ORIGINAL PAPER

Effects of Programmed Kinesiologic Stimulus to Hemodynamics at Peripheral Artery Disease of Lower Limbs

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ABSTRACT

Goal: The goal of the article is to examine level of hemodynamic improvement in the peripheral artery diseases of lower limbs among patients on medication therapy and patients included in programmed physical activities simultaneously with the medication therapy. **Material and methods:** Prospective-retrospective study includes 100 patients of the Clinic for Vascular Disease, Clinical Center of Sarjevo University (CCUS). It has been found out that the majority of patients in both groups were males. Average age of patients in control group was 48.60±3.82. Average value of claudication distance for patients in control group was 277 m, while the value for patients in test group was 270 m. **Results:** At the end of research the analysis of average PSV values proved significant difference in relation to examined groups (p<0.05). Average PSV value statistically significantly decreased in both groups after the treatment. According to the obtained results it was determined that the claudication distance of control group was statistically considerably smaller in comparison to the average claudication distance in the test group. **Conclusion:** It was established that the chance for the patients to have claudication distance within reference values is 2.57 times higher in the test group in comparison with the patients in the control group after the treatment.
Key words: peripheral artery disease, physical activity, claudication distance, PSV.

1. INTRODUCTION

Peripheral arterial circulation diseases can be divided into two groups: occlusive and non-occlusive diseases, i.e. functional disorders. Ageing is a well known risk factor for cardiovascular diseases and as such it is assessed as the most frequent cause of death in the elderly (1). Physical activity plays an important role in treatment of patients with peripheral arterial disease. Regular training increases functional ability; it has a positive influence on cardiovascular risk factors and improves quality of life (2). Physical training in peripheral arterial disease (Claudicatio intermittens), especially supervised walking, is very efficient in treatment and secondary prevention of this disease (3). The entire research has been conducted in Clinic for vascular disease, Clinical Center of Sarajevo University (CCUS). Research was controlled in two defined comparative groups.

2. WORK METHOD

The goal of the research is to determine the improvement level of the hemodynamic in peripheral artery disease of lower limbs of lower limbs in patients on medication therapy and patients performing programmed physical activities simultaneously with the medication therapy.

Sample

Retrospective-prospective, clinically descriptive controlled study has been carried out on patients of the Clinic for vascular diseases of the Clinical Center, University of Sarajevo. Clinic for vascular disease presents tertiary level of health protection. This study evaluated a 4 months period. Prospective -retrospective study includes 100 patients of the Clinic for vascular disease of the Clinical Centre of the Sarajevo University. All patients are divided in 2 equal groups: control (n=50), test (n=50)

Sample of variables

Intermittent claudication is clinical syndrome caused by occlusive atherosclerotic process of terminal aorta and distal branches with consequential chronically decreased perfusion of limbs (4,5). We have measured the claudication distance in both groups at beginning and at the end of the research Measuring of the PSV value was made by color Doppler sonography of artery tibialis posterior (ATP) – performed at ultrasound device Vivid 5m high frequency probe of 12 MHz, linear 4cm, where we measured PSV (peak systolic velocity) at ATP.

3. RESULTS

Analysis of the gender structure of patients has established that the larger number of patients in both groups were males, 66% in control group and 62% in the test group. Average age of patients in the control group was 48.60±3.82 while the age of patients in the test group was 47.56±3.62. Analysis of the patients' age in the examined groups in comparison with the

gender structure established that there is no statistically significant difference in average age of the patients in relation to the gender within the control and test group. At the beginning of research, after the ultrasound measuring of PSV pedal arteries (table 1), the findings confirmed that patients of both the test and the control group had pathological values which did not statistically deviate among examined groups (p=0.379). Average value of the PSV in patients of the control group was 23.7±8,47 cm/s, and in patients of the test group it was 22.4±5.76 cm/s. Analysis of the average PSV values at the end of research (table 1) has shown statistically significant difference in relation to the examined groups (p<0.05). Average PSV value in patients of the control group at the end of research was 32.2±6.59 cm/s, while in the test group the value was 36.9±4.89 cm/s.

GROUP	BEGINNING			END		
	X	SD	SEM	X	SD	SEM
Control	23.7	8.47	1.19	32.2	6.59	0.93
Test	22.4	5.76	0.81	36.9	4.89	0.69
	F=0.780; p=0.379			F=16.096; p<0.05		

Table 1. *Average PSV values in relation to examined group at the beginning and at the end of research.*

Average value of the claudication distance at the beginning of research for patients of the control group was 277 m, while for patients of the test group it was 270 m. The ANOVA test applied to the values of the claudication distance in patients of the control and test groups at the beginning of research has not determined statistically significant difference, F=0.125; p=0.724. Based on the obtained results after the treatment (table 2), it was determined that the claudication distance of the control group patients (456.44m) was statistically significantly lower than average claudication distance for the patients of the test group (532.78mm); p=0.003.

GR.	BEGINNING			END		
	X	SD	SEM	X	SD	SEM
Control	277.66	103.05	14.57	456.44	129.20	18.27
Test	270.66	94.64	13.38	531.78	119.35	16.87
	F=0.125; p=0.724			F=9.173; p=0.003		

Table 2. *Average values of the claudication distance in relation to the test group at the beginning and at the end of research.*

Statistically significant change of the average value has been established by use of the Wilcox test of paired variables (table 3) to the PSV value before and after the treatment on patients of the control and test groups. Average PSV value has significantly statistically decreased in both examined groups (p<0.05).

Group		
Control	Difference of the PSV – before and after research	Z=-5.933; p=0.001
Test	Difference of the PSV – before and after research	Z=-6.164; p=0.001

Table 3. *Difference between mean PSV values in relation to test group at the commencement and at the end of research*

Statistically significant change of the average value has been established by use of the Wilcox test of paired variables to the value of claudication distance before and after the treatment of patients in the control and test group (table 4). Average value of the claudication distance significantly statistically increased in both examined groups (p<0.05).

Group		
Control	Claudication distance – before and after research	Z=-6.145; p=0.001
Test	Claudication distance – before and after research	Z=-6.154; p=0.001

Table 4. *Difference between mean values of claudication distance in relation to test group at the commencement and at the end of research.*

4. DISCUSSION

Peripheral artery disease is the name for atherosclerotic, stenosing, occlusive or aneurismal disease of aorta and its branches. It is an important manifestation of a systemic atherosclerotic disease. In Western countries, peripheral artery disease affects around 5% of the population between 55 and 74 years of age (6). The epidemiology of artery disease in lower limbs has been studied in many, including several European, countries. The recent study involving the population between 60 and 90 years of age in Sweden shows the prevalence of 18%, out of which 7% patients were affected by intermittent claudication. Typically, one third of all artery diseases belong to the group of symptomatic ones. After the ultrasound measuring the PSV of pedal arteries, the findings confirmed those patients of both the test and the control group had pathological values which did not statistically differs among the examined groups. The PSV value before and after the treatment of patients of the control and test groups show statistically considerable variations in average values. The average PSV value in both examined groups was substantially reduced. No statistically significant divergence of the claudication distance values had been established at the beginning of the research among the patients of control and test groups. Statistical analysis of the claudication distance value before and after the treatment of patients of the control and test groups show statistically considerable variations in average values. The average value of claudication distance had significantly increased in both examined groups. The best proofs resulted from the studies that include monitoring of regular and intensified trainings in a short period of time and under controlled conditions. According to meta analyses of eight studies gathering data for 319 patients, a controlled physical therapy had shown, statistically and clinically, a considerable difference in improvement of maximum claudication distance on the treadmill in comparison with an uncontrolled physical therapy (+150 m, average). Generally, the training program lasts for three months, with three sessions per week. The training intensity on the treadmill is increased by the time, with one session lasting from 30 to 60 minutes. A short and randomized study, making comparisons between a controlled physical therapy and a regular care, did not result in significant divergences in maximum values of cardiovascular tests, however it indicates that after 12 weeks of training the patients under controlled physical therapy became more efficient in achieving circulatory and ventilatory requirements during the exercise (9-13). Progressive kinesiological activity is an effective treatment for improvement in walking ability and reduction of mortality and cardiovascular manifestations of patients with periphery artery disease, although the ability to perform effective kinesiological activity often declines by the age of patients. Maintaining and increasing reserves of functional capacity are important factors for elderly population. Maintenance and development of kinesiological reserves

are the goals that elderly population achieves through the participation in kinesiological activity. Therefore, the proper kinesiological activities in a form of programmed and controlled exercises may serve as a primary type of therapy for individuals affected by periphery artery disease.

5. CONCLUSION

At the beginning of research, after the ultrasound measuring of PSV pedal arteries, the findings confirmed those patients of both the test and the control group had pathological values which did not statistically diverge among examined groups. The analysis of average PSV values at the end of the research has indicated a statistically significant difference between the examined groups. Based on statistical analyses we can conclude that PSV values before and after the treatment of patients of the control and test groups show statistically significant variations in average values. The average PSV value in both examined groups, and especially in the test group, has increased substantially. Statistically significant diference of the claudication distance values has not been established at the beginning of the research among the patients of control and test groups. The claudication distance for all patients was measured once again, after the treatment. Based on given results, we conclude that claudication distance of the control group patients was considerably lower than the average claudication distance of the test group. After the treatment, the average claudication distance value has significantly increased in both examined groups. Based on our research, we can conclude that after the treatment the chance of an patient to have a claudication distance within the limits of reference values is 2.57 times higher among the patients of the test group than those of the control group, which has proven as statistically significant difference in recovery prospects compared to the control group.

CONFLICT OF INTEREST: NONE DECLARED.

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