

ASPECTS OF FUNCTIONAL RECOVERY OF PATIENTS WITH HEART FAILURE

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ABSTRACT

The study analyzes the benefits of physiotherapy for patients with heart failure, a condition that severely limits exercise capacity. The rehabilitation program was applied to a target group of 15 patients, constantly monitoring vital parameters (BP, HR) and progressing from light movements in supine position to light walking. The results of the target group were compared with the results of a control group of 15 patients.

The physiotherapy program brought clear cardiovascular benefits to the experimental group: a more pronounced decrease in heart rate compared to the first day of hospitalization, a lower mean systolic blood pressure (117 mmHg for patients compared to 126 mmHg in the control group) by decreasing peripheral vascular resistance, as well as optimizing stroke volume and oxygen consumption, determining a favorable evolution and increased exercise tolerance in 100% of patients.

INTRODUCTION

Heart failure syndrome is a serious problem affecting the pumping function of the heart, resulting in its inability to send blood to the tissues. Heart failure is often accompanied by other conditions, the most common of which are: diabetes, hypertension and lung disease. [3,7]

Heart failure is common, mostly affecting patients between the ages of 70 and 80 and less often younger patients, who account for 15-20% of patients hospitalized with CHF.[10,1]

Most often, patients are treated pharmacologically and by limiting partial effort, and in advanced cases, the treatment is surgical and the limitation of effort is almost complete. In this context, recovery through supervised physiotherapy programs can lead to an improvement in the patient's condition, reducing symptoms, reducing hospitalization and preventing complications. [6,9,2]

The main objective of the study is to apply a personalized physiotherapy program with the aim of supporting peripheral circulation, cardiac function, increasing independence, increasing exercise tolerance and training respiratory function.

MATERIALS AND METHODS

This is a comparative study that highlights the difference between the evolution of a group of patients who followed a physiotherapy program compared to a group of patients who did not follow the program.

The study included 30 patients, 15 followed the physiotherapy program and 15 did not. 43% were aged between 51 and 70 years, 32% were aged >71 years, 21% were aged between 31-50 years and 4% were aged <30 years. The majority of patients were male (63%).

The inclusion criterion in the study was represented by patients with heart failure hospitalized in the cardiology department, who had the consent of their treating physician to participate in the physiotherapy program.

In the first stage of the study, patients were assessed using scales and questionnaires, then a personalized physiotherapy program was created for them, applied during the hospitalization period (approximately 5 days), and at each session, BP and HR were monitored at rest, during exercise and after exercise. The equipment used was: a blood pressure monitor and a pulse oximeter.

For the objective assessment of patients, the Visual Analog Scale (VAS), ADL scaling and Barthel index, a fall risk assessment scale, as well as the specific KCCQ questionnaire were used.

The physiotherapy program included light exercises starting from supine, then sitting and finally standing. In supine, the patient performed active mobilizations starting from the small joints; from sitting, the patient performed active mobilizations with the recommendation that shoulder flexion and abduction not exceed 90°; from standing, the patient walked around the bed and light balance exercises. The difficulty of the exercises gradually increased, from one session to another, taking care of the values of vital parameters.

RESULTS

Patienti (P1,P2,P3,...)= patients who followed the recovery program.

Control group (C1,C2,C3,...)= patients who did not follow the recovery program.

Table 1- BP in patients who did not follow the recovery program

Control group	Hospitalization	Discharge
C1	148/85	133/80
C2	101/59	129/81
C3	157/105	140/99
C4	135/70	138/60
C5	137/98	111/71
C6	120/80	142/82
C7	92/51	92/54
C8	165/85	140/70
C9	113/64	126/70
C10	140/90	130/75
C11	127/73	142/80
C12	120/84	130/70

C13	125/70	119/74
C14	112/73	133/75
C15	105/68	98/58

Table 2- BP in patients who followed the recovery program

Patients	Day 1	Day 5
P1	139/74	119/60
P2	105/65	96/56
P3	119/84	93/63
P4	129/90	120/81
P5	145/67	134/69
P6	145/90	153/90
P7	132/76	160/80
P8	130/89	119/81
P9	114/52	123/67
P10	159/90	122/78
P11	103/73	93/63
P12	120/77	115/73
P13	127/75	111/64
P14	130/76	110/65
P15	100/70	101/72

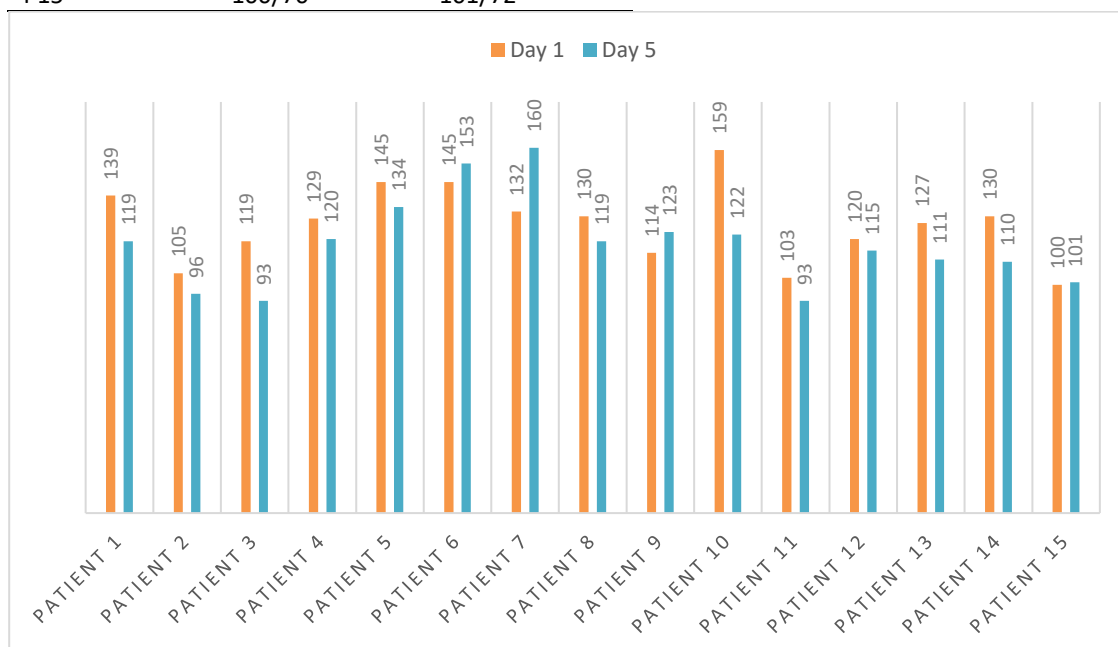


Figure 1- Graphical representation of patients systolic blood pressure values

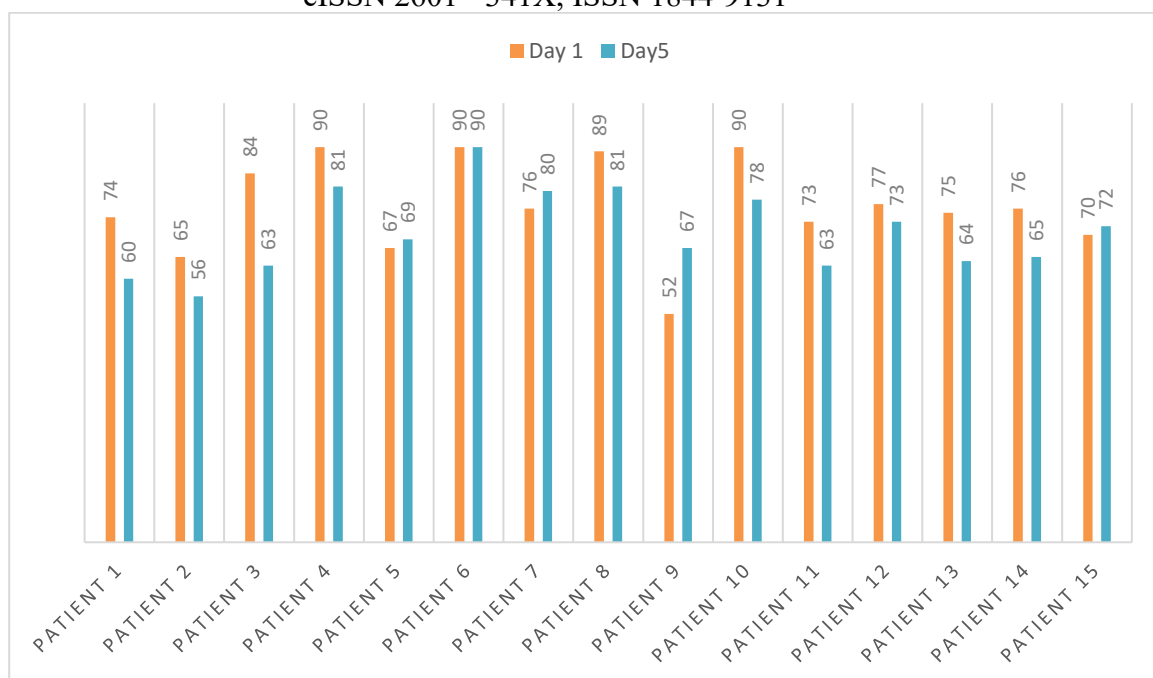


Figure 2- Graphical representation of patients diastolic blood pressure values

Table 3- HR in patients who did not follow the recovery program

Control group	Hospitalization	Discharge
C1	81	54
C2	61	63
C3	65	67
C4	90	78
C5	97	100
C6	65	65
C7	77	85
C8	39	58
C9	84	64
C10	105	115
C11	68	67
C12	110	95
C13	59	58
C14	109	81
C15	85	91

Table 4- HR in patients who followed the recovery program

Patients	Day 1	Day 5
P1	94	88
P2	70	78
P3	85	78

P4	65	73
P5	55	68
P6	91	67
P7	72	72
P8	115	93
P9	74	74
P10	150	78
P11	62	69
P12	65	70
P13	92	76
P14	69	69
P15	91	97

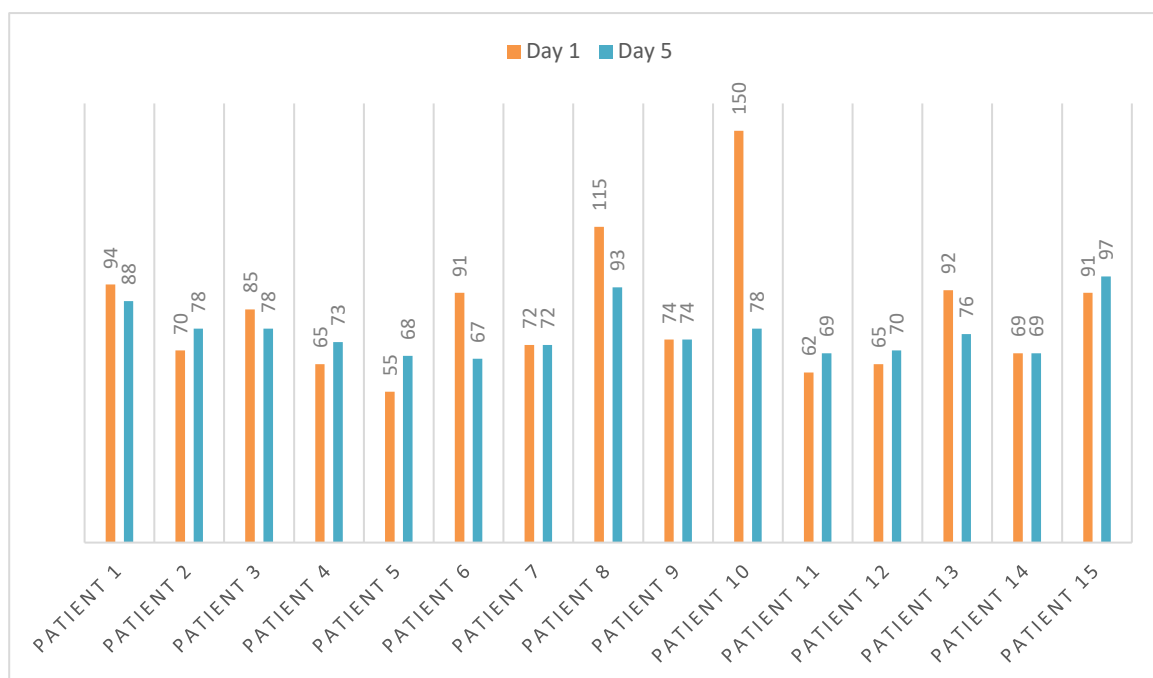


Figure 3- Graphical representation of patients heart rate

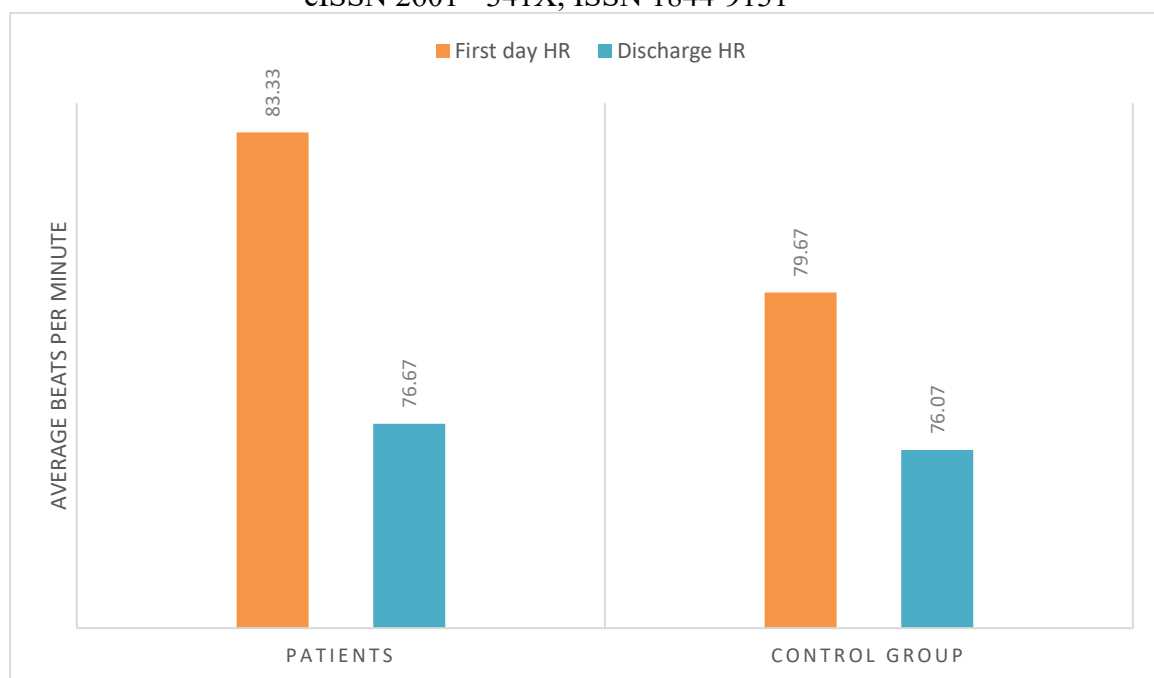


Figure 4- Graphical representation of the mean values of HR for both groups of patients

Table 5- Patient evolution

Patients	Day 1	Day 2	Day3	Day4	Day5
P1	Active mobilizations from supine position	Active mobilizations, sitting	Maintaining the orthostatic position	-	-
P2	Sitting exercises, walking around the hospital room	Orthostatic exercises	The 6-minute walk test	Easy exercises with elastic band	The 6-minute walk test
P3	Exercises from supine position, sitting	Walking around the hospital room 1,19 min	Walking around the hospital room 2,6 min	Calf raises	Sitting exercises
P4	Walking around the hospital room	-	-	-	-
P5	Walking around the hospital room	Orthostatic exercises	Easy exercises with elastic band	Easy exercises with elastic band	-

P6	Sitting exercises	Walking around the hospital room	-	-	-
P7	Sitting exercises	Maintaining the orthostatic position	-	-	-
P8	The 6-minute walk test	Easy exercises with elastic band	Easy exercises with elastic band	-	-
P9	Exercises from lying down	Maintaining a sitting position	Sitting exercises	Maintaining the orthostatic position	Walking around the hospital room, Standing mobilizations
P10	Walking around the hospital room	-	-	-	-
P11	Walking around the hospital room	The 6-minute walk test	Orthostatic exercises	The 6-minute walk test	Easy exercises with elastic band
P12	Orthostatic exercises	The 6-minute walk test	-	-	-
P13	Passive mobilizations from supine position	Passive mobilizations from supine position	Passive mobilizations from supine position	-	-
P14	Orthostatic exercises	Orthostatic exercises	-	-	-
P15	Sitting exercises	Maintaining the orthostatic position	Walking around the hospital room	-	-

Table 5- Statistical analysis of the results obtained through the evaluation scales for the target group

	Arithmetic mean		Standard deviation		T-Student	Result
	Initial	Final	Initial	Final		
VAS	5,73	4,47	2,2189	1,8465	0,0003	Validity (p<0.01)
ADL	9,00	9,60	2,0702	1,3523	0,0175	Validity (p<0.05)
Barthel	84,33	92,33	21,6244	20,2461	0,0008	Validity (p<0.01)
Risk of falling	5,53	4,47	2,4455	1,8385	0,0205	Validity (p<0.05)

DISCUSSIONS

From the results presented, it can be seen that the blood pressure of patients who followed a physiotherapy program during hospitalization is improved compared to patients who did not follow a physiotherapy program, normal blood pressure values being between 110-130/80-90 and the values at the end of the physiotherapy program being on average 117/70 compared to patients who did not follow a physiotherapy program who have an average of 126/73.

Although both hemodynamic parameters are within the physiological reference limits, the significant reduction in mean systolic blood pressure recorded in the patients in the experiment (117 mmHg compared to 126 mmHg in the control group) highlights the benefit of dosed physical effort. From a pathophysiological point of view, this effect is the direct result of the decrease in peripheral vascular resistance and the improvement of arterial wall compliance. [8,11]

The HR of patients who followed a physiotherapy program is improved compared to patients who did not follow the physiotherapy program, normal HR values are between 60-100 bpm. The values recorded at the end of the physiotherapy program are on average 76,67 bpm compared to patients who did not follow a physiotherapy program who have an average of 76.07 bpm.

The mean resting heart rate values are extremely close between the two groups at the end of the study, the dynamics of cardiac function must be interpreted in a broader context. The real improvement of cardiac function in the experimental group is not reflected only in the raw number of beats per minute at absolute rest, but in the increase in stroke volume, optimization of myocardial oxygen consumption and an adaptation to exercise.[12,4] Also, if we analyze the values recorded on the first day of hospitalization, we can see that patients who followed the recovery program had an average improvement in heart rate of 6.67 bpm, while the control group achieved a decrease in resting heart rate of only 3.6 bpm.[5]

Following the presented results, we can observe an improvement in cardiac function of patients who followed the recovery program during the hospitalization period.

The physiotherapy program lasted an average of 3 days, each session lasting approximately 30-40 min; the intensity of the exercises gradually increased, taking into account the patient progress. Each session included breathing exercises and active mobilizations, starting with small joints; each patient observed an increase in mobility and exercise tolerance.

In 100% of patients who followed the physiotherapy program, the evolution was favorable, their progress being visible from one session to the next.

CONCLUSIONS

After analyzing the patients data, we can say that the physiotherapy program met the main objectives:

- Supporting peripheral circulation through active mobilizations, starting with small joints;

- Supporting cardiac function and increasing exercise tolerance by gradually increasing exercise intensity;
- Training respiratory function through breathing exercises at each physiotherapy session;
- Increasing independence through standing exercises and gait training.

An improvement in BP values was observed in 65% of study participants and 58% had optimal HR values.

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