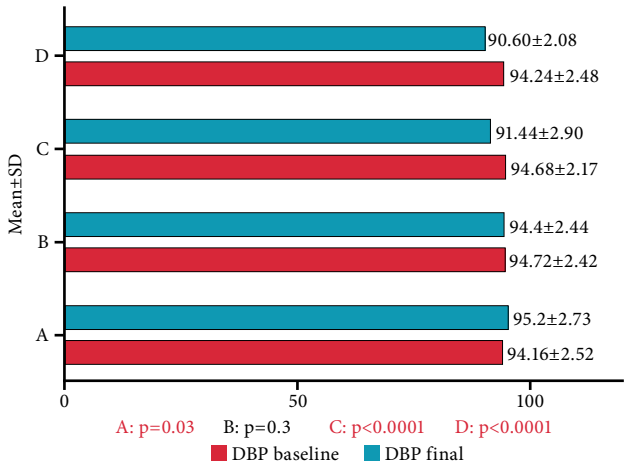

Figure 2. Intragroup comparison of DBP means before and after intervention.

SD: Standard deviation; DBP: Diastolic blood pressure; ≤0.5 was considered significant; Student t test.

given in Table 1 (SBP, DPP, 6MWT, and 6MWD), indicating that the groups were homogeneous before the interventional programs (p=0.83, p=0.7, p=0.33, and p=0.84, respectively).

After the eight-week program, the postintervention ANOVA analysis revealed statistically significant values for SBP and DBP between the four groups shown in Table 1 (p=0.002, p<0.001). Furthermore, the 6MWT and 6MWD values of the four groups, analyzed using the Kruskal-Wallis test, revealed no statistically significant differences among the groups in postintervention assessment (p=0.06, p=0.19; Table 1).

The SBP and DBP values statistically significantly decreased for both groups C and D after the interventional rehabilitation physical program (p<0.0001). The best outcome was reached by the patients of the hydrotherapy program (group D) with lower values for both SBP (150.2±6.85 vs. 143.9±4.72, 6.3-unit decrease) and DBP (94.24±2.48 *vs.* 90.60±2.08, 3.64-unit decrease) comparing the baseline with the final evaluation. Similar results were registered for the patients from the cardiorespiratory rehabilitation program in SBP (149.9±6.03 *vs.* 144.7±4.77, 5.2 units) and DBP (94.68±2.17 to 91.44±2.90, 3.24 units) values from baseline to final assessment (Figures 1, 2).

In addition, group B, which benefited from antihypertensive medication and recommendation for a healthy lifestyle, registered significant decrease values for SBP (p=0.03). One significantly increased parameter for blood pressure values was registered for DBP of group A that had only recommendation for a healthy lifestyle (p=0.03). There were no significant differences between baseline and final testing for SBP values for group A and DBP values of group B (p=0.45, p=0.3; Figures 1, 2).

Significant statistically improvement was achieved by groups B, C, and D, regardless of the interventional plans, for 6MWT after eight weeks, with increased means for all three of the groups when comparing postintervention values with baseline ones (all p<0.05). The data recorded described a positive growth curve of the distance walked

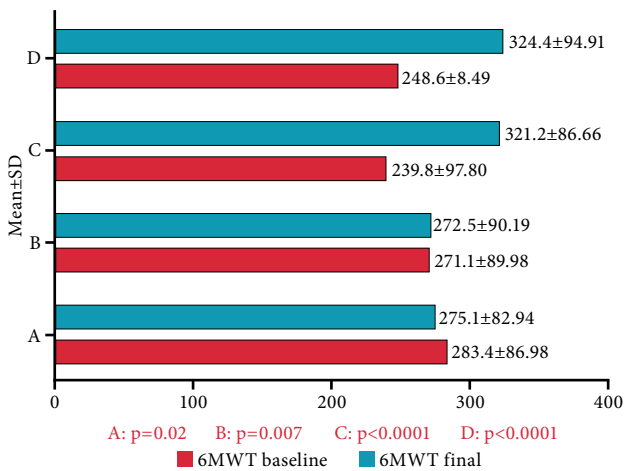

Figure 3. Intragroup comparison of 6MWT means before and after intervention.

SD: Standard deviation; 6MWT: Six-minute walk test; ≤0.5 was considered significant; Student t test.

TABLE 2
Intragroup comparisons of 6MWT and 6MWD before and after the eight-week therapy program

	Baseline	Postintervention	
	Mean±SD	Mean±SD	p
6MWT			
Group A	283.4±86.98	275.1±82.94	0.02
Group B	271.1±89.98	272.5±90.19	0.007
Group C	239.8±97.80	321.2±86.66	<0.0001
Group D	248.6±98.49	324.4±94.91	<0.0001
6MWD			
Group A	692.5±77.65	692.2±77.64	0.34
Group B	693.8±85.35	686.8±82.23	0.26
Group C	693±80.41	693.5±78.01	0.93
Group D	709.6±72.16	740.1±101.7	0.002

6MWT: Six-minute walk test; 6MWD: Six-minute walk distance; SD: Standard deviation; postintervention compared with baseline p≤0.5 was considered significant; Student t test.

TABLE 3
Intragroup comparison between the obtained distance (6MWT) and the predicted distance (6MWD) before and after the eight-week therapy program

	6MWT	6MWD	
	Mean±SD	Mean±SD	p
Baseline			
Group A	283.4±86.98	692.5±77.65	**<0.0001**
Group B	271.1±89.98	693.8±85.35	**<0.0001**
Group C	239.8±97.80	693±80.41	**<0.0001**
Group D	248.6±98.49	709.6±72.16	**<0.0001**
Postintervention			
Group A	275.1±82.94	692.2±77.64	**<0.0001**
Group B	272.5±90.19	686.8±82.23	**<0.0001**
Group C	321.2±86.66	693.5±78.01	**<0.0001**
Group D	324.4±94.91	740.1±101.7	**<0.0001**

6MWT: Six-minute walk test; 6MWD: Six-minute walk distance; SD: Standard deviation; p≤0.5 was considered significant; 6MWT distance achieved compared to predicted distance 6MWD in baseline and postintervention; Student t test.

represented by differences between the assessments with the highest score for group C (81.4 m progress from 239.8±97.80 to 321.2±86.66, p<0.001), followed by group D (75.8 m progress from 248.6±8.49 to 324.4±94.91, p<0.001), and group B (8.3 m progress from 283.4±86.98 to 275.1±82.94, p=0.007) being the last with a considerable difference. For group A, a statistically significant decrease was observed for the 6MWT parameter (283.4±86.98 to 275.1±82.94, p=0.02; Figure 3).

The 6MWT registered statistically significant progress for groups B, C, and D from baseline to postintervention (p=0.007, p<0.0001, and p<0.0001, respectively). Group A had a significantly decrease for 6MWT (p=0.02). Regarding 6MWD, only group D had a statistically significant increase from baseline to postintervention testing (p=0.002). All other 6MWD parameters listed for the groups A, B, and C were not statistically significant (p=0.34, p=0.26, and p=0.93, respectively; Table 2).

Table 3 shows, for all four groups, statistically significant differences for both baseline and postintervention testing when comparing 6MWT and 6MWD means within each group (p<0.0001). According to the same table, we calculated the differences between 6MWT and 6MWD means inside each group separately for baseline and postintervention testing. The data obtained from baseline compared to the postintervention revealed the group that came closest to the predicative values after the implemented program. Groups C and D registered numerically differentiated increases above the confidence threshold established to be 30±5 m according to latest studies (453.2-372.3=80.9 m; 461-415.7=45.3 m, respectively). Group B had a smaller increase (422.7-414.3=8.4 m), which was below the confidence threshold, and group A registered a decrease (409.1-417.1=−8 m) in the walking distance, (Table 3).

DISCUSSION

In the present study, we evaluated the effectiveness of a cardiorespiratory rehabilitation program in comparison with a different treatment approach (hydrotherapy recovery), antihypertensive medication, recommendation for healthy lifestyle for first-degree hypertension patients.

The findings showed for both interventional programs, cardiorespiratory rehabilitation for group C and hydrotherapy for group D, improved their effort capacity after eight weeks. Results revealed statically significant progress for all parameters (SBP, DBP, 6MWT, and 6MWD). Group A, which benefited only from recommendation for healthy lifestyle, had disease progression (both systolic and diastolic blood pressure parameters increased and effort capacity [6MWT]). The lack of pharmaceutical treatment may be the cause of these differences. Group B benefited from antihypertensive medications, along

with the healthy life style recommendation, and had significant improvements in all parameters; however, not all improvements were statistically significant.

The grounds of this study are the growing number of cardiovascular diseases, with stroke on the top of the list. In the last 20 years there have been numerous studies focused on the treatment and especially the recovery of stroke patients.[31-36] Taking into consideration that hypertension is a major cardiovascular risk,[37,38] we pursued to emphasize the impact of rehabilitations programs in stabilizing the blood pressure values. More evidence and further studies on hypertensive population are needed to see if recovery programs may prevent cardiovascular complications, such as stroke. The results of the current study can be considered encouraging; however, larger cohorts, long-term findings, and possible comparisons with other types of physical training are needed to confirm the effectiveness of physical therapy interventions.

There was no statistically significant difference between the two interventional programs (cardiorespiratory in group C and hydrotherapy in group D). Unexpectedly, the hydrotherapy program had similar outcomes to cardiorespiratory rehabilitation. In accordance with these results, we underline the fact that the hydrotherapy rehabilitation implemented is based on the same kinetic therapy direction as the cardiorespiratory program. Therefore, kinetics therapy for cardiorespiratory recovery in various forms (physical therapy in rehabilitation units or hydrotherapy in specialized centers) has definitely a significant impact in the health of hypertensive patients. Future studies should continue this work to see if the time extension of this programs may bring additional benefits or different perspectives in rehabilitation of hypertension patients.

We aim at encouraging the hypertensive population to go through programs of specialized rehabilitation. It is necessary for all patients to continue the rehabilitation interventional programs. Continued implementation of these programs is expected to bring benefits over time. It is known that the improvements obtained, as results of the kinetic therapy rehabilitation, lasts a certain period of time, but the progress will be lost in approximately half of the initial time of acquisition if the interventions are not continued. The progress for both groups C and D was sustained by all data presented above, and at this point of the study, we cannot conclude which group had the best outcome.

There were some limitations to this study. An evaluation of outcomes after an eight-week program may not be considered sufficient due to its duration and it being performed only once after the baseline evaluation. The study lacked extended follow-ups and was not able to determine the long-term effect of the interventions. Furthermore, the difference at baseline testing regarding 6MWT, based on ANOVA analysis, revealed no statistical differences between groups. Whether varying baseline physical capacity among hypertensives patients is a factor that should be eliminated from further studies. Physical capacity could be influenced by multiple physical, psychological, or ambient factors, and certain nonsignificant differences could be accepted. Studies based only on demographic and clinical characteristic correlated with the diagnostic may be easier to implement, might apply to a broader population, and possibly be more cost/time efficient. However, the homogeneity of the groups in term of age, sex, and occupation add value to this study and contribute to the literature on the sedentarism issue in hypertensives patients. Additional research with longer and multiple follow-ups is needed.

In conclusion, the findings suggest that physical activity of any kind has benefits in lowering the high blood pressure values and that medication should be used to sustain the patient's daily safety, particularly during practice or testing. Specialized medical intervention is absolutely necessary for hypertensives. Pharmaceutical treatment brings benefit to the patients, but the addition of specialized recovery interventions, such as cardiorespiratory or hydrotherapy programs, increases the patient's resistance to effort and stabilize the blood pressure values.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author R.B.R.C. upon reasonable request.

Author Contributions:

Idea/concept, design, materials, analysis and/or interpretation: R.C.R.B., E.G.P., A.O.D., R.M.M., M.A.; Control/supervision: R.C.R.B., E.G.P., M.A.; Data collection and/or processing: B.C.R.B., E.G.P., M.A.; Literature review: R.C.R.B., E.G.P., A.O.D., R.M.M., M.A.; Writing the article: R.C.R.B.

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