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Zinc as potential co-adjuvant in type-2 diabetes therapy

Submission date
05/02/2016

Recruitment status
No longer recruiting

Registration date
23/02/2016

Overall study status
Completed

Last Edited
22/02/2016

Condition category
Nutritional, Metabolic, Endocrine

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
Diabetes is a condition that causes a person's blood sugar level to become too high. Insulin is the hormone made by beta-cells in the pancreas and controls the amount of glucose in the blood. In type 2 diabetes, the body does not produce enough insulin for it to work properly or the body cells do not react properly to insulin (insulin resistance). Type-2 diabetes is very common. In Chile, this disease affects almost one-tenth of the adult population. It is a chronic (long lasting) condition responsible for long term-severe dysfunction of several organs (i.e. causes several organs to not work as they should, which can lead to health problems). While there a number of drug treatments available to treat insulin resistance and insulin secretion (how much insulin the body produces), measures to protect the beta-cells producing the insulin are less available. In addition, the use of some nutrients that may protect the function of beta-cells has not fully tested. Given that it mimics the action of insulin, and has antioxidant, anti-inflammatory, apoptosis (cell death), and insulin secretion functions, zinc is an interesting candidate to become a co-adjuvant to diabetes therapy (i.e used to treat diabetes in addition to other treatment). While there are promising results from studies suggesting a potential beneficial effect of increasing the amount of zinc available in both pancreas beta-cells and tissues that insulin is known to act upon, information from human studies is very limited. This research project will address this issue by looking at the effects of the supplementation with zinc on diabetes by comparing insulin secretion and clinical condition of type 2 diabetes patients that take zinc supplements over a two year period compared to those that don't.

Who can participate?
Adults aged 30-65 with type-2 diabetes.

What does the study involve?
Participants are randomly allocated to one of two groups. Those in group 1 take a zinc tablet once a day for two years. Those in group 2 take a placebo tablet (made from talc) once a day for two years. Insulin resistance and secretion is assessed for all participants after one year and again after two years.

What are the possible benefits and risks of participating?
All patents receive medical control for their diabetes every 4 months during the entire two-year

period of at no cost; nutritional advise every 12 months. Risks involved are associated to sampling and lab methods used in the study.

Where is the study run from?
Department of Nutrition, Faculty of Medicine, University of Chile

When is the study starting and how long is it expected to run for?
March 2012 to May 2016

Who is funding the study?
National Commission for Scientific and Technological Research (Chile)

Who is the main contact?
1. Dr Manuel Ruz (scientific)
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2. Mrs Juana Codoceo (public)

Contact information

Type(s)
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Type(s)
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Additional identifiers

EudraCT/CTIS number

IRAS number

ClinicalTrials.gov number

Secondary identifying numbers
Fondecyt 1120323

Study information

Scientific Title
Zinc supplementation in type-2 diabetes: a randomized clinical trial and molecular studies of the mechanisms involved

Acronym
DAZ (Diabetes and Zinc)

Study objectives
Two-year zinc supplementation in type-2 diabetic individuals will decrease their oxidative stress and inflammatory status leading to enhanced glucose-stimulated insulin secretion and improved clinical and metabolic condition of diabetes when compared with non-treated type-2 diabetic subjects.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Ethics committee for research in humans of the Faculty of Medicine, University of Chile, 22/03 /2012

Study design
Interventional double-blind, controlled, single centre study

Primary study design
Interventional

Secondary study design
Randomised controlled trial

Study setting(s)
Other

Study type(s)
Treatment

Participant information sheet
Not available in web format, please use contact details below to request information sheet

Health condition(s) or problem(s) studied

Type-2 diabetes

Interventions
Participants will be matched by BMI, age, sex and duration of diabetes, then, allocated into one of the two experimental groups using a double-blind randomized approach. All patients will undergo routine medical controls by Physicians of the Department of Nutrition every 4 months. The supplementation period is 2 years.
1. Experimental group: Participants will receive 30 mg/day of elemental zinc contained in one capsule, which is ~3-4 times the recommended intakes for men and women respectively, but below the upper level of intake (FNB-IOM 2001) in order to avoid any risk of excessive intake.
2. Placebo (Control) Group: Participants will receive one capsule of similar appearance to the Zn group but containing a placebo (talc).
The patients will receive a container with 30 capsules (Zn or placebo) to be taken once a day. This container will be replaced monthly. Personnel from the Department of Nutrition will check once a month the number of capsules consumed.

Intervention Type
Supplement

Primary outcome measure
1. Insulin secretion assessed by a modified frequently sampled intravenous glucose tolerance test (FSIVGTT)
2. Insulin sensitivity assessed by a modified frequently sampled intravenous glucose tolerance test (FSIVGTT)
3. Fasting glycated haemoglobin by HPLC
4. Plasma glucose, 5. Urinary glucose, and 6. Microalbumin determined by an automated dry-chemistry method

Determinations will be carried out before and one and two years after supplementation.

Secondary outcome measures
1. Oxidative stress (plasma isoprostane using the Cayman´s "8-Isoprostane ELISA kit, TBARS by the OxiSelect TBARS Assay kit; red blood cell glutathione by an enzymatic method; glutathione peroxidase activity by means of the Biovision glutathione peroxidase activity colorimetric assay kit")
2. Inflammation markers (plasma ultra sensitive reactive-C protein by an immunoturbidimetric assay;, Adiponectin, IL-6, and IL-1β by means of a microsphere Luminex fluorescent technique
3. Gene expression of selected zinc transporters in peripheral blood mononuclear cells (PBMNC) qPCR using SYBR Green
4. Zn status parameters (plasma and hair zinc) and size of the rapidly exchageable zinc pool (EZP) using Zn stable isotope methodology

Determinations will be carried out before and one and two years after supplementation.

Overall study start date
15/03/2012

Completion date
31/05/2016

Eligibility

Key inclusion criteria
1. Men and women with type-2 diabetes (<10 years since diagnosis)
2. Thirty to 65 years old
3. BMI 20-40 kg/m2
4. Stable body weight (weight variation <5%) for at least 3 months prior to screening
5. Glycated hemoglobin (HbA1c) <9 % and/or fasting glycemia <180 mg/dL

Participant type(s)
Patient

Age group
Adult

Lower age limit
18 Years

Sex
Both

Target number of participants
80

Key exclusion criteria
1. Insulin therapy.
2. History of ketoacidosis or hyperosmolar hyperglycemic nonketotic syndrome in the previous 6 months.
3. Estimated glomerular filtration rate <60 mL/min.
4. Alanine aminotransferase or aspartate aminotransferase >2.5 times the upper normal limit.
5. Congestive heart failure (grade III-IV according to the New York Heart Association criteria, 1994)
6. Uncontrolled hypertension
7. History of stroke, transient ischemic attack or acute myocardial infarction (previous 5 years). Recent surgery or acute infection (previous 3 months)
8. Major psychiatric disorder affecting compliance
9.. Use of antipsychotic medications
10. Systemic use of glucocorticoid steroids within previous 6 weeks
11. Alcohol intake ≥2 drinks/day
12. Cancer diagnosis or treatment in the past 5 years, with the exception of cancers that have been cured, and carry a good prognosis
13. HIV positivity
14. Pregnant or lactating women
15. Having taken vitamins mineral supplements in the previous 3 months

Date of first enrolment
11/10/2012

Date of final enrolment
31/05/2014

Locations

Countries of recruitment
Chile

Study participating centre
Department of Nutrition, Faculty of Medicine, University of Chile
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Sponsor information

Organisation
University of Chile, Faculty of Medicine

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Sponsor type
University/education

Website
http://www.med.uchile.cl

ROR
https://ror.org/047gc3g35

Funder(s)

Funder type
Government

Funder Name
Comisión Nacional de Investigación Científica y Tecnológica

Alternative Name(s)
National Commission for Scientific and Technological Research, CONICYT

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
Chile

Results and Publications

Publication and dissemination plan
To be confirmed at a later date

Intention to publish date
30/09/2016

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available