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Effect of tai chi training on muscle mass and well-being in older adults

Submission date
01/04/2021

Recruitment status
No longer recruiting

Registration date
05/05/2021

Overall study status
Completed

Last Edited
03/07/2025

Condition category
Musculoskeletal Diseases

[X] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
The loss of muscle mass related to ageing (sarcopenia) is one of the main health problems of concern in the elderly. Muscle mass declines approximately 3 to 8% per decade after age 30. Different moderate physical exercise (MPE) options have been proposed for healthy aging in general and for the prevention and control of sarcopenia, among which resistance physical exercise (RPE) stands out, which is effective in increasing muscle mass and strength, improve maximum aerobic capacity. Also, Tai Chi training has been shown to have positive effects on metabolism, the function of the cardiovascular, respiratory and neuromuscular systems. It also has a positive effect on cognitive function, well-being and quality of life. In addition, a positive effect on muscle mass and strength has been observed in some studies, although progress in this line of research is incipient.
Our research group has standardized Tai Chi training (form 8) as a MPE option, which has been shown to have an antioxidant and anti-inflammatory effect, so we infer that it could have a better effect on strength and muscle mass than the RPE.
The purpose of the present study is to evaluate the effect of remote tai chi training over the internet in comparison with resistance exercise on biological markers, muscle mass and well-being in older adults.

Who can participate?
Older adults between 60 and 74 years of age without physical limitations

What does the study involve?
Three groups will be formed: (i) tai chi group (TCG), (ii) resistance exercise group (REG), and (iii) control group (CG). All participants will be measured before, at 6, 12 and 18 months after the intervention, biological markers (metabolic, oxidative stress and inflammation), diet, nutrition, strength and muscle mass, well-being and quality of life.

What are the possible benefits and risks of participating?
None

Where is the study run from?
National Autonomous University of Mexico

When is the study starting and how long is it expected to run for?
March 2020 to July 2023

Who is funding the study?
The study received financial support from the General Directorate of Academic Personnel Affairs, National Autonomous University of Mexico (DGAPA, UNAM) PAPIIT IN306121

Who is the main contact?
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Contact information

Type(s)
Scientific

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Additional identifiers

Protocol serial number
PAPIITIN306121, DGAPA-UNAM

Study information

Scientific Title
Effect of remote online tai chi training compared to resistance exercise on biological markers, muscle mass and well-being in older adults

Acronym
TC&MM

Study objectives
According to the scientific evidence on the effect of tai chi on the markers of oxidative stress, inflammation and psychological well-being, we hypothesize that the group of older adults who participate in this training program remotely over the internet, will present less loss of muscle mass, stress oxidative and chronic inflammation, linked to higher well-being than the group with

resistance exercise training.
According to the scientific evidence on the effect of tai chi on the markers of oxidative stress, inflammation and psychological well-being, we hypothesize that the group of older adults who participate in this training program remotely over the internet, will present less loss of muscle mass, oxidative stress and chronic inflammation, linked to higher well-being than the group with resistance exercise training.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 10/03/2020, Bioethics and Research Committee of Facultad de Estudios Superiores Zaragoza UNAM (Guelatao Nº 66 Col. Ejército de Oriente, Mexico City, Mexico; +52 55 5623 0722; coordinacion.investigacion@zaragoza.unam.mx), ref: FESZ/DEPI/CI/039/20

Primary study design
Interventional

Study design
Interventional randomized controlled trial

Study type(s)
Prevention

Health condition(s) or problem(s) studied
Prevention of sarcopenia in older subjects

Interventions
A quasi-experimental study will be carried out in a sample of 120 older adults between 60 and 74 years of age without physical limitations, or decompensated non-communicable chronic diseases and who are not consuming anti-inflammatory treatments or antioxidant supplements in the last three months, of which will be made up of three groups: (i) n = 40 tai chi group (TCG), (ii) n = 40 resistance exercise group (REG), and (iii) n = 40 control group (CG). During the first six months, a workshop will be held for the training and standardization of the group of researchers to guarantee reliability in the measurement of clinical parameters, body composition and biological markers. The training programs will also be designed, considering the development of two manuals and videos, one on tai chi and the other on physical strength exercise, which will be useful for training for monitors and as support material for older adults who participate in training groups. Likewise, a healthy aging program will be designed with the purpose of strengthening healthy lifestyles and the optimal use of social support networks, which will be applied in the three groups. Subsequently, the older adults who will participate in the study will be summoned and a pilot study will be carried out in 10 people to evaluate the protocols and times for the application of the evaluation instruments. With prior informed consent, a two-week practical course will be held to learn about the use of digital tools that will be used throughout the interventions (Zoom, google forms, WhatsApp and pedometer), All participants will receive a bracelet smart device (pedometer) to monitor movements and heart rate and they will be sent a video manual on the physical exercise they will perform. The training time will be 60 minutes for four days a week (240 minutes / week) adhering to the time recommended in the “Copenhagen Consensus Statement 2019: Physical Activity and Aging”.

All participants will be measured before, at 6, 12 and 18 months after the intervention, biological markers (metabolic, oxidative stress and inflammation), anthropometric measurements, diet, nutrition, strength and muscle mass, well-being and quality of life.

Randomisation:
A simple random assignment will be carried out using Stata 14.0 (StataCorp, College Station, TX, USA) statistical software.

Intervention Type
Behavioural

Primary outcome(s)
1. Anthropometric: A protocol for reliable self-assessment of weight, height, and waist, arm, hip, and calf circumferences will be designed at baseline and monthly. Blood pressure, oxygen saturation, and heart rate will also be measured
2. Body composition: Muscle mass and strength will be measured before the intervention and at the end of the study by the mono-frequency bioelectric impedance method, the raw data of resistance (R) and reactance (Xc) are obtained, to estimate skeletal muscle mass (MME), the skeletal muscle mass index (IMME) and phase angle. Likewise, the force will be measured through an adjustable mechanical hand dynamometer, the maximum value of three repetitions will be recorded with the dominant hand, with 1 minute between measurements to avoid fatigue
3. Biochemical measurements: Fasting blood samples will be taken to measure the biochemical parameters of hematic biometry, blood chemistry with lipid profile, glycated hemoglobin by colorimetric methods and commercial kits at the beginning and at the end of the study
4. Markers of oxidative stress and chronic inflammation: The blood concentration of lipoperoxides, superoxide dismutase (SOD), glutathione peroxidase (Gpx) and catalase (CAT), as well as total antioxidant capacity, will be quantified by colorimetric methods and commercial kits. Inflammation markers (IL1, IL6, IL8, IL10 and TNFα) will also be measured by flow cytometry (CBA Kit, Human Inflammatory Cytokine, BD, San Diego, CA, USA). All measurements will be carried out at the beginning and at the end of the intervention according to standardized techniques in our laboratory

Key secondary outcome(s)
1. Polypharmacy and health status measured using a questionnaire designed and validated by consensus of experts in the Gerontology Research Unit, of the FES Zaragoza, UNAM, with the purpose of recording the antecedents of the state of health, lifestyles and chronic drug use
2. Food and nutrition: Before and every month the characteristics of the feeding will be evaluated through the diet by means of the 24-hour reminder applied by telephone and corroborated with photographs. Nutrient intake (macronutrients and micronutrients) will be analyzed using the “Food Processor® Nutrition Analysis Software”. Nutrition status will also be measured using the "Mininutritional Assessment (MNA)" this instrument can be applied in the google form
3. Psychological well-being. The well-being questionnaire developed by Ryff (1995) revised and adapted for the Spanish-speaking population and the Quality of Life Questionnaire (WHOQOL-OLD) validated for the Mexican population will be applied

Completion date
31/07/2023

Eligibility

Key inclusion criteria
1. Age between 60 and 74 years old
2. Physically and mentally independient
3. Basic (o hiegher) schooling, but that they know how to read and write without any difficulty
4. Without uncontrolled chronic non-communicable diseases
5. Without a history of periodic physical exercise in the last 6 months
6. Without chronic consumption of antioxidant supplements, anti-inflammatory drugs
7. With the capacity to use, operate and charge a bracelet with a heart rate monitor and step counter
8. Have computer equipment and an internet connection that allows the use of zoom applications and google tools
9. Have time (two hours in the morning for 5 days)
10. Sign the informed consent

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
No

Age group
Senior

Sex
All

Total final enrolment
120

Key exclusion criteria
1. People with physical limitations
2. Uncontrolled chronic diseases
3. Balance problems and risk of falls
4. Cognitive impairment
5. Depression
6. Without internet access
7. Living alone
8. People who do not comply with the physical exercise program in more than 80%, or have decompensation in chronic non-communicable disease, will be eliminated from the study

Date of first enrolment
01/06/2021

Date of final enrolment
30/11/2021

Locations

Countries of recruitment
Mexico

Study participating centre
Universidad Nacional Autónoma de México
Unidad de Investigación en Gerontología
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Sponsor information

Organisation
National Autonomous University of Mexico

ROR
https://ror.org/01tmp8f25

Funder(s)

Funder type
University/education

Funder Name
Universidad Nacional Autónoma de México

Alternative Name(s)
National Autonomous University of Mexico, National Autonomous University, Universidad Nacional Autónoma, National University of Mexico, UNAM

Funding Body Type
Government organisation

Funding Body Subtype
Universities (academic only)

Location
Mexico

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

IPD sharing plan summary

Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		04/06/2024	03/07/2025	Yes	No