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PHYSICAL EDUCATION

THE EFFECT OF 12 WEEKS OF MODERATE INTENSITY SHALLOW WATER EXERCISES ON SELECTED CHD RISK FACTORS: AN ECOLOGICAL APPROACH

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Abstract

The main purpose of the present study was to verify the effects of a 12-week moderate intensity shallow water program on CHD risk factors in adults. Fifteen volunteers were part of an experimental group (Moderate Intensity shallow water Exercise) (MISWE), and fifteen volunteers were part of the control group (CG). The Exercise performed 45 min of moderate intensity shallow water program four days in a week for 12 weeks; no physical exercise was permitted for the Control during the same period. The evaluations were performed the week before (pre-training) and after the training program (post-training). The primary outcomes were the CHD risk factors such as Total Cholesterol (TC), Triglycerides (TG) and High Density Lipoproteins Cholesterol (HDL). Adjusted analysis for age and baseline values showed no differences between Exercise and Control in post-training moment. However, there was a moderated tendency for reduced Total Cholesterol (TC), Triglycerides (TG) and High Density Lipoproteins Cholesterol (HDL) in MISWE. These results suggest that 12 weeks of MISWE performed four days in a week in a real-life context seem to benefit the Total Cholesterol (TC), Triglycerides (TG) and High Density Lipoproteins Cholesterol (HDL) of adults.

Keywords: Total Cholesterol (TC), Triglycerides (TG) and High Density Lipoproteins Cholesterol (HDL).

INTRODUCTION

Over the years, there has been a widespread recommendation for all people to participate in physical activity on a regular basis. However, certain limitations may restrict people's ability to participate in exercise programs, specifically obesity, low levels of physical fitness, locomotion difficulties caused by aging, orthopedic or neurological disabilities, or pulmonary disease. Given these difficulties, health and sports professionals have recommended water-based exercises as an alternative to traditional dry-land exercise, leading to a significant increase in physical exercise performed in an aquatic context .The properties of the aquatic environment, which reduce the effect of body weight on the joints and compression forces and reduce the risk of injury or fall, combined with the resistance of the water during all movements, make it beneficial for overall body exercise and recovery from injuries(Alberton et al., 2013).

Currently, water aerobics is among the aquatic programs most widely recognized by health specialists, sport professionals, and practitioners. This recognition could be due not only to the organic changes caused by hydrostatic pressure, buoyancy and thermodynamics but also to the variety of movements that can be carried out using the properties of water to create resistance to movement with reduced neuromuscular activity required from the antigravity muscles. These aspects could be used to improve the physical conditions of people with certain difficulties as well as healthy young people and adults. Studies have reported improvements in oxygen uptake muscle strength and body composition as a result of water aerobics participation. Nevertheless, previous discussions have noted that the exercise program should be specific enough or long enough to cause effective improvements Studies with a short duration and lower intensities, even with experienced practitioners, have found contrary results and further research should be developed(Borreani, 2014).

Shallow water exercise (SWE) is performed in water with participants typically immersed anywhere from waist to auxiliary level. Because of its greater density and dynamic viscosity, water offers more resistance to movement compared with an air medium. Furthermore, the buoyancy effect of water reduces impact forces on joints . The unique properties offered by water require that certain instructional (i.e., verbal cues) and movement tactics be employed to modulate physical exertion during aquatic exercise. For example, participants can change intensity during SWE by manipulating speed, body surface area, force application, range of motion, and planes of movement. Employing any one or a combination of these movement strategies will dramatically change the magnitude of resistance to motion and impact physical exertion and energy expenditure during a continuous or intermittent SWE workout (Raffaelli et al., 2016).

MATERIALS AND METHODS

PARTICIPANTS

The subjects were recruited from the same residential zone in Thrissur, Kerala. Participants of different classes, randomly chosen, were informed about the study protocol, risks, and benefits and once they agreed, they voluntarily signed the informed consent form.

For inclusion in the experimental group (Exercise), the individuals had to i) be water aerobics practitioners for more than six months; ii) participate in at least two lessons per week regularly; iii) be aged 18 years or older. The control group (Control) included subjects older than 18 years who did not exercise regularly and living at the same residential zone of the Thrissur, Kerala. Subjects were excluded from the study if they presented a recent hospitalization, severe cognitive or motor impairments, an inability to exercise and any other medical contraindications for physical exercise.

An initial sample of 42 individuals were assessed for eligibility and 35 agreed to take part in the study. From these, thirty subjects were included upon meeting the criteria for selection. The Exercise included 15 participants of male adults (32.21 ± 12.21 years of age; 1.65 ± 0.03 m of height; 69.23 ± 13.13 kg of body mass; 2.11 ± 1.70 years of experience in water aerobics). All of them participated in water aerobics classes at the District Sports Stadium, Thissur. The Control included fifteen subjects, of male adults (3139 ± 12.55 years of age; 1.64 ± 0.75 m of height; 70.61 ± 11.19 kg of body mass). The Control did not participate in the water aerobics classes and maintained their basic daily activities without physical exercise.

PROCEDURES

The present study consists of a non-randomized controlled trial that aimed to verify the changes in selected CHD risk factors (Total Cholesterol (TC), Triglycerides (TGL) and High Density Lipoproteins Cholesterol (HDL) and after 12 weeks of Moderate Intensity shallow water Exercise. These variables were assessed during the week before the program implementation (week 0—pre-training) and the week after the end of the program (week 12—post-training). The variables assessed could be categorized into single group, namely, CHD risk factors (Total Cholesterol (TC), Triglycerides (TG) and High Density Lipoproteins Cholesterol (HDL).

The variables were evaluated in a single day in the morning session. The subjects were instructed in advance to refrain from exercise, alcohol and caffeine consumption during the evaluation period. All variables were assessed by experienced medical lab technician. They were not informed about the group to which the subjects belonged to.

CHD RISK FACTORS

The Total Cholesterol (TC), Triglycerides (TG) and High Density Lipoproteins Cholesterol (HDL) was assessed by using blood sample test. This measurement was performed according to the protocol described *Burstein et al., (1970) and Lopes et al. (1977)*.

MODERATE INTENSITY SHALLOW WATER EXERCISE PROGRAMME

The Moderate Intensity shallow water Exercise held during the 12-weeks program were the ones usually performed at the institution. The subjects performed the exercise routines, four days in a week, each lone lasting 50 min. The researchers did not interfere with the Moderate Intensity shallow water Exercise programming, evaluating only the usual classes carried out by the teacher.

Each programme started with a warm-up (e.g., jogging and lateral movements) of 10 ± 2 min. Then, it was followed a main routine divided in 30 ± 2 min of aerobic exercitation, with all body stimulation (e.g., general exercises for upper and lower limbs simultaneously performed), recording heart rates between 101 and 126 bpm and 10 min of specific exercitation (e.g., specific upper or lower body exercitation), recoding heart rates between 98 and 118 bpm. The Moderate Intensity shallow water Exercise programme ended usually with approximately 5 min of active recovery, with heart rates between 90 and 99 bpm. The swimming pool where the water aerobics took part was 1.50 m deep and the water temperature approximately 29°C.

STATISTICAL ANALYSIS

Standard statistical procedures were selected to calculate means, standard deviations (SD) and 95% confidence limits. For the statistical analysis between groups, we made several analysis decisions relative to our study population that entailed adjusting our analysis for covariates that might influence the overall outcome.

RESULTS

In the beginning of the training program, there were no significant differences between Moderate Intensity shallow water Exercise and Control in Total Cholesterol (f = 0.07), Triglycerides (f = 0.25) and High Density Lipoproteins Cholesterol (f = 0.06). After adjusting for baseline values, the variables assessed to evaluate CHD risk factors showed only moderated effect sizes between Moderate Intensity shallow water Exercise and Control in post-training for Total Cholesterol(f = 29.35), Triglycerides (f= 33.52) and High Density Lipoproteins Cholesterol (f=10.73).

We have presented the results of our statistical analysis between groups after the intervention, considering the adjustment for baseline values. However, a deeper analysis was performed to verify the effects within groups. To this end, the following results are unadjusted, analyzing each variable change from

baseline following the intervention, presenting absolute and relative values, changes, 95% CI, effect sizes and f-values for within groups comparison. The Moderate Intensity shallow water Exercise program decreased the Total Cholesterol, Triglycerides and enhanced the High Density Lipoproteins Cholesterol.

These favorable effects on the CHD Risk factors of those who practiced a 12-week program of Moderate Intensity shallow water Exercise program can be verified in Table 1. Among these results, the significant gains in the Total Cholesterol, Triglycerides and High Density Lipoproteins Cholesterol in the Moderate Intensity shallow water Exercise are worth noting in the Fig 1 to Fig 3.

TABLE 1
CHD RISK FACTORS VALUES OF THE MODERATE INTENSITY SHALLOW WATER EXERCISE AND CONTROL IN PRE AND POST-TRAINING

	Moderate Intensity shallow water Exercise(n-15)				Control(n=15)			
	Pre Training	Post Training	MI%	*F* value (0.05)	Pre Training	Post Training	MI%	*F* value (0.05)
TC	189.40	176.87	12.53	4.67*	189.67	189.86	0.20	0.06
TGL	179.20	154.20	25.00	9.15*	178.20	178.67	0.47	0.12
HDL	41.87	49.27	7.40	5.06*	41.47	42.33	0.87	0.57

FIGURE 1
TC CHANGES BETWEEN PRE AND POST TRAINING

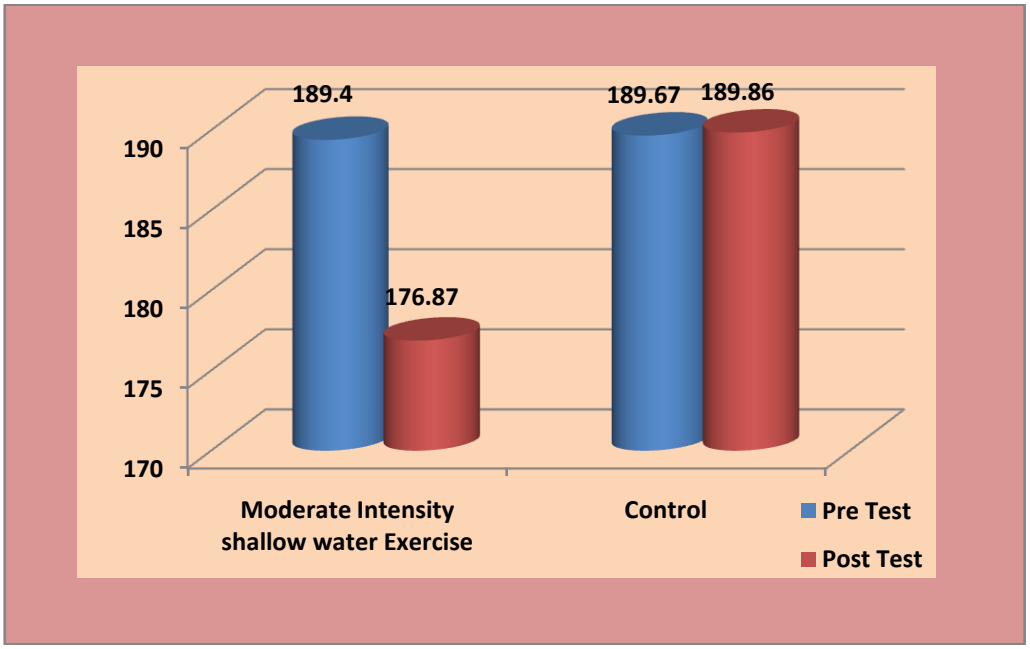


FIGURE 2
TG CHANGES BETWEEN PRE AND POST TRAINING

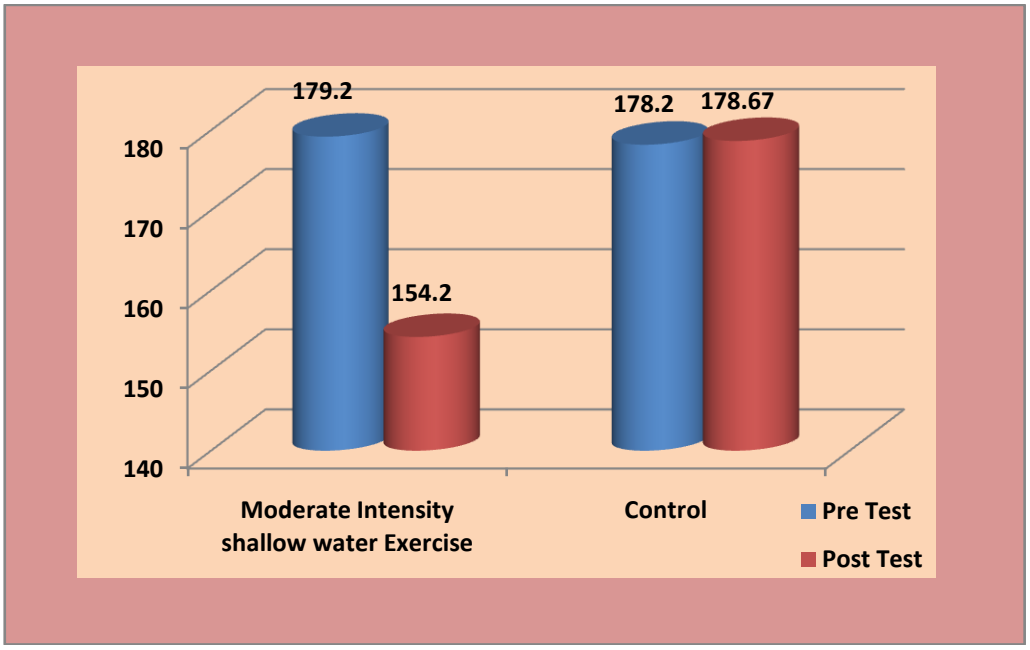
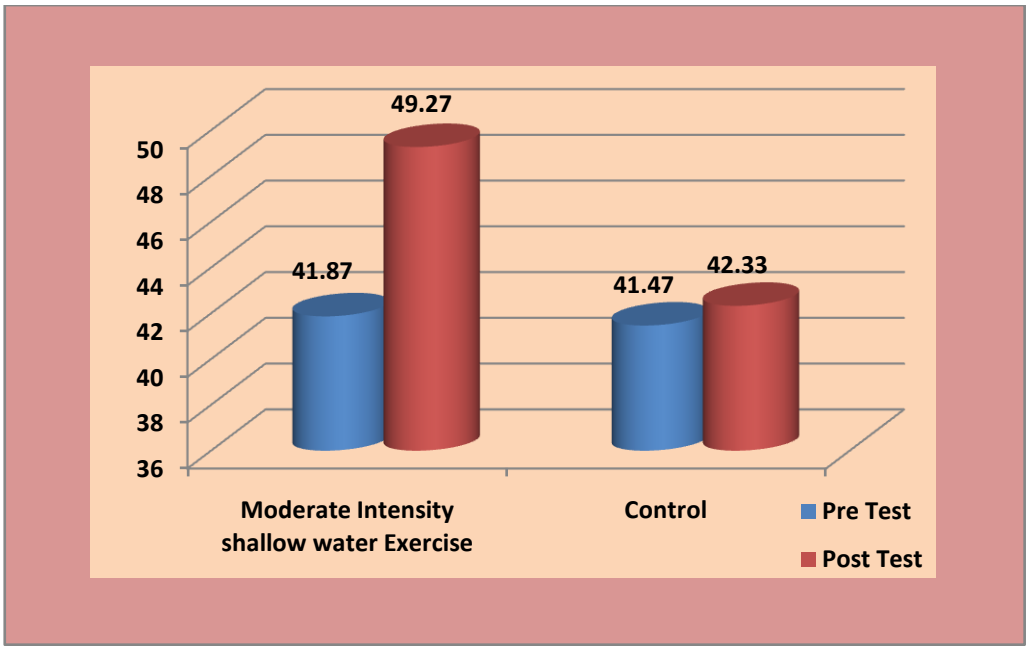


FIGURE 3
HDL CHANGES BETWEEN PRE AND POST TRAINING



RESULTS AND DISCUSSION

The main purpose of this study was to verify the effects of a 12-week Moderate Intensity shallow water Exercise program on CHD Risk factors (Total Cholesterol, Triglycerides and High Density Lipoproteins Cholesterol) in adults on Thrissur, Kerala. The results showed that 12 weeks of Moderate Intensity shallow water Exercise program greatly improved theHDL and decreased in TC and TG values. Thus, it appears that a 12-week Moderate Intensity shallow water Exercise program (four 50-minute classes per week) is enough to induce improvements in TC, TG and HDL in the adult population. These results are in agreement with

previous investigations that focused on the acute effects of water exercise (Cunha et al., 2016).

CONCLUSION

The current results suggest that a 12-week Moderate Intensity shallow water Exercise program program held four days in a week for 50 min per session contributes favorably to improve HDl and decrease TC and TG. Further high-quality studies with ecological validity should be performed to better determine the effects of the methods implemented and to optimize the benefits of this CHD risk factors, which is increasingly being practiced today.

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