

The effects of *Lactobacillus plantarum* INDUCIA® probiotic in healthy volunteers with elevated cholesterol

Submission date 04/10/2022	Recruitment status No longer recruiting	<input type="checkbox"/> Prospectively registered
		<input type="checkbox"/> Protocol
Registration date 13/01/2023	Overall study status Completed	<input type="checkbox"/> Statistical analysis plan
		<input type="checkbox"/> Results
Last Edited 08/01/2024	Condition category Nutritional, Metabolic, Endocrine	<input type="checkbox"/> Individual participant data
		<input type="checkbox"/> Record updated in last year

Plain English summary of protocol

Background and study aims

Mortality from cardiovascular disease is the world leader. In order to reduce the risk of cardiovascular disease, it is recommended to reduce the total serum cholesterol and LDL cholesterol as well as oxidative stress.

There is a focus on functional foods, including foods containing probiotics and food supplements. The positive effects of probiotics on lowering cholesterol and alleviating excessive oxidative stress have been described in scientific articles. Positive results have been obtained with various probiotics in reducing oxidative stress, an important factor for the pathogenesis of cardiovascular disease.

Probiotics are friendly bacteria that are known to improve health in human beings by, amongst other ways, interacting with the bacteria that already live in the gut. The aim of this study is to test if the daily consumption of a probiotic supplement can improve cholesterol metabolism, oxidative stress markers, clinical blood indices and gastrointestinal microbiota of reasonably healthy volunteers with elevated cholesterol.

Who can participate?

Generally healthy people aged between 30 and 65 years old with higher cholesterol levels

What does the study involve?

Participants will be randomly allocated to either a probiotic or a placebo group and asked to take one capsule per day for 12 weeks. Participants will also be asked to assess their well-being and gastrointestinal (digestive) effects, and also to provide blood, urine and fecal samples to test the effect of the probiotic.

What are the possible benefits and risks of participating?

A benefit of participation is that subjects will receive an assessment of their health status and if necessary recommendations for future steps. The study will cause minimal inconvenience to participants. As blood samples are taken by an experienced nurse, the procedure is safe.

However, as with any blood test, there may be bruising and discomfort at the site of the blood test. The amounts of blood will be small enough not to cause fatigue or anemia.

Where is the study run from?

Laboratory for Clinical and Physiological Research, BioCC LLC (Estonia)

When is the study starting and how long is it expected to run for?

From January 2019 to December 2021

Who is funding the study?

BioCC LLC (Estonia)

Who is the main contact?

Ms. Merle Rätsep (Estonia)

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Contact information

Type(s)

Scientific

Contact name

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Contact details

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Additional identifiers

Clinical Trials Information System (CTIS)

Nil known

ClinicalTrials.gov (NCT)

Nil known

Protocol serial number

IND1

Study information

Scientific Title

Mechanisms of action of a probiotic strain *Lactobacillus plantarum* INDUCIA® DSM21379

comprising dietary supplement on cholesterol metabolism, oxidative stress markers, clinical

blood indices, and gastrointestinal microbiota of reasonably healthy volunteers with elevated

cholesterol

Study objectives

The consumption of a dietary supplement comprising *L. plantarum* INDUCIA® DSM21379 has a positive effect on any of the following health parameters of reasonably healthy volunteers with elevated cholesterol: cholesterol metabolism, oxidative stress markers, clinical blood indices, and gastrointestinal microbiota.

Ethics approval required

Old ethics approval format

Ethics approval(s)

Approved 19/11/2018, Research Ethics Committee of the University of Tartu (University of Tartu, Grant Office, Lossi 3, 51003 Tartu, Estonia; +372 737 6215; eetikakomitee@ut.ee), ref: 287/T-24

Study design

Interventional randomized placebo-controlled trial

Primary study design

Interventional

Study type(s)

Prevention

Health condition(s) or problem(s) studied

Elevated cholesterol levels

Interventions

Participants were randomly allocated to either the intervention group or the placebo group applying a 1:1 allocation ratio.

Group 1 (verum): Participants take one capsule daily for twelve weeks. The capsule contains a daily dose of a product containing 5×10^9 CFU of *L. plantarum* INDUCIA®.

Group 2 (placebo): Participants take one capsule daily for twelve weeks. The capsule contains a daily dose of a product containing no active compounds (microcellulose).

Participants take the product daily for twelve weeks and the last study visit will be performed two weeks after the end of the treatment.

All the samples are collected at the run-in, after 8 weeks and at the end of the interventions.

Changes at 8 weeks from baseline and at 12 weeks from baseline are measured for the following outcomes: oxidative stress indices (ELISA), SCFA's content in faeces (HPLC), and changes in lipid fractions.

Intervention Type

Supplement

Primary outcome(s)

1. LDL-cholesterol level in blood serum at baseline, and weeks 8, 12 and 14
2. Total-cholesterol level in blood serum at baseline, and weeks 8, 12 and 14
3. Oxidative stress indices measured from blood and urine samples using different ELISA-based assays at baseline, and weeks 8 and 12
4. Gut microflora indices (lactoflora, anaerobes etc) measured from stool samples using molecular approaches and specific primers at baseline, and weeks 8, 12 and 14

Key secondary outcome(s)

1. Metabolic syndrome indices measured from blood samples using different ELISA-based assays at baseline, and weeks 8 and 12
2. Short-chain fatty acids (SCFA) measured from stool and urine samples using High-Pressure Liquid Chromatography (HPLC) at baseline, and weeks 8, 12 and 14
3. Bile acids concentration measured from stool and urine samples High-Pressure Liquid Chromatography (HPLC) at baseline, and weeks 8, 12 and 14

Completion date

30/12/2022

Eligibility**Key inclusion criteria**

1. Written informed consent
2. Aged between 30 and 65 years old
3. Willingness to maintain a stable diet and physical activity level
4. Willingness to cease using probiotic products and supplements (except vitamin D) during the study period
5. Normal or not clinically relevant deviations in safety laboratory values
6. One of the following outcomes at the screening visit: LDL-cholesterol value >3.4 mmol/L; LDL-cholesterol/HDL-cholesterol >3.5 mmol/L or total cholesterol/HDL between 3.5 and 4.5 mmol/L

Participant type(s)

Mixed

Healthy volunteers allowed

No

Age group

Adult

Sex

All

Total final enrolment

37

Key exclusion criteria

1. Using blood pressure and/or cholesterol lowering drugs/supplements within the last 3 months prior to start of the study (i.e. baseline visit)
2. Diabetes
3. Acute or chronic inflammatory disease
4. Endocrinological disease
5. (Food) allergy
6. Using antibiotic within the last 4 weeks prior to start of the study (i.e. baseline visit)
7. Using NSAIDs regularly
8. Pregnancy and breastfeeding
9. Donor within the last 3 months prior to start of the study (i.e. baseline visit)
10. Smoking

11. Use of any pre-, probiotic or food supplement within the last 2 weeks prior to start of the study
12. Intolerance to the investigational product/its ingredients
13. Acute infection within the last 2 weeks prior to baseline
14. Eating disorder
15. Extensive exercise (daily training of professional athletes)
16. Drug or alcohol abuse

Date of first enrolment

03/01/2019

Date of final enrolment

31/08/2022

Locations

Countries of recruitment

Estonia

Study participating centre

The Laboratory for Clinical and Physiological Research of the BioCC

Riia 181A

Tartu

Estonia

50411

Sponsor information

Organisation

BioCC LCC (formerly Bio-Competence Centre of Healthy Dairy Products (Estonia))

ROR

<https://ror.org/02e801388>

Funder(s)

Funder type

Industry

Funder Name

BioCC LLC Project EU48686 HEALTHY FOOD

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are not expected to be made available due to belonging to a private company.

IPD sharing plan summary

Not expected to be made available

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes