Beta-alanine supplementation in patients with COPD receiving non-linear periodized exercise (NLPE) training: randomized placebo-controlled trial.

No registrations found.

Ethical review	Positive opinion
Status	Pending
Health condition type	-
Study type	Interventional

Summary

ID

NL-OMON23943

Source
Nationaal Trial Register

Brief title
BASE-TRAIN

Health condition

Chronic obstructive pulmonary disease (COPD); Exercise intolerance; Muscle dysfunction.

Sponsors and support

Primary sponsor: Radboudumc Board of Directors
Source(s) of monetary or material Support: Lung Foundation, the Netherlands

Intervention

Outcome measures

Primary outcome

Exercise tolerance, defined as walk endurance time. This will be assessed via the endurance

shuttle walk test, a standardized externally controlled constant paced field test at 85% of the pre-determined maximal velocity (evaluated by the incremental shuttle walk test) until exhaustion.

Secondary outcome

Exercise capacity - by means of cardiopulmonary exercise test and incremental shuttle walk test.
Exercise tolerance - by means of the constant work rate cycle test.
Quadriceps muscle function - by means of isometric and isokinetic quadriceps strength and endurance (computerized dynamometer) and maximal dynamic isotonic strength (one-repetition maximum; 1-RM).
Body composition - by means of Bioelectrical impedance analysis.
Muscle characteristics (after m. vastus lateralis muscle biopsy) - Structural and metabolic parameters as well as markers of oxidative stress and inflammation will be measured with dedicated methodology.
(Fasted) systemic factors (after obtaining fasting venous blood) - Systemic beta-alanine, taurine and histidine levels as well as systematic markers of oxidative stress and inflammation at rest will be measured with dedicated methodology.
Cognitive function - executive functioning will be assessed using the Modified Wisconsin Card Sorting Test (M-WCST), and divided attention will be examined via the Stroop Colour-Word Test (SCWT).
Physical activity - by means of activity monitors (Dynaport MoveMonitor).
Dyspnoea - by means of the Modified Medical Research Council (mMRC) dyspnoea scale.
Health-related quality of life - by means of the COPD Assessment Test (CAT).
Anxiety and Depression - by means of the Hospital Anxiety and Depression Scale (HADS).
Fatigue - by means of the subjective fatigue subscale of the Checklist Individual Strength (CIS-Fatigue).
Compliance - by means of a patient diary and documenting remaining tablets at end of study.
Patient safety/side effects - by means of a patient diary en personal check-ups.

Additional outcomes are used to characterize patients at baseline. Pulmonary function will be assessed using post-bronchodilator spirometry, whole body plethysmography and diffusion capacity. Furthermore, respiratory muscle strength, using maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) measurements, will be determined. An arterial blood sample is collected to determine arterial blood gases at rest. Additionally, patient characteristics as age, gender, level of education, marital status, smoking status, exacerbation/hospitalisation frequency and medical history (Charlson Comorbidity Index; CCI), medication and/or oxygen use will be assessed at baseline during an intake interview.

Study description

Background summary

Exercise intolerance is common in patients with chronic obstructive pulmonary disease (COPD) and, although multifactorial, it is largely caused by lower-limb muscle dysfunction. Research has shown that patients with severe to very severe COPD have significantly lower levels of muscle carnosine, which acts as a pH buffer and antioxidant. Beta-alanine (BA) is the rate-limiting precursor to carnosine synthesis and BA supplementation has been shown to consistently elevate muscle carnosine in a variety of populations. Hence, it is very plausible to hypothesize that BA supplementation in COPD patients following a non-linear periodized exercise (NLPE) training program (as part of pulmonary rehabilitation; PR) will increase muscle carnosine levels, which in turn will result in a positive effect on exercise tolerance and lower-limb muscle function.

Study objective

It is hypothesized that beta-alanine supplementation in patients with COPD following a non-linear periodized exercise (NLPE) training program (as part of pulmonary rehabilitation; PR) will increase muscle carnosine levels, which in turn will result in a positive effect on exercise tolerance and lower-limb muscle function. These adaptations may translate into improved functional capacity during activities of daily living and improved quality of life. The primary targets of both exercise training and BA supplementation are the muscles of ambulation. Nevertheless, it seems reasonable to hypothesize that an enhanced bio-availability of carnosine in the body, by means of beta-alanine supplementation, may have an anti-oxidative effect in both the muscle and the brain.

Study design

The regular PR program at CIRO and Dekkerswald consists of a baseline assessment, followed by an in- or outpatient PR program and is ended with a post-rehabilitation assessment. After completion of the baseline assessment and obtaining informed consent, an additional study-related appointment is scheduled with included patients approximately 1-2 week prior to the start of the PR program. This additional testing day will be repeated after the rehabilitation period. Study duration per subject will be approximately 10 to 12 weeks. During the regular (baseline and post) assessments, the following outcomes will be measured: exercise capacity, tolerance and endurance, quadriceps muscle function, body composition, physical activity, dyspnoea, health-related quality of life, anxiety and depression, fatigue, pulmonary function and patient characteristics. The study-related appointments include: fasting venous blood sampling, a vastus lateralis muscle biopsy (optional, not required) and two cognitive function tests (M-WCST and SCWT). During the PR program the patients will receive NLPE as standard care. Patient safety and compliance will be constantly monitored during the PR program.

Intervention

Oral beta-alanine (sustained-release Carnosyn®; 3.2 g/day) or identical looking placebo supplementation for a duration of 8-10 weeks.

Contacts

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Eligibility criteria

Inclusion criteria

- COPD, GOLD group B or D
- Modified Medical Research Council (mMRC) dyspnoea score ≥2
- Clinically stable according to the pulmonary physician, i.e. no exacerbation and/or hospitalization within the previous 4 weeks.
- Age between 40-80 years
- Attending the regular in- or outpatient pulmonary rehabilitation program in Dekkerswald or CIRO and receiving NPLE

Exclusion criteria

Patients will be excluded if they meet at least one of the following criteria: instable cardiac disease, use of anabolic steroids during PR program, history of drugs/alcohol abuse, vegetarianism, inability to understand the Dutch language, self-reported beta-alanine supplementation in the past 3 months, participation in a PR program within the past 12 months, inability to perform an incremental shuttle walk test.

If the patient agrees to undergo a vastus lateralis muscle biopsy, the following exclusion criterion will also apply: bleeding disorder, a recent trauma of the muscle, or an infection in the region of the proposed biopsy.

Study design

Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Double blinded (masking used)
Control:	Placebo

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	01-04-2020
Enrollment:	154
Type:	Anticipated

IPD sharing statement

Plan to share IPD: Undecided

Ethics review

Positive opinion

Date:	03-03-2020
Application type:	First submission

Study registrations

Followed up by the following (possibly more current) registration

ID: 49690
Bron: ToetsingOnline
Titel:

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

No registrations found.

In other registers

Register	ID
NTR-new	NL8427
CCMO	NL70781.091.19
OMON	NL-OMON49690

Study results