

**Participant Information Sheet Participants above the age of 50 yr**

**Research Ethics Committee Reference Number**:

**Title of Study:** A comparison of upper limb and lower limb exercise on endothelial ischemia reperfusion injury

You are being invited to take part in a research study.You do not have to take part if you do not want to. Please read this information, which will help you decide.

1. **What is the purpose of the study?**

Cardiovascular diseases, such as a heart attack, often occur because of low levels of blood flow and ischemia (low oxygen) in the blood vessels supplying the heart. Treatment for this involves restoring blood flow to normal levels. This is called an ischemia reperfusion injury. A single session of exercise prior to ischemia may be able to reduce the size and severity of an injury from an episode of ischemia reperfusion. It is not known if performing this exercise with the arm (small muscles) or the legs (larger muscles) causes the largest benefits. It is also unknown if one exercise session or several exercise sessions performed more regularly cause the largest benefit. We aim to compare the effects of short-term exercise (daily for 1 week) of small (handgrip) and large (sit to stand exercises) muscle mass exercise on ischemia reperfusion injury in elderly individuals (above the age of 50).

1. **Why have I been invited to participate?**

You have been invited because you are male or female and aged above the age of 50 yr.

The inclusion/exclusion criteria for the study are as follows:

Inclusion Criteria

* Over 50 years of age
* No leg or arm injuries
* Normal cholesterol or high cholesterol controlled with medication
* Normal blood pressure or high blood pressure controlled with medication

Exclusion Criteria

* Smoking
* Leg or arm injury, which could prevent application of Ischemic preconditioning or exercise.
* Pregnancy
* Previous myocardial infarction, stroke or thrombosis.
* Established cardiovascular disease
* Type 1 or 2 diabetes
* Peripheral vascular disease
* Angina pectoris
* Any type of treatment for cancer
* Age < 50 years
* Participation in >3 hours of weekly exercise
1. **Do I have to take part?**

No. You can ask questions about the research before deciding whether to take part. If you do not want to take part that is OK. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. You can stop being part of the study at any time, without giving a reason, but we will keep information about you that we already have. You may withdraw from the study by contacting me (Yasina Somani; Y.B.Somani@ljmu.ac.uk)

You must not take part if you have COVID-19 or symptoms of COVID-19 - <https://www.nhs.uk/conditions/coronavirus-covid-19/symptoms/>

1. **What will happen to me if I take part?**

If you consent to taking part in this research you will be asked to make 5 visits to the laboratory over 2 phases.

Prior to the first laboratory visit we will ask you to collect a small blood sample from your finger. Details of procedure are explained further in this information sheet. We will ask you to post the sample to the lab for analysis in the pre-paid/pre-addressed envelope on the day you took the blood sample.

**Phase 1.**

You will perform handgrip and squat exercises or no exercise during the first phase of the study in a random order across three visits (3 different days~ 2 hour per visit):

Control Visit:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Arrival | Height, weight, waist circumference, blood pressure, health screening | Rest | FMD | Rest | IRI | FMD |
|  | 5 min | 20 min | 15 min | 40 min | 30 min | 15 min |

Baseline Handgrip visit:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Arrival | MVC Test | Rest | FMD | Handgrip exercise | Rest | IRI | FMD |
|  | 5 min  | 20 min | 15 min | 20 min | 20 min | 30 min | 15 min |

Baseline Squat visit:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Arrival | Rest | FMD | Squats exercise | Rest | IRI | FMD |
|  | 20 min | 15 min | 20 min | 20 min | 30 min | 15 min |

Definitions of test and abbreviations on next page

**Phase 2**

You will then perform either handgrip or squat exercises daily for the next 6 days at your home. Whether you perform handgrip or squats will be decided randomly. On the 8th day we will ask you to return to the laboratory and repeat the tests outlined below. We will supply the handgrip device for you to use at home.

Following 6 days of handgrip or squat exercises performed at home:

Post-exercise intervention visit:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rest | FMD  | Rest | IRI | FMD |
| 20 min | 15 min | 40 min | 30 min | 15 min |

There will be a 2-week period where we will ask you to return to your normal daily routine before beginning the next exercise intervention of either handgrip or squats (i.e. the opposite to what you did in the original week) and you will attend the laboratory for the final time for a post-intervention visit.

Explanation of measurements and intervention protocols

Sit to stand exercise protocol:

You will perform 5 min of squatting without load except for your body weight for 5 minutes with 5 minutes of rest. This process is repeated a total four times. We will ask you to perform 10-15 sit to stand movements per minute. This protocol will be used in the relevant visits to the lab and for the home exercise programme. The number of squats may be adjusted during the exercise session if you feel discomfort.

Handgrip exercise protocol

During the first visit, you will perform 3 maximal voluntary contractions, which will then be averaged to determine an exercise intensity of ~30% of your maximal level. You will then perform 4 bouts of interval exercise (intermittently squeezing the handgrip completing 20-30 repetitions per minute) lasting 5 minutes, interspersed with a 5-minute rest period between each bout. This protocol will be used in the relevant visits to the lab and for the home exercise programme. Similar to the sit to stand protocol, the number of handgrip contractions may be adjusted during the exercise session.

Anthropometric Data

Your height and weight measurements will be taken using a stadiometer and scales, respectively.

Blood Pressure Measurement

Blood pressure will be measured with a cuff being placed around the upper arm which is inflated in order to give a blood pressure reading.

Blood Sample

Using a commercially available testing kit ([www.MonitorMyHealth.org.uk](http://www.MonitorMyHealth.org.uk)), you will collect a small blood sample from your finger. Using a lancet (a small pin), you will make a small cut on the finger (this will feel like a small scratch). You will then fill a tube with 500ul of blood (equivalent to 4-5 drops of blood). You might need to repeat the process on more than one finger to get enough blood. This sample will be used for later analysis of glucose and cholesterol.

Flow Mediated Dilation (FMD):

FMD is used to measure blood vessel function. An ultrasound probe (and gel) will be held on your upper arm to image a large blood vessel for 9 minutes whilst you are lying down. A small cuff will also be placed on the wrist. The upper arm cuff will then be inflated to a pressure greater than your normal blood pressure for 5 minutes and we will image the artery for 1 minute before deflating the cuff and 3 minutes thereafter.

Temporary Ischemia Reperfusion Injury (IRI):

A blood pressure cuff will placed around the upper arm and inflated for 15 min to a pressure greater than your normal blood pressure and then a period of 15 min of reperfusion will follow after the cuff has been deflated to allow blood flow to return to the arm.

1. **Are there any potential risks in taking part?**

There are no high risks involved in this study. However, after exercise you can feel muscle soreness that tends to disappear within 1-2 days after. During the Flow Mediated Dilation testing the cuff will be inflated up to 220 mmHg for 5 minutes, at this point you can feel some discomfort in the arm, however, this discomfort will cease after the cuffs are deflated. There is a very small risk of Petachie (tiny, circular red patches that appear on the skin as a result of small blood vessels bleeding under the skin) occurring in the limb exposed to the blood pressure measurement / Temporary Ischemia Reperfusion Injury protocols if the cuffs are not inflated to a high enough pressure (above systolic blood pressure). Only trained individuals will conduct these procedures and we will ensure the cuff pressures are high enough to prevent this happening. If something happens on the day of testing any injuries will be treated according to standard First Aid procedures and the Investigators will provide you with advice and signpost you to the appropriate support services, e.g., further treatment via local GP or clinical services if necessary. You will also be given the option on the consent form to agree, or not agree, for abnormal blood pressure (e.g., hypertension) results to be reported to you. However, please keep in mind that we are not medical doctors and any results we feed back to you should be confirmed and discussed with your GP before forming any conclusions.

The blood draw via finger prick performed on the first visit may cause some mild momentary discomfort, however there are no adverse effects of this procedure.

There is possibility of COVID transmission when traveling to the laboratory and interactions with study investigators. We plan to mitigate this risk on site by wearing PPE at all times during testing, and we ask that you also wear a face mask during all laboratory visits, with the exception of when you are exercising. During that time we will ensure that all study investigators are at a safe distance away as recommended by government guidance.

1. **Are there any benefits in taking part?**

Whilst there will be no direct benefits to you for taking part in the study, we hope to better understand the effectiveness of exercise in the elderly for alleviating ischemic reperfusion injury, which can take place during surgery.

1. **Payments, reimbursements of expenses or any other benefit or incentive for taking part**

Beyond your contribution to the field of exercise science, you will also be reimbursed with one voucher valued at £100 for participation in all parts of the study.

1. **What will happen to information/data provided?**

The information you provide as part of the study is the **study data**. Any study data from which you can be identified (e.g. from identifiers such as your name, date of birth, audio recording etc.), is known as **personal data** When you agree to take part in a study, we will use your personal data in the ways needed to conduct and analyse the study and if necessary, to verify and defend, when required, the process and outcomes of the study. Personal data will only be accessible to the study team. Personal data collected from you will be recorded using a linked code – the link from the code to your identity will be stored securely and separately from the coded data. When we do not need to use personal data, it will be deleted or identifiers will be removed. Personal data does not include data that cannot be identified to an individual (e.g. data collected anonymously or where identifiers have been removed). However, your consent form, contact details, etc. will be retained for 5 years. You will not be identifiable in any ensuing reports or publications. Personal identifiable data/information will not be transferred outside of the European Economic Area. Responsible members of Liverpool John Moores University may be given access to data for monitoring and/or audit of the study to ensure that the study is complying with applicable regulations.

1. **Who is organising the study?**

This study is organised by Liverpool John Moores University

1. **Whom do I contact if I have a concern about the study or I wish to complain?**

If you have a concern about any aspect of this study, please contact the relevant investigator, and we will do our best to answer your query. You should expect a reply within 10 working days. If you remain unhappy or wish to make a formal complaint, please contact the Chair of the Research Ethics Committee at Liverpool John Moores University who will seek to resolve the matter as soon as possible:

Chair, Liverpool John Moores University Research Ethics Committee; Email: FullReviewUREC@ljmu.ac.uk; Tel: 0151 231 2121; Research Innovation Services, Liverpool John Moores University, Exchange Station, Liverpool L2 2QP

1. **Data Protection**

Liverpool John Moores University is the data controller with respect to your personal data. Information about your rights with respect to your personal data is available from:

* <https://www.ljmu.ac.uk/legal/privacy-and-cookies/external-stakeholders-privacy-policy/research-participants-privacy-notice>

The LJMU Data Protection Office provides oversight of LJMU activities involving the processing of personal data, and can be contacted at secretariat@ljmu.ac.uk. This means that we are responsible for looking after your information and using it properly. LJMU’s Data Protection Officer can also be contacted at secretariat@ljmu.ac.uk***.*** The University will process your personal data for the purpose of research.

1. **Contact details**

Principal Investigator: Yasina Somani

Postdoctoral Researcher

LJMU Email address: *Y.B.Somani@ljmu.ac.uk*

LJMU School/faculty: *School of Sport and Exercise Sciences*

LJMU Central telephone number: 0151 231 2121

Supervisor Names: Dr. David Low; D.A.Low@ljmu.ac.uk, Prof. Helen Jones; H.Jones1@ljmu.ac.uk; Prof Dick Thijssen; D.Thijssen@ljmu.ac.uk