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Effect of shallow water and land walking on selected physical fitness variables among obese adults

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ABSTRACT

The aim of this study was to outline an integrated approach to shallow water walking (SWW) and Land walking (LW). Sixty healthy, untrained male volunteers ranging in age from 18–21 years were studied to find out the effect of shallow water and land walking on selected physical fitness variables of obese adult, including muscular strength and endurance, flexibility, cardio respiratory fitness, body fat and body mass index (BMI). Subjects were required to attend five classes per week for a total of 12 weeks. The subjects were evaluated before and after the 12-week training program. These findings indicate that regular shallow water and land walking practice can result in improvements in the physical fitness. It was observed that the mean gains from pre and post test were statistically significant showing that the twelve weeks of Shallow water walking and land walking training produced significant improvement SWWG .Body Weight (kg) (± 2.10, p<0.001 , change ± 0.65). Flexibility (cms) (± 0.51, p<0.00 1, change ± 0.62), Muscular Endurance (nos) (± 1.39 p< 0.001 change ± 0.26), Cardio Respiratory Endurance (mts). (± 41.90 p<0.001 change ± 3.29), Body Fat (± 0.87 p <0.001 change ± 0.26). BMI (%) (± 0.63 p<0.001 chan ge ± 0.05). LWG. Body Weight (kg) (± 3.24 p<0.01 change ± 0.10), Flexibility (cms) (± 1.48 p<0.01 change ± 0.30), Muscular Endurance (nos)(± 1.10 p<0.001 change ± 0 .33), Cardio Respiratory Endurance (mts)(± 27.33 p <0.01 change± 4.34), Body Fat (± 0.64 p<0.001 change± 0.2 4), BMI (%)(± 0.45 p<0.001 change± 0.04).

Keywords: shallow water walking, land walking, Muscular endurance, Muscular strength,

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INTRODUCTION

Water walking introduces new exercise variables such as buoyancy, water resistance, and heat exchange between your body and water that may add to the benefits you get out of exercising in water. Water walking as you may have figured out right now has nothing to do with walking on water. Walking in water makes a great aerobic workout that helps put your body in the fat burning zone fast helping your burn fat like a fat burning machine. Water walking it may be your best bet to getting stronger muscles [7].Although the kinetic and kinematic characteristics of walking in water have been studied over the past few years [1, 2].When exercise intensity was matched to cardio respiratory and RPE responses, muscle activity was approximately 70% lower during both forward and backward walking in water, compared with land walking, in younger and older participants. Despite this difference, cardiovascular intensity was similar in both environments. It is thought that in water, the arms moving through the water's resistance may contribute to higher cardio overload. Slower walking speeds (approximately 57% lower)—caused by water's buoyancy and resistance—could also decrease muscle activation in the pool[3,4]. When land and water walking speeds were matched; cardio respiratory and RPE responses were higher in water. Walkers had lower peak

muscle activity in water than on dry land, although water walkers had higher average muscle activity for the quadriceps (rectus femoris and vastus lateralis), hamstrings (biceps femoris) and gastrocnemius. Investigators suspected that in order to keep pace by pushing through water, the water walkers had to engage propulsive forces, using more muscle activity over a longer period of time[4].When participants walked at self-selected speeds, they chose slower speeds in water, and only the hamstrings produced greater muscle activation than on land. This could be related to the need to increase propulsive force to overcome drag in water [5]. Investigators reported that the gastronomies was used more as speed increased, while the soleus was engaged more as lower-extremity load increased. Changing water depth can change load. The researchers thought that greater load and shallower water increased the somatosensory input that stimulated soleus motor neurons [6].

MATERIALS AND METHODS

METHODOLOGY

The objective of the study was to investigate the effect of shallow water and land walking on selected physical fitness variables of obese adult. Muscular endurance, muscular strength, flexibility, body composition, cardiovascular fitness and waist circumference were selected as variables for this investigation. Sixty physically active, male, undergraduate engineering college students between 18 and 20 years of age volunteered as participants. Participants were randomly categorized into three groups of 20 each: Group I was not exposed to any specific training/conditioning program (CG), group II was involved in Land walking group (LWG) and group III was given Shallow Water Walking Group (SWWG). The Shallow Water and land walking program was designed by the investigators and was administered for a period of 12 weeks, 5 days a week. It was specifically designed to improve the fitness levels of obese adults. Participants attended one, 45 minute session Monday thru Friday. Both experimental groups underwent their respective experimental treatment.

MEASUREMENTS

Invitation letters were sent to participant for consent to participate in the study; only those who declined participation were required to return a signed reply form. Student participation was entirely voluntary. Height and weight of participates were measured barefoot and in light clothing by a researcher, following the National Health and Nutrition Examination Survey protocol[8].The equipment used for measurement (electronic scales and wall-mount tapes) was validated against a calibrated Seca stadiometer (Model 844) and Seca electronic scale (Model 214). Body mass index (BMI) was computed [weight (kg)/height squared (m2)] to classify participants into overweight and obese groups using the International Obesity Task Force age- and sex-specific BMI cut-offs equivalent to BMI values (kg/m2) of 25 and 30, respectively, at age 18 . Four fitness tests were carried out including: (i) timed push-up test, (ii) sit-up test, (iii) sit-and-reach test, and (iv) 12-minute run and walk test. (V) Skin fold calliper. Push-ups and sit-and-reach were used to assess upper body muscular strength and low back flexibility, respectively [9]. Timed sit-ups were carried out to gauge abdominal muscular strength and endurance. Cardiovascular fitness was assessed by a 12-minute run and walk on a 400 meter track. Participants performed the sit-up test with knees bent at 90 degrees and feet flat on the floor. The number of completed sit-ups in 1 minute was recorded. Participants could select to perform push-ups with bent or extended legs dependant on their ability. In the sit-and-reach test, participants sat on the ground with straight legs against a standard reach box with 23 centimetres marked at the level of the feet. They were instructed to reach smoothly forward and sustain in the extreme reach position for 2 seconds. Fat Track is a computerized skin fold calliper that is super-accurate--down to the millimetre

STATISTICAL ANALYSIS

Statistical analyses were performed using SPSS 15 for Windows. The pre and post-test were conducted 1 day before and after the experimental treatment. Analysis of co variance was used to analyze the collected data. Scheffe's test was used as a post-hoc test to determine level of significance. All data are presented as means ± standard error, and the level of significance was set at $P<0.01$ for all analyses.

RESULTS

During 12 weeks of training the subjects did not report any health problems or discomfort. A significant, positive impact on the measured variables was observed. The subjects decreased in body fat 8.61%, from base line among SWWG and 6.87 % in LWG; however there was no statistical significance in the control group. As far Body fat is concerned again it was decreased due to treatment and it was higher of 3.57% in SWWG than the LWG, which was 3.47%. The mean BMI among the SWWG was 2.29% (SD = 0.05), and 2.25% (SD = 0.04) in the LWG. The fitness

variables such as flexibility, endurance cardio respiratory endurance were significantly altered by the treatments. In over all the aquatic aerobic with weight group showed improvement due to the fact that the exercises were performed with resistance.

Table 1: Physical variables in the Swwg, Lwg and Control groups before and after interventions

Groups	Pre	Post	Change
Body Weight (kg)			
SWWG	98.18 ± 2.38	89.57 ± 2.10***	8.61 ± 0.65
LWG	99.24 ± 3.24	92.37 ± 3.24**	6.87 ± 0.10
CG	98.29 ± 1.80	98.26 ± 1.72	0.02 ± 0.37
Flexibility (cms)			
SWWG	18.80 ± 0.89	24.90 ± 0.51***	-6.10 ± 0.62
LWG	21.25 ± 1.61	26.60 ± 1.48**	-5.35 ± 0.30
CG	21.10 ± 1.08	22.00 ± 1.07	-0.90 ± 0.32
Muscular Endurance (nos)			
SWWG	21.95 ± 1.51	26.00 ± 1.39***	-4.05 ± 0.26
LWG	20.05 ± 1.11	24.05 ± 1.10***	-4.00 ± 0.33
CG	22.05 ± 0.83	21.40 ± 0.89	0.65 ± 0.25
Cardio Respiratory Endurance (mts)			
SWWG	1353.85 ± 42.29	1439.45 ± 41.90***	-85.60 ± 3.29
LWG	1285.60 ± 28.89	1361.75 ± 27.33**	-76.15 ± 4.34
CG	1279.35 ± 25.79	1276.10 ± 25.50	3.25 ± 5.94
Body Fat			
SWWG	35.26 ± 0.87	31.68 ± 0.87***	3.57 ± 0.26
LWG	36.61 ± 0.73	33.14 ± 0.64***	3.47 ± 0.24
CG	35.76 ± 0.67	36.30 ± 0.69	-0.53 ± 0.16
BMI (%)			
SWWG	32.84 ± 0.61	30.54 ± 0.63***	2.29 ± 0.05
LWG	32.73 ± 0.45	30.48 ± 0.45***	2.25 ± 0.04
CG	32.91 ± 0.46	33.12 ± 0.44	-0.21 ± 0.06

*SWWG=Aerobic Training with Weight Group, LWG= Aerobic Training without Weight Group, CG= Control Group, BMI=Body Mass Index. All data are means ±s.e. **P<0.01, ***P<0.001 compared with baseline.*

CONCLUSION

The present study reveals that the 12 weeks of shallow water and land water walking shown significant differences among the three groups with respect to Body Weight, Flexibility, Muscular Endurance, Cardio Respiratory Endurance, Body Fat, BMI finally it is also concluded that the subjects shallow water walking has shown greater improvement comparable to the subject land walking and control group regard to all parameters.

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