

The effect of 12 weeks of water-aerobics on health status and physical fitness: an ecological approach.

Henrique Pereira Neiva, Luís Brandão Faíl, Mikel Izquierdo, Mário Cardoso Marques, Daniel Almeida Marinho

Abstract

Water-aerobics has been purposed as an attractive alternative to land-based exercise for achieving improved health and fitness in populations with orthopaedic or musculoskeletal limitations, excess adiposity or other medical recommendations. This is reflected in the growing interest of scientific community on this matter, increasing the publications in the last few years. Despite this increase of interest by participants and sports community, it seems not clear what might be the benefits that water-aerobics lessons provide to adult population. Some studies evidenced improvements in physical fitness, aerobic capacity, strength, flexibility, but some pointed the opposite conclusions (Barbosa et al., 2009; Benelli et al., 2004). In this sense, it is understood that there is no uniformity and clarity of results maybe because of the testing and procedures used, because there is likely to exist some differences between those evidences reported by studies and real practice. So, regarding the effects of aquatic exercitation in health status and physical fitness, the main gaps that could be highlighted in scientific research are the lack of longitudinal studies on several other health variables (i.e. blood pressure, triglycerides, cholesterol) in usual practitioners and the gap between the laboratorial context and the real-venue context (Bergamin et al., 2012; Delevatti et al., 2015; Volaklis et al., 2007).

The main purpose of the present study is to verify the effects of a 12-week water aerobics program on health indicators (lipid profile and blood pressure) and physical fitness (strength, cardiorespiratory fitness, and body composition) in adults and older adults. This project would allow to develop a master thesis and the results should also be published in a scientific journal to knowledge the scientific community and water-related professionals.

Citation: Henrique Pereira Neiva, Luís Brandão Faíl, Mikel Izquierdo, Mário Cardoso Marques, Daniel Almeida Marinho The effect of 12 weeks of water-aerobics on health status and physical fitness: an ecological approach.. **protocols.io**

dx.doi.org/10.17504/protocols.io.ncpdavn

Published: 19 Feb 2018

Guidelines

The study will consist in a quasi-experimental research that aims to verify the changes in health status and physical fitness after 12 weeks of water aerobics lessons. The variables that we intend to measure could be categorized into different groups, namely, i) anthropometry, with the measurement of height, body mass by bioimpedance, and circumferences (waist and hip); ii) physical condition, through the evaluation of the explosive strength of the upper limbs (3-kg medicine ball throwing) and lower limbs (countermovement jump), endurance strength of the upper limbs (maximum number of arm pushups) and the lower limbs (chair -stand test) and cardiorespiratory fitness evaluation (YMCA 3-min step-test); iii) lipid profile (triglycerides and cholesterol) and blood pressure. These variables

will be assessed during the week before the program implementation (week 0 - pre-training) and the week after the end of the program (week 13 - post-training). The evaluations will be developed on two different days separated by 72 hours. On the first day, the participants' anthropometric characteristics, lipid profile and blood pressure should be measured, followed by an assessment of explosive strength of the upper and lower limbs. On the second day of assessment, endurance strength and cardiorespiratory tests should be performed. All variables will be assessed by experienced researchers and scientific, valid and reliable methods will be used to measure those variables (ACSM, 2013; Mayhew et al., 1997; Rikli et al., 1999; Stewart et al., 2011). In every evaluation the participant will be allowed to rest for fully recover from the previous evaluation. The subjects will be instructed in advance to refrain from exercise, alcohol and caffeine consumption during the evaluation period.

The potential subjects will be informed of the right to refuse to participate in the study or to withdraw consent to participate at any time without reprisal. The teachers of water-aerobics classes will also be informed of everything and will be free to accept or give up of the study procedures. No external pressure will be made to conditioning teacher activity, being free to choose and implement the program exercitation that usually is performed. The contact of main researcher and project responsible will be available for participants and for the institution. One sport academy will be contacted, and the classes will be chosen randomly from the same institution. Participants of different classes will be informed about the study and once they agreed, they will be part of the research.

The researchers involved will be experienced and aware of society and ethical considerations, that must always take precedence over laws and regulations and procedures. Also, the research will carefully assess risks and benefits and will probably benefit the population studied. The confidentiality of data is guaranteed by all researchers that will signed a responsibility term before the beginning of the data collection.

Before start

To analyze the adaptations to water-aerobics lessons, we intend to examine more than twenty subjects divided by experimental and control groups. The experimental group will comprise those ones that participate in water aerobics classes at the same sports academy. The inclusion criteria to be part of the experimental group are i) to be water aerobics practitioner; ii) to participate in at least two lessons per week regularly; iii) to be aged more than 18 years old. Furthermore, sample size calculation for an unmatched case-control study was determined using OpenEpi (OpenEpi, Version 3, open source calculator—SSPropor) and a minimal of 10 subjects and 6 subjects should be allocated to experimental and control group, respectively, to obtain a power of 0.8 at a two-sided level of 0.05. The control group will include subjects older than 18 years that do not exercise regularly. These will not participate in the water aerobics classes and should maintain their basic daily activities without physical exercise. These will be recruited from the same residential zone of sports academy. Subjects with recent hospitalization, severe cognitive or motor impairments, an inability to exercise and any other medical contraindications for physical exercise will not be included. The procedures will be explained to the subjects previous and risks and benefits will be also explained. The subjects will be

voluntary to participate in the study and should accept by signing the informed consent form. This must include the methodological design and the experimental procedures.

Protocol

Background

Step 1.

Water-aerobics has been purposed as an attractive alternative to land-based exercise for achieving improved health and fitness in populations with orthopaedic or musculoskeletal limitations, excess adiposity or other medical recommendations. This is reflected in the growing interest of scientific community on this matter, increasing the publications in the last few years. Despite this increase of interest by participants and sports community, it seems not clear what might be the benefits that water-aerobics lessons provide to adult population. Some studies evidenced improvements in physical fitness, aerobic capacity, strength, flexibility, but some pointed the opposite conclusions (Barbosa et al., 2009; Benelli et al., 2004). In this sense, it is understood that there is no uniformity and clarity of results maybe because of the testing and procedures used, because there is likely to exist some differences between those evidences reported by studies and real practice. So, regarding the effects of aquatic exercitation in health status and physical fitness, the main gaps that could be highlighted in scientific research are the lack of longitudinal studies on several other health variables (i.e. blood pressure, triglycerides, cholesterol) in usual practitioners and the gap between the laboratorial context and the real-venue context (Bergamin et al., 2012; Delevatti et al., 2015; Volaklis et al., 2007).

Aim

Step 2.

The main purpose of the present study is to verify the effects of a 12-week water aerobics program on health indicators (lipid profile and blood pressure) and physical fitness (strength, cardiorespiratory fitness, and body composition) in adults and older adults. This project would allow to develop a master thesis and the results should also be published in a scientific journal to knowledge the scientific community and water-related professionals.

Research team

Step 3.

The research team is composed by Henrique Neiva (responsible; ORCID iD: 0000-0001-9283-312X), Daniel Marinho (responsible; ORCID ID: 0000-0003-2351-3047), Mário Marques (ORCID ID: 0000-0002-5812-1580), Luís Faíl (ORCID ID: 0000-0003-1495-9039) and Mikel Izquierdo (ORCID ID: 0000-0002-1506-4272).

Benefits and risks

Step 4.

The risks for physical assessment will be controlled, since a questionnaire will be filed before participating in experimental group. They will be informed about the tests and subjects' safety must be a concern throughout the exercise or testing experience. As any physical exercitation, there are

risks of falling and risks of musculoskeletal injuries. Some soreness could appear in the following days after evaluations, because of the exercises performed. However, all of participants of experimental group will be usual participants in water-aerobics lessons and had medical clearance to participate in usual exercitation. The tests chosen will be mainly submaximal and those maximal will be performed with increased precautions. There will be a researcher always controlling wellbeing and comfort of participants and any sign of concern will be reported and any test finished. Individuals will also be informed on know the nature of cardiac prodromal symptoms (excessive, unusual fatigue and pain in the chest and/or upper back) and should inform teacher or/and researchers if something happen. The participants in lessons will benefit from the enhanced physical function, well-being, performance, prevention of functional limitations, reduced risk of falls and injuries. The main purpose is that in the future better and proper water-aerobic lessons will be developed and any participants should benefit from these conclusions. One week after each evaluation, each subject will have a full report on his/her health and physical status.

Procedures

Step 5.

To analyze the adaptations to water-aerobics lessons, we intend to examine more than twenty subjects divided by experimental and control groups. The experimental group will comprise those ones that participate in water aerobics classes at the same sports academy. The inclusion criteria to be part of the experimental group are i) to be water aerobics practitioner; ii) to participate in at least two lessons per week regularly; iii) to be aged more than 18 years old. Furthermore, sample size calculation for an unmatched case-control study was determined using OpenEpi (OpenEpi, Version 3, open source calculator—SSPropor) and a minimal of 10 subjects and 6 subjects should be allocated to experimental and control group, respectively, to obtain a power of 0.8 at a two-sided level of 0.05. The control group will include subjects older than 18 years that do not exercise regularly. These will not participate in the water aerobics classes and should maintain their basic daily activities without physical exercise. These will be recruited from the same residential zone of sports academy. Subjects with recent hospitalization, severe cognitive or motor impairments, an inability to exercise and any other medical contraindications for physical exercise will not be included. The procedures will be explained to the subjects previous and risks and benefits will be also explained. The subjects will be voluntary to participate in the study and should accept by signing the informed consent form. This must include the methodological design and the experimental procedures.

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Step 6.

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Warnings

The risks for physical assessment will be controlled, since a questionnaire will be filed before participating in experimental group. They will be informed about the tests and subjects' safety must be a concern throughout the exercise or testing experience. As any physical exertion, there are risks of falling and risks of musculoskeletal injuries. Some soreness could appear in the following days after evaluations, because of the exercises performed. However, all of participants of experimental group will be usual participants in water-aerobics lessons and had medical clearance to participate in usual exertion. The tests chosen will be mainly submaximal and those maximal will be performed with increased precautions. There will be a researcher always controlling wellbeing and comfort of participants and any sign of concern will be reported and any test finished. Individuals will also be informed on know the nature of cardiac prodromal symptoms (excessive, unusual fatigue and pain in the chest and/or upper back) and should inform teacher or/and researchers if something happen. The participants in lessons will benefit from the enhanced physical function, well-being, performance, prevention of functional limitations, reduced risk of falls and injuries. The main purpose is that in the future better and proper water-aerobic lessons will be developed and any participants should benefit from these conclusions. One week after each evaluation, each subject will have a full report on his/her health and physical status.