

# Physiological responses to water aerobics performed at different levels of intensity

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## INTRODUCTION

Water aerobics has become one of the most widely performed "fitness" activities in different groups: elderly, injured, and even healthy people. Some studies have investigated the different physiological responses during land and water aerobics and have discovered a difference in heart rate of about 10-15 bpm. Other studies have found a progressive decrease both in heart rate and blood lactate when going from land, to shallow water, to deep water. This seems related to the water itself: there is a situation of reduced gravity acceleration and the density of the fluid is high enough to keep the speed of the movements rather slow. So water aerobics is less demanding and traumatic than activity on land. The purpose of our work was to compare the results of heart rate and blood lactate levels in two groups of ten females doing aerobics on land, water aerobics at various speeds and performed at different depths.



## METODOLOGY

Two similar groups of ten females were selected. The average age, height, and weight of the first one were  $27.4 \pm 3.63$  years old,  $164.1 \pm 6.57$  cm,  $60.7 \pm 7.27$  kg respectively. Those of the second one were  $35.77 \pm 4.82$  years old,  $166.08 \pm 2.66$  cm,  $56.81 \pm 3.69$  kg respectively.

Group 1 did 30 minutes of standardised exercise, the first 15 minutes at a slow pace and the second 15 min. at a twice the original pace. This kind of exercise was executed in a gym, in a swimming pool in shallow water (about 80 cm) and then in deep water (about 135 cm). The subjects were equipped with a heart rate monitor (Polar Vantage) in order to measure the heart rate (beats per minute) throughout the exercise. Furthermore, capillary blood was taken from the finger tip after 15 and 30 minutes of exercise. Blood lactate (mM) was analysed by Boehringer Accusport.

Group 2, equipped with special floating vests and heart monitors, did a standardised exercise in deep water: two periods of 7 min. of warm up at increasing pace, then 14 min. of exercise at high pace and then another period of 7 min. at decreasing pace. Blood lactate was analysed after every period.

## RESULTS AND DISCUSSION

Table 1 shows the results obtained with the first group when performing an exercise under different conditions. As expected, there is a decrease in heart rate and blood lactate levels, because of the effect of the water.

We found the highest heart rate and lactate values when the exercise was performed on land. The values went down when the exercise was performed in shallow water, and even more so in deep water. Because of the small levels of lactate during water exercise, it seems that the metabolism involved is probably fully aerobic in this kind of exercise.

Table 2 shows, on the other hand, that a particular exercise performed in deep water at a fast pace, with a high involvement of different parts of the body, is rather demanding as regards the heart rate and the blood lactate values.

Table 1. Values (mean  $\pm$  sd) of heart rate and blood lactate during exercise performed in different conditions

	On land		Shallow water		Deep water	
	Slow pace	Fast pace	Slow pace	Fast pace	Slow pace	Fast pace
Heart rate (bpm)	138.2 $\pm$ 18.5	162.7 $\pm$ 13.8	119.0 $\pm$ 15.6	149.1 $\pm$ 18.8	93.1 $\pm$ 12.4	112.5 $\pm$ 12.6
Blood Lact (mM)	3.86 $\pm$ 2.02	6.53 $\pm$ 3.52	1.83 $\pm$ 0.37	3.06 $\pm$ 0.82	1.72 $\pm$ 0.45	1.72 $\pm$ 0.38

## CONCLUSIONS

Our data indicate that the performance during water aerobics can vary greatly according to the depth of the water, the pace of execution, the equipment used. This is useful to know since we can adjust the activity according to the level of training of the subjects.

Therefore we expect that the American College of Sport Medicine (ACSM) will revise the guidelines for the fitness activities in order to meet the needs of water aerobics.

Table 2. Values (mean  $\pm$  sd) of heart rate and blood lactate during exercise performed in deep water

	1 <sup>st</sup> period	2 <sup>nd</sup> period	3 <sup>rd</sup> period	4 <sup>th</sup> period
Heart rate (bpm)	153.1 $\pm$ 12.4	161.6 $\pm$ 10.1	166.4 $\pm$ 10.1	148.6 $\pm$ 5.9
Blood Lact (mM)	9.42 $\pm$ 2.30	11.59 $\pm$ 1.69	12.07 $\pm$ 2.91	7.34 $\pm$ 2.97

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