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Thiamine supplementation in type 2 diabetes

Submission date
20/11/2009

Recruitment status
No longer recruiting

Registration date
04/01/2010

Overall study status
Completed

Last Edited
20/04/2017

Condition category
Nutritional, Metabolic, Endocrine

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

Plain English summary of protocol

Background and study aims
People with diabetes mellitus are at increased risk of developing heart disease and strokes. Thiamine is a vitamin that is needed by the body to regulate blood sugar levels and may also be involved in preventing heart disease. This study aims to see whether giving additional thiamine can reduce the risk of developing heart disease.

Who can participate?
This study is looking for 34 participants aged between 18 and 70 who are known to have type 2 diabetes.

What does the study involve?
This study will take place over a 5-month period and participants will need to attend for four visits each lasting about 2 hours. On the first visit you will need to undergo a routine physical examination and have an ECG (tracing of your heart). At each of the visits you will need to have fasted from the evening before, provide a sample of urine (to test for protein levels) and undergo blood tests (30 ml of blood) to check your kidneys, liver, blood fat levels, insulin sensitivity, thiamine levels, and diabetes control. We will then assess the function of the lining of the blood vessels using a probe that is applied to your fingertip (this is painless) attached to a specialised machine. We repeat the finger-probe test after administration of GTN spray under the tongue and again following administration of inhaled salbutamol via a spacer device. These medications are usually used for angina and asthma respectively and work by temporarily dilating the blood vessels. At the doses used in the study they have rare mild side effects which include transient headache and a metallic taste in the mouth. After the first visit you will be given either thiamine tablets to be taken once a day or a placebo (dummy) equivalent. You are to take these tablets for 8 weeks and then return for the same protocol of urine, blood and finger-probe testing as described above. You will then be given a minimum 2-week break before the same testing procedure will be repeated with a further 8-week administration of thiamine or placebo (whichever you did not receive the first time). The blood samples taken during the study will be stored for up to 12 months after completion of the study and may be analysed for other markers that may be related to circulatory disease.

What are the possible benefits and risks of participating?
The aim is to see whether thiamine can help reduce the risk of developing diseases such as heart attacks and stroke while also improving a persons general diabetic health. Therefore, although

the study will not specifically benefit your diabetic/medical care, the results may be beneficial in the care of many patients with diabetes in the future. The Food Standards Agency has shown that the oral administration of thiamine is safe and non-toxic. A small number of individuals may show an allergic response to lower doses but reports of these events are rare.

Where is the study run from?
The study will be run from Queen Alexandra Hospital, Portsmouth Hospitals NHS Trust (UK).

When is the study starting and how long is it expected to run for?
The study ran from February 2010 to August 2011.

Who is funding the study?
All study funding is coming from internal departmental budgets.

Who is the main contact?
Dr Georgina Page
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Contact information

Type(s)
Scientific

Contact name
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Additional identifiers

Protocol serial number
PHT/2009/36

Study information

Scientific Title
Oral thiamine (Vitamin B1) supplementation in subjects with type 2 diabetes mellitus: a randomised, double-blind, placebo-controlled crossover trial assessing biophysical markers of endothelial function, oxidant stress, insulin sensitivity and vascular inflammation

Study objectives

It is well known that people with type 2 diabetes are more prone to circulatory-related diseases (heart attack, stroke) when compared with individuals without diabetes. It is thought that this is related to problems with the function of the lining of blood vessels (endothelium), an increase in generalised inflammation within the blood vessels and various other factors including over-production of harmful by-products (oxidative stress). The changes in the endothelium that occur subsequently contribute to blocking of the arteries (atherosclerosis), which can lead to heart attack or stroke.

Similar mechanisms to those just described have been implicated in the development of other complications of type 2 diabetes such as kidney and eye disease as well as the development of type 2 diabetes itself. Traditional risk factors for this include smoking, raised cholesterol, excess weight and family history and these have all been extensively studied. However, despite modification of these risk factors the occurrence of these diabetes and these complications continues to rise and therefore further research is being done to look at other potential modifiable elements.

Thiamine is a water-soluble vitamin essential found naturally in raw foods. It is known that, despite a normal dietary intake of thiamine, people with diabetes have a lower level of thiamine in their blood compared to individuals without diabetes. It is an important regulator of glucose metabolism and some experimental studies have shown that thiamine may have a role in maintaining function of the endothelium.

This study aims to investigate whether thiamine supplementation will have benefits in the way of reducing inflammation, reducing formation of harmful by-products and improving the bodys ability to use insulin.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Southampton B Research Ethics Committee (REC), 11/01/2010, ref: 09/H0504/137

Study design
Single-centre randomised placebo-controlled double-blind crossover trial

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Type 2 diabetes mellitus

Interventions
Thiamine (vitamin B1/thiamine hydrochloride) versus placebo. Thiamine is being given orally at a dose of 300 mg daily for 8 weeks.

Total duration of treatment: 8 weeks each for thiamine or placebo
Duration of follow-up: 18 weeks in which the participant is in the study

Intervention Type
Drug

Phase
Phase II

Drug/device/biological/vaccine name(s)
Thiamine

Primary outcome(s)
Change in VCAM-1 (vascular adhesion molecule-1) levels pre- and post-treatment (baseline and 8 weeks). This is a surrogate marker of vascular inflammation.

Key secondary outcome(s))
Measured at 8 weeks:
1. Measurement of endothelial dysfunction determined by the reflection index of the digital volume waveform using photoplethysmography
2. Measurement of insulin sensitivity (pancreatic B-cell function [HOMA-B] method)
3. Markers of oxidant stress (total antioxidant status [TAOS], lipid hydroperoxides [LHP], cyclic guanosine monophosphate [cGMP], glutathione [GSH]/oxidised glutathione [GSSG])
4. Markers of vascular inflammation (high sensitivity C-reactive protein [hsCRP] and albumin /creatinine ratio [ACR])
5. Glycaemic control (HbA1c, fructosamine)
6. Lipid parameters

Completion date
02/08/2011

Eligibility

Key inclusion criteria
1. Individuals with a diagnosis of type 2 diabetes mellitus with a more than 30% chance of cardiovascular disease (ischaemic heart disease, cerebrovascular disease or peripheral vascular disease) over the next 10 years
2. HbA1c less than 10%
3. Between the ages of 18 and 75 years, either sex

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Sex

All

Key exclusion criteria
1. Established cardiovascular disease (ischaemic heart disease, cerebrovascular disease or peripheral vascular disease)
2. Allergy/intolerance to thiamine supplementation
3. Insulin treatment
4. Diuretic treatment
5. Current multivitamin/thiamine therapy
6. Abnormal thyroid function
7. Chronic excess alcohol consumption/impaired liver function (greater than 21 units per week in females, greater than 28 units per week in males; Department of Health Guidelines)

Date of first enrolment
01/02/2010

Date of final enrolment
02/08/2011

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Academic Department of Diabetes and Endocrinology
Portsmouth
United Kingdom
PO6 3LY

Sponsor information

Organisation
Portsmouth Hospitals NHS Trust (UK)

ROR
https://ror.org/009fk3b63

Funder(s)

Funder type

Government

Funder Name
Portsmouth Hospitals NHS Trust (UK) - Academic Department of Diabetes and Endocrinology

Funder Name
Diabetes UK (UK) - in process of applying for a small grant

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?
HRA research summary			28/06/2023	No	No