The Bioscan AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES 19(3): 237-240, 2024 www.thebioscan.com

PHYSIOLOGICAL EFFECTS OF SHALLOW AND DEEP AQUA AEROBIC EXERCISES ON MAXIMAL OXYGEN UPTAKE IN COLLEGE-AGED MEN

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DOI: https://doi.org/10.63001/tbs.2024.v19.i03.pp237-240

KEYWORDS
Shallow aqua,
Deep aqua,
Aerobic exercise and Maximal oxygen consumption

Received on:

07-09-2024

Accepted on:

08-10-2024

Published on:

11-11-2024

ABSTRACT

Purpose: The purpose of this study was to look into the effects of shallow and deep water activities on maximum oxygen consumption in college male pupils.

Material and methods: Forty-five male students aged 17 to 23 years from JAIN (Deemed-to-be University) in Bangalore, India. The participants were placed into two groups of fifteen. Experimental Group I engaged in a shallow-water aerobic exercise program (SAAG), whereas Experimental Group II participated in a deep-water aerobic exercise program (DAAG) for six weeks. Cooper's 12-Minute Run/Walk Test was used to determine maximum oxygen consumption, and pre-and post-test information was analyzed using analysis of covariance (ANOVA). The F-ratio Statistical significance was determined at the 0.05 level.

Results: The study's findings revealed a significant difference in the physiological effects of exercises performed in shallow water compared to deep water, particularly regarding maximum oxygen consumption, an important indicator of an individual's aerobic capacity and overall cardiovascular fitness. The findings demonstrated that the location in which these exercises were performed had a significant impact on the efficiency of the workout, with each setting having distinct properties that affect the body's oxygen use during physical activity. This distinction shows that the depth of water not only influences the resistance faced by the body during aquatic activities but also modifies the cardiovascular demands imposed on it, consequently altering the improvement of maximum oxygen consumption.

Conclusions: The deep-water aerobic exercise group outperformed the shallow-water in terms of oxygen capacity, according to the outcomes of the study.

INTRODUCTION

Aqua aerobics (also known as aquatic fitness, aqua fitness, or aqua fit) is the practice of aerobic exercise in water that is relatively shallow, such as a swimming pool. It is a sort of resistance exercise that is performed largely vertically and without swimming, usually in nearly waist-deep or deeper water. Aqua aerobics is an aerobic activity in which participants are submerged in water. The majority of aqua aerobics classes are held in a group exercise environment with certified professional teaching for around an hour. The workouts emphasize aerobic endurance, resistance training, and creating a fun atmosphere with music. Aqua aerobics may take a variety of forms, including aqua Zumba, aqua yoga, aqua aerobics, and aqua jog. Most terrestrial aerobic exercisers do not include strength training in their routines, thus adding aquatic exercise can considerably benefit their health. Over time, water aerobics can lower blood pressure and resting heart rate, enhancing general health.

Water aerobics, just like land aerobics, focuses on cardiac exercise, but it also includes water resistance and stability. Although the heart rate does not rise as much as in terrestrial aerobics, the heart works just as hard, and underwater exercise actually pumps more blood to the heart. Because of the aqua resistance, exercising in the water is both aerobic and strength-training. Pushing your body through the water provides resistance to force, which engages muscle groups.

According to Moreno (1996), who references Huey, an Olympic athlete trainer, the benefits of water resistance training include the stimulation of different muscle groups for a balanced exercise. The aqua's push and pull allow for improved muscle exercise while additionally offering a built-in joint safety barrier.

In fact, before aqua aerobics, injury rehabilitation utilized the advantages of aqua. Aqua also helps to minimize lactic acid accumulation. Another evident benefit of aqua exercise is that it cools the system. The typical temperature in a group workout pool is around 78 degrees. This temperature will drive the body to burn calories to be at homeostasis while maintaining a cool, easy ambiance with less transpiration visible to the participant.

Material and Methods

Participants

Forty-five male college students aged 17 to 23 years from JAIN (Deemed-to-be University), Bangalore, India, were assigned at random as subjects for the training. They were grouped into three distinct categories: shallow aqua aerobic exercise (Experimental Group I), and deep aqua aerobic exercise (Experimental Group II), each with 15 individuals.

Methods

In the study, participants were separated into three groups to determine the effect of various intensities of water aerobic exercise on their physical well-being. The two groups, experimental groups I and II, underwent a six-week organized training routine. Group I performed shallow aqua aerobic activity, whereas Group II did deep aqua aerobic exercise. This methodological approach enabled a thorough assessment of the effects on tasks at various depths within a swimming context.

Procedure

The Experimental groups I and II used exercises of travel, forward, backward, sideways, grapevine (feet alternately cross in front and behind), in circles (in place, but change direction faced), whirlpool, ladder, downward (alternate 2 exercises, do 8, 6, 4, 2 reps each), forward (as upward, but start with a smaller number of reps), and the load given were progressively increased from 50%, 60%, and 70% intensity level aqua aerobic exercise drills accordingly for one hour per day. The individuals in all three groups were assessed for maximum oxygen consumption before and after the training period. Cooper's formulas were used to calculate the individuals' maximum oxygen consumption, and Cooper's 12 Minutes Run / Walk Test was conducted using a mean value count by mille/liter.

RESULTS AND DISCUSSION

Table No.1

Table No.1.Analysis of Covariance for the pre-, Post, and Adjusted Post Test Means Values for Shallow aqua aerobic exercise group, Deep aqua aerobic exercise group, and Control group on Maximal oxygen consumption

(Maximal oxygen consumption mean value measure by Cooper's 12 Minutes run / Walk Test in mille/liter)

Variable name	Test	Shallow aqua aerobic exercise group	Deep aqua aerobic exercise group	Source of Variance	Sum of Square	df	Mean square	'F' ratio
Vo2 Max	Pre test	128.23	129.41	Between	0.07	1	0.07	0.001
				Within	4492.1	28	303.28	
	Post test	120.14	116.26	Between	2770.88	1	2770.88	**12.65***
				Within	6129.87	2	218.92	

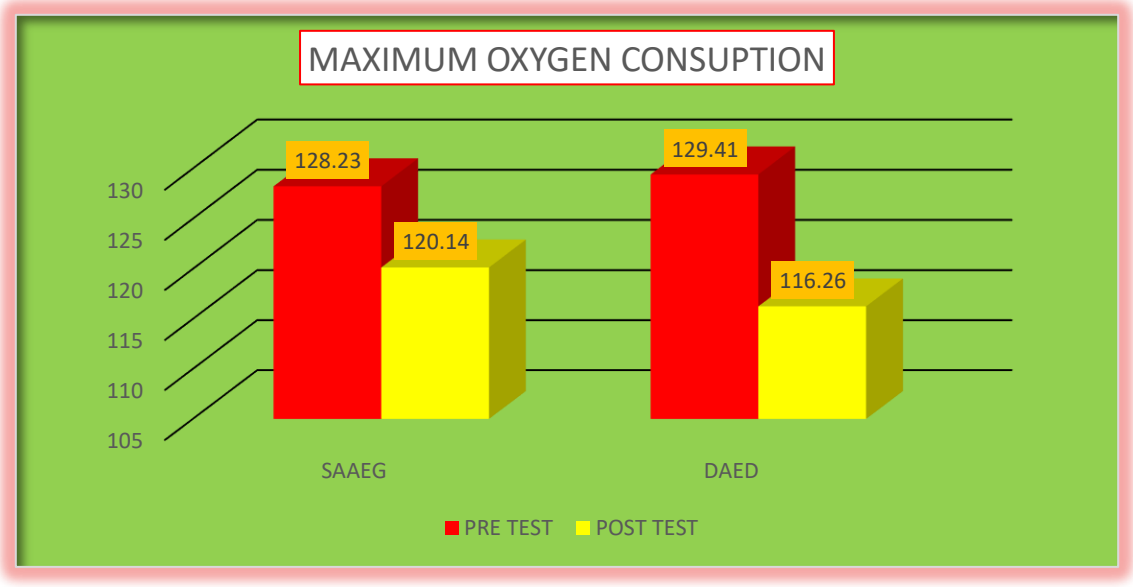
Significance at 0.05 level of confidence

Table value required for significance at 0.05 level with df 1 and 28, 1 and 28 are 3.34 and 3.34 respectively.

Statistical Analysis

According to the statistical analysis in Table 1, the pre-test means for the shallow aqua aerobic exercise group, and deep aqua aerobic exercise group, are 128.23, and 129.41, respectively. The computed F ratio of 0.001 for the pre-test is less than the table value of 3.22 for df 1 and 28 for significance at the 0.05 level. Following the test, the mean values for the shallow aqua aerobic exercise group, and deep aqua aerobic exercise group were 120.14, and 116.26 respectively. The post-test F ratio of **12.65*** is greater than the table value of 3.34 for df 1 and 28, which must be met for significance at the 0.05 level

Figure.1.Bar diagram ordered mean values of Maximal oxygen consumption



DISCUSSION OF FINDINGS

An exercise modality known as "aquatic exercise" is an ensemble of exercises done in shallow or deep water, usually in a vertical position. When the exercises are done with maximum effort, VO2 responses can be observed between situations. For young women, the RPE values for the first and second VT can simplify and expedite the intensity prescription for these water activities Rubalcaba, 2020. The endurance of the lay-up shot was positively

impacted by the maximal oxygen consumption variable and its development. Hashem (2022). Considerable increase in heart function due to improvements in the central and peripheral variables influencing VO2 max activity of citrate synthase, although variations in other auxiliary metrics Rosenblat, 2022. Head-out swimming activities are a crucial therapeutic component for people with physical limitations. The findings of the VO2 max and HR max tests should be read carefully because they are interchangeable measures of exercise intensity with identical values across the protocols Andrade (2022). The two main factors influencing physiological reactions to the aquatic environment are hydrostatic pressure and water temperature. Running in water offered the least amount of blood lactate accumulation and required the least amount of cardio-metabolic exertion. Demarie, 2022.

A thorough evaluation of the cardiovascular, respiratory, and metabolic reactions to exercise is offered by the cardiopulmonary exercise test. In healthy older persons, moderate-intensity ATM and LTM can improve cognitive performance and CBF, indicating that they may be used as preventative measures against age-related deficits. Billy, 2024. The ability of the body's respiratory and circulatory systems to provide blood and oxygen during prolonged physical activity is known as cardiorespiratory fitness. There are very few therapies designed to increase the respiratory muscles' strength and functionality. Among its many uses, aquatic treatment helps patients lose weight because of the water's inherent buoyancy. Following a water aerobics intervention, there was a notable improvement in chest expansion and pulmonary function because the viscosity of the water provides resistance when the body moves and the pressure of the water on the body causes the body to work harder to circulate blood. Muralidharan, 2022.

The result of the present study indicated that there was a significant difference between the training groups and control group on maximal oxygen consumption responses to six weeks of training intervention among college men students. Further significant improvement has been noticed in the level of maximal oxygen consumption response between the experimental groups, when compared with the control group. After analyzing statistical results the researcher found that the selected training groups have significantly increased the level of maximal oxygen consumption from the baseline to post interventions. The change from pre to post-intervention is as follows. The deep aqua aerobic exercises group from pre (128.33) to post (120.14) and shallow aerobic exercises group from pre (129.41) to post (116.23) have significantly changed the pre and post results. The present study demonstrates the increased level of maximal oxygen consumption of 8.19 % and 13.18 % for shallow aqua aerobic exercises group and deep aerobic exercises group respectively. This result of the study proves that the level of maximal oxygen consumption increased, due to the six weeks of training effects of shallow aqua aerobic exercises and deep aerobic exercise groups. Among the training groups, the deep aqua aerobic exercises group shows a greater increased level of maximal oxygen consumption when compared with the shallow aerobic exercises training group. Further shallow aerobic exercises training group also significantly increased the maximal oxygen consumption level of male college students.

Author's Contribution

Conceptualization, TAP and MPR; methodology, TAP and UVS; software, UVS and MPR; check, UVS; formal analysis, MPR; investigation, TAP; resources, TAP and UVS; data curation, TAP; writing - rough preparation, TAP; writing - review and editing, MPR and UVS; visualization, MPR; supervision, UVS; project administration, TAP.

All authors have read and agreed with the published version of the manuscript.

Acknowledgment

We gratefully acknowledge JAIN (Deemed-to-be-University), Bangalore for providing the facilities and support necessary to conduct this research.

Conflict of Interest

The authors declare no conflict of interest regarding this study

Source of Funding

This study received no external funding.

CONCLUSION

After the completion of all the work, we can conclude that the group doing deep-water aerobic exercises had better oxygen capacity than the shallow-water group. The group doing shallow-water aerobic exercises had better oxygen capacity than the control group.

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