

Table 7. Influence of the Period after OHT on Study Variables

Variable	Period after OHT	Case Number	Before exercise training	After exercise training	Z-value
			mean (SD)	mean (SD)	
Body Image	≤1 year	(7)	130 (33.9)	138.6 (33.7)	-0.34
	>1 year	(6)	112.5 (32.0)	162.7 (22.1)	-2.2*
Self-Efficacy	≤1 year	(7)	13.6 (13.8)	37.6 (13.5)	-2.4*
	>1 year	(6)	16.8 (7.9)	27.7 (11.8)	-1.9
Physical Symptoms	≤1 year	(7)	19.3 (11.1)	27.4 (22.5)	-1.02
	>1 year	(6)	48.0 (37.2)	31.8 (16.8)	-0.95
Estimated VO _{2max}	≤1 year	(7)	5.3 (2.0)	8.5 (1.7)	-2.4*
	>1 year	(6)	5.6 (2.3)	7.8 (2.3)	-2.2*
DASI	≤1 year	(7)	30.6 (10.9)	40.1 (13.2)	-1.27
	>1 year	(6)	37.7 (14.5)	44.6 (12.5)	1.75
FEV1	≤1 year	(7)	2.4 (0.5)	2.5 (0.9)	-0.17
	>1 year	(6)	2.3 (1.4)	1.9 (1.2)	-0.94
FVC	≤1 year	(7)	3.2 (1.4)	2.9 (1.1)	-0.34
	>1 year	(6)	2.1 (1.1)	2.3 (0.9)	-0.52
FEV1/FVC%	≤1 year	(7)	83.6 (23.1)	95.2 (32.2)	-2.0*
	>1 year	(6)	97.9 (45.9)	72.5 (29.0)	-1.57
HR resting	≤1 year	(7)	102.7 (13.9)	94.6 (10.8)	-1.15
	>1 year	(6)	95.7 (12.8)	94.8 (13.8)	-0.4
SBP	≤1 year	(7)	122.6 (16.2)	115.4 (7.8)	-1.27
	>1 year	(6)	135.7 (17.2)	124.3 (10.5)	-2.01*

DASI = Duke Activity Status Index. * $p < 0.05$.

tion resulted in different physical conditions, subjects were divided into two groups (≤ 1 year vs. > 1 year). The average estimated VO_{2max} was 5.3 METs for subjects who had undergone OHT less than 1 year and 5.6 METs for subjects who had undergone OHT over 1 year. These results are similar to the findings of Osada,¹¹ in which exercise capacity significantly improved within 6 months after cardiac transplantation and was maintained for a long period.

Previous studies of heart transplant recipients have reported that exercise training can increase peak VO₂ by 18% as in Savin's study¹⁸ and 27% as in Kavanagh's study.⁸ In the current study, after 10 weeks of exercise training, the estimated VO_{2max} significantly improved (from 5.4 to 8.1 METs) with an increase of 50%. With respect to the gender difference in improvement of VO_{2max}, although a significant increase was only found in male patients, the magnitude of improvement in VO_{2max} was not significantly different between males (54%) and females (44%). In addition, after 10 weeks of exercise training, a significant improvements in VO_{2max} was observed in both groups (≤ 1 year vs. > 1 year). This result suggests that the

VO_{2max} still can be improved by exercise training even more than 1 year after OHT. Therefore, exercise training should be started to improve the patient's functional capacity, no matter how much time has passed since the heart transplantation took place.

Studies^{8,9} have demonstrated that improvements in exercise capacity after exercise training are associated with pulmonary as well as cardiovascular changes. A significant increase in oxygen uptake in response to exercise training is always paralleled by a significant increase in peak heart rate.^{9,30,31} The increase in peak heart rate accounts for 52% of the increase in VO_{2max}.⁹ Unfortunately, peak heart rate increasing after exercise training was not observed in the current study. A possible explanation for this could be that the exercise test was terminated at a submaximal level rather than at a maximal level. Because an indirect method was used during exercise testing, the most common reason for stopping exercise tests was due to subjects' request rather than reaching their maximal levels. Another possible reason could be that the decreased resting heart rate and systolic blood pressure after training contributed to a greater range of increases in heart rate