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Can drinking beetroot juice prevent and reduce the severity of winter viral infections in residential and nursing homes?

Submission date
07/12/2020

Recruitment status
No longer recruiting

Registration date
13/01/2021

Overall study status
Completed

Last Edited
18/11/2022

Condition category
Respiratory

[X] Prospectively registered
[X] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Residents in care homes are at increased risk of developing viral infections, particularly during the winter months. This study aims will look at whether daily consumption of a beetroot juice supplement (which is naturally high in nitrates) will help prevent or lessen the impact of winter viruses such as flu, the common cold, as well as new viruses such as COVID-19.

Who can participate?
Care home residents aged 65 years old, taking a normal diet, and willing to participate following a taste-test of the beetroot juice are eligible to take part in the study. Those who are on a soft diet or using thickener, using antiseptic mouthwash, are in short term respite care, or are identified as being in the last few days of life, are not eligible to take part in the study.

What does the study involve?
Participants in this study will take nitric oxide that comes in the form of concentrated beetroot juice. The juice comes in a small container and is drunk once-a-day for two months (60 days). The only ingredients in the juice are crushed beetroot with 2% lemon juice from concentrate. There are no other additives, preservatives or other allergens, and there is no risk of cross-contamination during manufacturing.

Half of the care homes in the study will have active juice, and the other half an inactive juice that does not contain nitrates. Neither the participants nor their care home will know which sort of juice they receive. The active and inactive juice look and taste the same. Participants will be able to have a taste test of the juice before the study to make sure they can take it.

The study team will also ask to collect a specimen of spit and urine from participants at the beginning and end of the study. This will be used to test the levels of nitrate/nitrite in the body. The results will be recorded, and the samples will be disposed of immediately.

What are the possible benefits and risks of participating?
Concentrated beetroot juice is widely used by athletes to help their performance. It has been

tested in many studies and lowers blood pressure a little. In lab studies, nitric oxide is shown to be anti-microbial– a feature that might help in fighting infections. Beetroot juice (both active and inactive) will also contribute to one of the participant's 'five-a-day'.

Due to its wide use, we do not think participants will be at risk by taking part in the study. The most common side-effect of drinking beetroot juice is that urine may go red or pink coloured. Less commonly, faeces may also go red or pink coloured, but this colour is noticeably different from blood. On rare occasions, beetroot may cause a rash or stomach cramps (usually because the individual has a food allergy or intolerance). The care home staff will look out for side effects, and participants are encouraged to speak to the care home staff if they have any concerns.

Where is the study run from?
The University of Nottingham (UK)

When is the study starting and how long is it expected to run for?
From September 2020 to September 2021

Who is funding the study?
The Biomedical Research Centre and Senior Investigators, University of Nottingham (UK)

Who is the main contact?
Mrs Di Havard (Trial Manager) and Prof Philip Bath (CI)
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Contact information

Type(s)
Public

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Scientific

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Additional identifiers

Integrated Research Application System (IRAS)
288542

Protocol serial number
Version 2.0 19/10/20

Study information

Scientific Title
Nitric oxide for preventing and reducing the severity of winter viral infections in care (residential and nursing) homes (BEET-Winter)

Acronym
BEET-Winter

Study objectives
1. To determine if it is feasible to recruit residents in care homes into a trial aiming to reduce winter infections
2. To determine if nitric oxide given as dietary nitrate reduces winter-timed infections and their severity in care home residents.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 25/11/2010, West Midlands - Coventry & Warwickshire Research Ethics Committee (The Old Chapel, Royal Standard Place, Nottingham, NG1 6FS; +44 (0)207 104 8009; coventryandwarwick.rec@hra.nhs.uk), ref: 20/WM/0278

Primary study design
Interventional

Study design
Prospective phase II cluster-randomized double-blind placebo-controlled trial assessing feasibility and proof of principle

Study type(s)

Prevention

Health condition(s) or problem(s) studied
Winter respiratory viral infections in care home residents

Interventions
Homes, and not participants, will be randomised. Randomisation will be stratified by care home type (residential vs nursing/mixed), prior COVID-19 in phase 1 of pandemic (yes vs no), and size of care home (number of residents <32 vs >32). Residents and care home staff are blinded, with a double-blind design.

Participants will be randomly allocated to receive either:
1. Nitric Oxide in the form of 70 ml of beetroot juice containing 400 mg nitrate given once daily for 60 days
2. Placebo in the form of 70 ml of beetroot juice containing 0 mg nitrate given once daily for 60 days

The intervention and placebo are foods and not investigational products. Active beetroot juice is available from supermarkets and on-line.

Participants will be invited for three follow-up visits. The first follow up visit will occur on day 14, where saliva/urine nitrate/nitrite test, dietary nitrate intake from menu, and beetroot juice adherence will be assessed. The second follow up visit will be on day 60, where the clinical tests Clinical Frailty Index (CFI), Barthel index (BI), 6 item cognitive impairment test (6CIT), quality of life visual analogue scale (EQ-VAS), and EuroQol 5-dimension 5-level (EQ-5D-5L) quality of life questionnaire, as well as dietary nitrate intake from menu and saliva/urine nitrate/nitrite test will be assessed. The final follow up visit will be on day 90 where saliva/urine nitrate/nitrite test and dietary nitrate intake from menu will be assessed.

Intervention Type
Supplement

Primary outcome(s)
1. Feasibility of conducting a larger scale trial assessed using data on the recruitment of care homes, recruitment of residents, assessment of background infection rate, assessment of background dietary nitrate intake, adherence to the intervention, ability to measure the ordinal outcome, an estimation of the intra-cluster correlation (ICC), and incidence of death between baseline and 60 days
2. Severity of the first infection measured using a 5 level ordinal outcome (using the worst level if >1 event, where a score of: 0 represents no symptoms of infection; 1 represents symptoms of infection; 2 represents symptoms of infection needing healthcare advice such as a call to 111, or GP appointment; 3 represents hospitalisation for any reason, or intention to hospitalise but advance directive precluded this; or 4 represents death from any cause) between baseline and 60 days

Key secondary outcome(s)
1. Severity of worst infection stratified by subgroups of age (median), sex, size of home (median), type of care home (residential, nursing), home's location (median deprivation index), and infection location (respiratory tract, gastrointestinal tract, urinary tract, cutaneous) measured using a 5 level ordinal outcome (where a score of: 0 represents no symptoms of infection; 1 represents symptoms of infection; 2 represents symptoms of infection needing

healthcare advice such as a call to 111, or GP appointment; 3 represents hospitalisation for any reason, or intention to hospitalise but advance directive precluded this; or 4 represents death from any cause) between baseline and 60 days
2. Number of infections measured using patient records between baseline and 60 days
3. Time to first infection measured using patient records between baseline and first identification of infection
4. Time to first hospitalisation or death in home measured using patient records between baseline and first record of hospitalisation or death in home
5. Disposition at day 60 measured using patient records (options such as care home, with relative /friend, another home, hospital, or died) at 60 days
6. Frailty measured using the Clinical Frailty Index (CFI) at baseline and 60 days
7. Activities of daily living measured using the Barthel index (BI) at baseline and 60 days
8. Cognitive impairment measured using the 6 item cognitive impairment test (6CIT) at baseline and 60 days
9. Quality of life measured using the visual analogue scale (EQ-VAS) and the EuroQol 5-dimension 5-level (EQ-5D-5L) quality of life questionnaire at baseline and 60 days
10. Global outcome measured as a combination of the severity of first infection, frailty, activities of daily living, cognitive impairment, and quality of life at baseline and 60 days
11. Incidence of death from all causes measured using patient records between baseline and 60 days
12. Incidence of fatal serious adverse events (SAE) measured using patient records between baseline and 60 days
13. Salivary nitrite/nitrate and urinary nitrate measured using salivary and urine samples collected at baseline, 14, 60, and 90 days
14. Care home dietary nitrate intake measured from care home menus at baseline, 14, 60, and 90 days

Completion date
30/09/2021

Eligibility

Key inclusion criteria
1. Residents from 26 participating care homes (residential and nursing) with 16 participants from each
2. Aged ≥65 years
3. Currently consuming a normal diet
4. Willing to take treatment having taste-tested a beetroot shot

Participant type(s)
Other

Healthy volunteers allowed
No

Age group
Senior

Sex
All

Total final enrolment
49

Key exclusion criteria
1. Unwilling to participate or opted-out of the trial (resident, or family, if resident lacks capacity)
2. Currently consuming a soft diet or using a thickener
3. Using antiseptic mouthwash
4. Identified by care home staff to be in the last few days of life
5. Short-term respite care
6. Care home staff

Date of first enrolment
01/05/2021

Date of final enrolment
31/05/2021

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Sutton Manor Care Home
Priestsic Road
Sutton in Ashfield
United Kingdom
NG17 2AH

Study participating centre
Sutton Lodge
Priestsic Road
Sutton in Ashfield
United Kingdom
NG17 2AH

Study participating centre
Wren Hall Nursing Home
234 Nottingham Road
Selston
United Kingdom
NG16 6AB

Study participating centre
Sutton Court
Priestsic Road
Sutton in Ashfield
United Kingdom
NG17 2AH

Study participating centre
Church Farm at Skylarks
Adbolton Lane
West Bridgford
Nottingham
United Kingdom
NG2 5AS

Study participating centre
Lynwood Court Care Centre
Rise Road
Ascot
United Kingdom
SL5 0FG

Study participating centre
Landermeads
265 High Rd
Chilwell
Beeston
Nottingham
United Kingdom
NG9 5DD

Study participating centre
Aria Court
Coronation Close
March
United Kingdom
PE15 9PP

Study participating centre

Springbank Care Home
17 Ashgate Road
Chesterfield
United Kingdom
S40 4AA

Study participating centre
Ashbourne Lodge care home
Derby Road
Ashbourne
United Kingdom
DE6 1BH

Study participating centre
Appletrees
Arlington Gardens
Grantham
United Kingdom
NG31 7GQ

Study participating centre
Cedar Falls
Little London Road
Spalding
United Kingdom
PE11 2UA

Study participating centre
Ashdene Care Home
89 Eastgate
Sleaford
United Kingdom
NG34 7EE

Study participating centre
Acer Court Care Home
Coronation Close
March
United Kingdom
PE15 9PP

Study participating centre
Barnfield Manor
Barnfield Close
Heath Road
Holmewood
Chesterfield
United Kingdom
S42 5RH

Study participating centre
Burton Closes Care Home
Haddon Road
Bakewell
United Kingdom
DE45 1BG

Sponsor information

Organisation
University of Nottingham

ROR
https://ror.org/01ee9ar58

Funder(s)

Funder type
Government

Funder Name
NIHR Nottingham Biomedical Research Centre (BRC)

Funder Name
Philip Bath NIHR Senior Investigator Award

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated and/or analysed during the current study during this study will be included in the subsequent results publication.

IPD sharing plan summary

Other

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		16/11/2022	18/11/2022	Yes	No
HRA research summary			28/06/2023	No	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes
Preprint results		26/04/2022	17/11/2022	No	No
Protocol file	Protocol and Statistical Analysis Plan version 1.0	09/08/2021	29/09/2021	No	No
Study website	Study website	11/11/2025	11/11/2025	No	Yes