Dietary oxalate absorption and microbiome diversity in patients with nephrolithiasis and hyperoxaluria: a stable isotope technique.

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With this study, we aim to gain insight in the influence of dietary oxalate on urinary oxalate levels by quantification of the intestinal oxalate absorption in patients with recurrent idiopathic calcium oxalate stones, primary hyperoxaluria, and...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Metabolic and nutritional disorders congenital
Study type	Observational non invasive

Summary

ID

NL-OMON51626

Source
ToetsingOnline

Brief title
Influence of diet on CaOx stones and hyperoxaluria (DIOX study)

Condition

- Metabolic and nutritional disorders congenital
- Malabsorption conditions
- Urolithiases

Synonym
kidney stones, Nephrolithiasis

Research involving
Human

Sponsors and support

Primary sponsor: Amsterdam UMC
Source(s) of monetary or material Support: Fondsen

Intervention

Keyword: Diet, Hyperoxaluria, Microbiome

Outcome measures

Primary outcome

1. To quantify dietary oxalate absorption from the gastrointestinal tract in patients with idiopathic CaOx kidney stones, primary hyperoxaluria, and secondary hyperoxaluria compared to healthy volunteers, by administering labelled oxalate.

2. To identify differences in the intestinal microbiome between these patient groups, by looking at the diversity and abundance of (oxalate degrading) bacteria.

Secondary outcome

1. To identify differences in the intestinal metabolome by measuring volatile and non-volatile organic compounds in the faeces and measuring labelled CO2 in exhaled air.

Study description

Background summary

Urinary oxalate excretion is an important risk factor for calcium oxalate kidney stones. If urinary oxalate levels exceed normal levels, this is referred to as hyperoxaluria. Hyperoxaluria is a devastating disease, and patients with hyperoxaluria may suffer from frequent stone events, nephrocalcinosis, and eventually kidney impairment. In normal conditions, oxalate can be derived from

different sources, either by endogenous production in the liver, or by intestinal oxalate absorption from food. The treatment of patients with hyperoxaluria can be difficult. In an early stage of the disease this is similar to the treatment of other calcium oxalate stone formers, and patients are often advised to take medication, drink enough fluids, and follow a restrictive diet to avoid high-oxalate foods. However, little is known about the impact of an oxalate low diet on urinary oxalate levels in both these patients. Some studies have been performed, mostly in patients with calcium oxalate stones, showing that patients with idiopathic calcium oxalate nephrolithiasis have increased absorption of oxalate from diet and have a less diverse microbiome, with less oxalate degrading bacteria. However, these studies were limited by taking only one of these two parameters into account.

Study objective

With this study, we aim to gain insight in the influence of dietary oxalate on urinary oxalate levels by quantification of the intestinal oxalate absorption in patients with recurrent idiopathic calcium oxalate stones, primary hyperoxaluria, and enteric hyperoxaluria by using a revised stable isotope method which will be correlated with the microbiome diversity and abundance of oxalate degrading bacteria and network. Hereby, we will be able to provide more insight in the impact of an oxalate-low diet, the gastrointestinal oxalate metabolism, the role of the microbiome, and potential new targets for therapeutics.

Study design

Experimental design.

Study burden and risks

Stable isotopes have been safely used in many studies in children and adults, therefore no significant risks are associated with participation. The burden of participation in the study consists of feces and urine sample collection, a dietary restriction, a visit to the clinic, and assessment of relevant clinical variables by questioning. The study burden is minimal since most patients are familiar with similar dietary restrictions and 24-hours urine collections.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adolescents (16-17 years)
Adults (18-64 years)

Inclusion criteria

For this study, we identify four different groups of participants:
Group 1: patients with primary hyperoxaluria.
Group 2: patients with secondary or unspecified hyperoxaluria
Group 3: patients with idiopathic calcium oxalate kidney stones disease.
Group 4: control group of healthy volunteers.

Inclusion criteria primary hyperoxaluria (group 1):
- Age 16 - 60 years
- Diagnosed with primary hyperoxaluria (type 1, 2 or 3), confirmed by genetic testing.

Inclusion criteria secondary or unspecified hyperoxaluria (group 2):
- Age 16 - 60 years
- Diagnosed with secondary hyperoxaluria, confirmed by: hyperoxaluria (defined as > 0.5 mmol/1.73m2/day oxalate in 24-hours urine) and confirmed diagnosis of a disease as underlying secondary enteral cause of hyperoxaluria.
- Diagnosed with unspecified hyperoxaluria.

Inclusion criteria CaOx stone formers (group 3):

- Age 16 - 60 years
- Recurrent calcium oxalate stones

Inclusion criteria healthy volunteers (group 4):
- Age 16 - 60 years
- Good health, no background of nephrolithiasis, kidney or gastrointestinal disease.

Exclusion criteria

- eGFR <30 ml/min/1.73m2
- Use of drugs affecting the gastrointestinal microbiome
- Gastro-intestinal or systemic diseases known to affect microbiome (causes of secondary hyperoxaluria excluded)

Study design

Design

Study type:	Observational non invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	18-12-2022
Enrollment:	60
Type:	Actual

Ethics review

Approved WMO

Date:	24-05-2022
Application type:	First submission
Review commission:	METC Amsterdam UMC
Approved WMO Date:	05-03-2025
Application type:	Amendment
Review commission:	METC Amsterdam UMC

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL80333.018.22