

The short term effects of coffee and caffeine on the cardiovascular and autonomic nervous systems

Submission date
17/05/2009

Recruitment status
No longer recruiting

☐ Prospectively registered

☐ Protocol

Registration date
12/08/2009

Overall study status
Completed

☐ Statistical analysis plan

☒ Results

Last Edited
06/11/2012

Condition category
Nervous System Diseases

☐ Individual participant data

Plain English summary of protocol

Not provided at time of registration

Contact information

Type(s)

Scientific

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Additional identifiers

Protocol serial number

N/A

Study information

Scientific Title

The short term effects of coffee and caffeine on the cardiovascular and autonomic nervous systems: a crossover, double blind, placebo-controlled and cohort randomised clinical trial

Study objectives

Coffee and caffeine have/do not have an effect on the autonomic system as measured by changes of cardiac parameters and breathing frequency. This study uses two research models to investigate the short term effects (up to one hour) of coffee and caffeine preparations on the autonomic nerve system and recordings are made of cardiovascular parameters and breathing frequency.

The first model involves pre-test recording with post-test recording 30 and 60 minutes after administration. The second model uses continuous recordings for 45 minutes after administration of the test substance. Testing is carried out in supine, sitting and upright postures. The third and fourth models included physiological recordings.

Recordings undertaken:

1. Recording of cardiovascular parameters with Finometer-finger pulse contour measures providing measures of blood pressure, heart rate, ejection time, diastolic interval, dp/dt, diastolic pressure time index (DPTI), systolic pressure time index (SPTI), DPTI/SPTI, stroke volume, cardiac output, peripheral resistance, aortic impedance and arterial compliance
2. Recording of breathing frequency with Biopac Respiratory Effort Transducer (TSD201) attached to Finometer
3. R-R (heart beat) recordings with Nerve Express using a Polar thoracic band - used for determining heart rate variability measures

Ethics approval required

Old ethics approval format

Ethics approval(s)

Approved by the University of Westminster Ethics Committee on the 8th April 2004 (ref: 03/04-08)

Study design

Crossover, double blind, placebo-controlled, randomised clinical trial

Primary study design

Interventional

Study type(s)

Treatment

Health condition(s) or problem(s) studied

Cardiovascular and autonomic nervous system functioning

Interventions

Each model was conducted over time and only one model was recruited for at a time. All models were crossover. Patients will be randomised to:

1. Placebo capsule
2. Caffeine capsule (67, 133, 200 mg)
3. Espresso coffee (16.5 mg caffeine)
4. Espresso coffee and caffeine/placebo capsule

The designs of the different models were as follows:

Model design 1:

Participants were monitored for 90s continuous recordings at 30 minutes and 60 minutes after intervention. The equipment is attached for 15 - 20 minutes each test period and between recording periods the equipment is removed. There are three recording periods per session: pre intervention and post intervention at 30 minutes and 60 minutes.

Model design 2:

Participants were monitored by a continuous recording which includes pre-intervention recording (baseline) and extends for 35 to 40 minutes after intervention. Continuous recordings of breathing and the cardiovascular system for approximately 45 minutes. The equipment is not removed from the participant during the experimental session. There is only one test period per session.

Model design 3:

Initially uncontrolled breathing, then alternating frequency (0.167 Hz/0.250 Hz). Recording for 270s in supine and upright postures.

Model design 4:

Recording for 270s with participants engaging in four activities (lying, standing, cycling with heart rate: 115 bpm, cycling with heart rate: 135 bpm), presented in the same order for all participants.

Intervention Type

Drug

Phase

Not Applicable

Drug/device/biological/vaccine name(s)

Coffee, caffeine

Primary outcome(s)

Pre-planned comparisons to placebo conditions:

1. The cardiovascular parameters derived from the Finometer recordings of the finger pulse contour (www.finapres.com): systolic, diastolic and mean blood pressure, heart rate, ejection time, diastolic interval, dp/dt, DPTI, SPTI, DPTI/SPTI, ejection time, stroke volume, cardiac output, total peripheral resistance, aortic impedance and arterial compliance
2. Breathing rate

Timepoints:

Model 1: recording 30 and 60 minutes after intervention; test session 15 minutes

Model 2: constant recording for 40 minutes after intervention

Key secondary outcome(s))

1. Pre planned comparisons of intervention effects in different postures
2. Variability analysis of Finometer derived cardiovascular parameters as appropriate in a post experimental analysis
3. Dosage relationships

Timepoints:

Model 1: recording 30 and 60 minutes after intervention; test session 15 minutes

Model 2: constant recording for 40 minutes after intervention

Completion date

01/03/2009

Eligibility

Key inclusion criteria

1. Voluntary recruits from the students, staff and associates of the University of Westminster
2. Non-medicated
3. Normotensive
4. Aged 18 to 63 years, either sex
5. Habitual caffeine users (consumption of tea or coffee on a daily basis) or non caffeine users (less than 3 servings per week)

Model 4 only:

6. Regular cyclists

Participant type(s)

Patient

Healthy volunteers allowed

No

Age group

Adult

Lower age limit

18 years

Sex

All

Key exclusion criteria

1. Pregnant and breast feeding women
2. Hypertensive (blood pressure greater than 140/90 mmHg)
3. Users of prescribed medicines

For models 1 and 2:

4. Smokers

Date of first enrolment

01/10/2004

Date of final enrolment

01/03/2009

Locations

Countries of recruitment

United Kingdom

Sweden

Study participating centre

Box 65

Vaddo

Sweden

76040

Sponsor information

Organisation

University of Westminster (UK)

ROR

<https://ror.org/04ycpbx82>

Funder(s)

Funder type

University/education

Funder Name

University of Westminster (UK) - PhD study (self-funded) at the School of Life Sciences

Funder Name

Donations received from:

Funder Name

Whitehorse Nutraceuticals (UK) - Dr Brian Whitton donated caffeine capsules,

Funder Name

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary

Not provided at time of registration

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	01/04/2011		Yes	No
Results article	results	01/09/2012		Yes	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes