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Effect of Mediterranean diet components on microbiota

Submission date	Recruitment status	[X] Prospectively registered
03/11/2020	No longer recruiting	[_] Protocol
Registration date	**Overall study status**	[_] Statistical analysis plan
16/12/2020	Completed	[_] Results
Last Edited	**Condition category**	[_] Individual participant data
13/03/2023	Nutritional, Metabolic, Endocrine	[_] Record updated in last year

Plain English summary of protocol

Background and study aims

The microbiome consists of all the microbes (bacteria, fungi, protozoa and viruses) that live on and inside the human body. Diet plays a fundamental role in the composition of the gut microbiome. The Mediterranean diet (MD) is considered a healthy diet and is associated with the prevention of numerous diseases. Such beneficial effects might be due to components such as fiber, unsaturated fatty acids and antioxidants (i.e. polyphenols). Although there is increasing evidence of the beneficial effects of several nutrients on the gut microbiome, the effect on the microbiome of a diet such as the MD has not been sufficiently studied. The aim of this study is to measure how the components of the MD affect the gut microbiome in overweight people with habitually low adherence to the MD.

Who can participate?

Men and women aged 30-60 who are overweight with low adherence to the Mediterranean diet

What does the study involve?

Participants will be randomly allocated to consume one of two products (75 g of an MD-enriched product or a placebo product) daily for 8 weeks. At the beginning and at the end of the intervention, blood, urine, and stool samples will be collected.

What are the possible benefits and risks of participating?

The MD-enriched product may have beneficial effects on the gut by increasing the levels of bacteria associated with health. There are no notable risks involved with participating.

Where is the study run from?

1. Department of Food, Environmental and Nutritional Sciences (DeFENS), University of Milano (Italy)
2. Department of Agricultural, Forest and Food Sciences (DISAFA), University of Torino (Italy)
3. Department of Soil, Plant, and Food Sciences (DiSSPA), University of Bari - Aldo Moro (Italy)
4. Department of Biomedical Sciences and Human Oncology (DIMO), University of Bari - Aldo Moro (Italy)

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

Who is funding the study?
Ministry of Education, Universities and Research (Italy)

Who is the main contact?
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Additional identifiers

Study information

Scientific Title
Microbiome-tailored food products based on typical Mediterranean diet components

Acronym
MeDGUT

Study objectives
The present study aims to explore the causal effect of Mediterranean Diet (MD) components (e. g., dietary fiber, polyphenols, glucosinolates) on the structure and function of the gut microbiome (including bacteria, fungi and viruses) and metabolome in overweight individuals with habitually low adherence to MD.

Ethics approval required
Old ethics approval format

Ethics approval(s)
1. Approved 18/06/2020, Ethics Committee of the University of Milan (Università degli Studi di Milano, via Festa del Perdono 7, 20122, Milano, Italy; +39 (0)2 503 12667; comitato.etico@unimi.it), ref: 67/20
2. Approved 10/06/2020; Ethics Committee of Azienda Ospedaliera Universitaria “Consorziale Policlinico”; Piazza Giulio Cesare 11, Bari, Italy; +39 (0)80 5593399; comitatoetico@policlinico.ba.it), ref: 6408
3. Approved 08/05/2020; Ethics Committee of Bioetica, University of Torino (Comitato di Bioetica d'Ateneo, Direzione Ricerca e Terza Missione, Via Bogino 9, 10123 Torino, Italy; +39 (0) 11 6704394; sfaff.cba@unito.it), ref. 179485

Primary study design
Interventional

Study design
Two-arm randomized double-blind placebo-controlled multicenter parallel study

Study type(s)
Prevention

Health condition(s) or problem(s) studied
Overweight and low adherence to the Mediterranean Diet

Interventions
The following multicentric study involves 120 volunteers (40 subjects for each research centre). Volunteers will be enrolled and randomized based on a computer randomization plan:
1. MD-enriched food product (75 g, walnuts, broccoli, pomegranate and moringa)
2. Placebo (75 g, water, maltodextrin, 0.1% starch and guar gum)
Volunteers will consume one portion (75 g) per day of MD-enriched food product or placebo. Each treatment will be 8 weeks long. At the beginning (time zero) and at the end of the intervention (8 weeks), participants will provide blood, urine and stool samples.

Intervention Type
Supplement

Primary outcome(s)
Fecal Prevotella relative amount analysed by high-throughput rRNA gene-targeted amplicon sequencing and short-chain fatty acids (SCFAs), urinary and fecal ferulic acid analysed by GC-MS and 1H-NMR at time zero and after 8 weeks

Key secondary outcome(s)
1. Gut microbiota quantified by a metagenomic approach based on amplicon sequencing ar time zero and after 8 weeks
2. Host-microbe interactions: fecal samples will be treated to safely separate the microbial cells, which will be allowed interact with HT29 cells and the inflammatory activity will be assessed by RT-PCR and ELISA at time zero and after 8 weeks
3. Identification and estimation of gut metabolome in fecal samples by GC-MS and 1H-NMR at time zero and after 8 weeks
4. Shotgun meta-genomics will be carried out on all the fecal samples collected. Meta-proteomics analyses will be performed in a subset of fecal samples. Fecal microorganisms will be recovered and lysed with the aim to identify peptides. The analysis will be performed by gel-free proteomic platforms at time zero and after 8 weeks
5. Inflammatory markers, e.g., C-reactive protein (PCR), interleukin-6 (IL-6), tumour necrosis factor-alpha (TNF-α), analysed by ELISA kit at time zero and after 8 weeks
6. Oxidative stress markers (e.g. endogenous and oxidatively induced DNA damage) analysed in blood by comet assay at time zero and after 8 weeks
7. Metabolic and functional markers (e.g., glycemia, total cholesterol, HDL-cholesterol, LDL-cholesterol, triglycerides, liver and renal function) assessed by a standardized validated protocol using an automatic biochemical analyser at time zero and time 8 weeks
8. Anthropometric measurements assessed by following international guidelines at time zero and time 8 weeks
9. Blood pressure measured by determining both systolic and diastolic pressure obtained in a resting, seated position following validated guidelines at time zero and 8 weeks
10. Food intake estimated using food diaries and analysed by using specific software at time zero and every 2 weeks until 8 weeks

Completion date
30/09/2023

Eligibility

Key inclusion criteria
1. Age 30 - 60 years old
2. BMI 25 - 29.9 kg/m²
3. Low adherence (score ≤ 5) to the Mediterranean diet

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
No

Age group
Adult

Sex
All

Total final enrolment
125

Key exclusion criteria
1. Obesity (BMI <25 or >30 kg/m²)
2. Diabetes, dysthyroidism
3. Chronic constipation, diarrhea or any other gut disease
4. Liver, kidney or other diseases
5. Known food allergies
6. Regular use of medications, dietary supplement
7. Consumption of antibiotics in the previous 3 months
8. Specific diet such as vegan or macrobiotic
9. Pregnancy/lactation
10. SARS-CoV-2 infection diagnosed by molecular diagnostic

Date of first enrolment
07/01/2021

Date of final enrolment
25/05/2021

Locations

Countries of recruitment
Italy

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University of Milano
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Sponsor information

Organisation
Ministry of Education, Universities and Research

ROR
https://ror.org/0166hxq48

Funder(s)

Funder type
Government

Funder Name
Ministero dell'Istruzione, dell'Università e della Ricerca

Alternative Name(s)
Ministry of Education, University and Research, Ministry of Education, Universities and Research, Italian Ministry for Universities and Research, Italian Ministry for Education, University and Research, Italian Ministry of Education, MIUR

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
Italy

Results and Publications

Individual participant data (IPD) sharing plan

Data of the markers analysed will be available upon request at the end of the study from:
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Data are anonymous and consent was obtained from participants.

IPD sharing plan summary
Available on request