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Does cannabidiol treatment lead to recovery of brain structure and function in cannabis users?

Submission date
13/06/2017

Recruitment status
No longer recruiting

Registration date
16/06/2017

Overall study status
Completed

Last Edited
04/10/2022

Condition category
Mental and Behavioural Disorders

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

Plain English summary of protocol

Background and study aims:
Cannabis is a widely-used illegal drug derived from the cannabis plant. Cannabidiol (CBD) is a constituent of cannabis plant matter that has gain notoriety for its supposed therapeutic, neuroprotective (protecting the nervous system) and antipsychotic properties. CBD has been shown to improve or reverse problems with cognition (mental processes) and psychotic symptoms associated with cannabis use, and preliminary evidence suggests CBD may protect against shrinking of a part of the brain called the hippocampus (which is responsible for memory), which is often seen in cannabis users. Whilst the mechanisms underlying these effects are currently unknown, there is evidence to suggest that CBD may protect against the harms associated with cannabis use and that it may do so by controlling certain pathways in the brain involving natural chemical messengers (neurotransmitters). The aim of this study is to find out whether prolonged CBD treatment in regular cannabis users has an effect on brain structure and to see if this is underpinned by changes in neurotransmitter mechanisms.

Who can participate?
Adults who have been using cannabis at least once a week for at least three years.

What does the study involve?
All participants receive capsules containing CBD to take four times a day for ten weeks. At the start of the study and ten weeks later, participants undergo brain scans to see if there have been any structural changes to the brain or changes in brain activity. Participants also answer questions via telephone about their mental health one month and three months after the end of the study.

What are the possible benefits and risks of participating?
There are no direct benefits or risk involved with participating.

Where is the study run from?
University of Wollongong (Australia)

When is study starting and how long is it expected to run for?
March 2015 to June 2018

Who is funding the study?
Australian Research Council (Australia)

Who is the main contact?
Professor Nadia Solowij
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Contact information

Type(s)
Scientific

Contact name
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Protocol serial number
CT15/02

Study information

Scientific Title
Does cannabidiol treatment lead to recovery of brain structure and function in cannabis users? A pilot investigation

Acronym
Prolonged CBD Trial

Study objectives
Primary study aim:
The aim of this study is to determine whether daily cannabidiol (CBD) administration over a 10 week period will lead to improved brain structure, function, neurochemistry and integrity (via modulation of glutamatergic and GABAergic signalling) in regular cannabis users.

Primary hypothesis:
Prolonged CBD administration will result in larger volumes of specific hippocampal subfields

(such as CA1 and subiculum); elevated markers of hippocampal neuronal integrity (NAA); more normalised glutamate and GABA levels in the hippocampus; and increased MMN amplitude

Secondary study aim:
The aim of this study is to investigate the potential for CBD administration to reduce cognitive impairment, psychological symptoms and cannabis use in regular cannabis users.

Secondary hypotheses:
2. Prolonged CBD administration will result in the following outcomes and in turn these will be associated with the primary outcomes of Hypothesis 1:improved cognitive function; and reduced psychological symptoms
3. Prolonged CBD administration will result in reduced cannabis use

Ethics approval required
Old ethics approval format

Ethics approval(s)
Joint University of Wollongong and Illawarra and Shoalhaven Local Health District Health and Medical Human Research Ethics committee, 08/07/2015, ref: CT15/02

Study design
Interventional non-randomised study

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Chronic cannabis use

Interventions
All participants receive medical grade cannabidiol (CBD) formulated into capsules for oral administration. Each capsule contained 50mg of 99.9% pure CBD powder solved in corn oil gelatin capsules (BSPG/Trigal Pharmaceuticals, UK). Participants are instructed to take four capsules per day (100mg in the morning and 100mg in the evening, totaling 200mg daily).

Participants are clinically and cognitively assessed and EEG and MRI measured obtained at baseline and after 10 weeks of daily CBD administration. They are also followed up by brief telephone assessment one month and three months after the end of the trial.

Intervention Type
Drug

Phase
Phase II

Drug/device/biological/vaccine name(s)
Cannabidiol.

Primary outcome(s)
1. Hippocampal volumetrics (whole hippocampus as well as subfields (e.g. CA1 and subiculum) is assessed by magnetic resonance imaging (MRI) using high resolution T1 weighted images at baseline and following 10 weeks of CBD administration
2. Markers of hippocampal neuronal integrity (NAA), as well as glutamate and GABA levels in the hippocampus, aremeasured using magnetic resonance spectroscopy (MRS) at baseline and following 10 weeks of CBD administration
3. MMN amplitude is recorded via electroencephalography (EEG) at baseline and following 10 weeks of CBD administration

Key secondary outcome(s))
1. Other EEG and fMRI measures including P50 and resting state EEG/fMRI measured at baseline and following 10 weeks of CBD administration
2. Neuropsychological measures, assessed utilising the Rey Auditory Verbal Learning Test (RAVLT), and the Cambridge Neuropsychological Test Automated Battery (CANTAB) and CogState test batteries at baseline and following 10 weeks of CBD administration
4. Psychological symptomatology, as assessed by the Beck Depression Inventory (BDI); State-Trait Anxiety Index (STAI-I and II); Profile of Mood States (POMS); Community Assessment of Psychic Experiences (CAPE); Schizotypal Personality Questionnaire (SPQ); and Cannabis Experiences Questionnaire (CEQ) at baseline and following 10 weeks of CBD administration.
5. Substance use measures, utilising Timeline Follow Back; Cannabis Withdrawal Scale (CWS), Severity of Dependence Scale; and the Alcohol Use Disorder Identification Test (AUDIT) at baseline and following 10 weeks of CBD administration.
6. Levels of CBD and THC metabolites and neurotransmitter markers in blood and urine weekly throughout the 10 week trial

Completion date
30/06/2018

Eligibility

Key inclusion criteria
1. Cannabis use at least once per week for a minimum of three years
2. Between 18 and 55 years of age

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Sex
All

Key exclusion criteria
1. Current regular (more than once per month) use of substances other than cannabis, aside from alcohol and tobacco
2. Consumption of more than 28 standard drinks of alcohol per week
3. A history of regular illicit drug use (more than weekly) or dependence on or treatment seeking for any substance other than cannabis
4. Any neurological or psychiatric disorders (assessed by the MINI International Psychiatric Interview Plus)
5. Pregnancy of lack of contraception use for female cannabis users
6. Contraindications for EEG or MRI (e.g. epilepsy, metal implants, claustrophobia)

Date of first enrolment
08/07/2015

Date of final enrolment
10/06/2016

Locations

Countries of recruitment
Australia

Study participating centre
University of Wollongong
School of Psychology and Illawarra Health and Medical Research Institute
Northfields Avenue
Wollongong
Australia
2522

Study participating centre
Liverpool Cancer Therapy Centre and Ingham Institute
Liverpool Hospital (MRI scanner facility)
Campbell Street
Liverpool
Australia
NSW 2170

Sponsor information

Organisation
University of Wollongong

ROR
https://ror.org/00jtmb277

Funder(s)

Funder type
Government

Funder Name
Australian Research Council

Alternative Name(s)
arc_gov_au, The Australian Research Council, Australian Government Australian Research Council (ARC), ARC

Funding Body Type
Government organisation

Funding Body Subtype
Other non-profit organizations

Location
Australia

Results and Publications

Individual participant data (IPD) sharing plan
The current data sharing plans for the current study are unknown and will be made available at a later date.

IPD sharing plan summary
Not provided at time of registration

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		01/03/2018	04/10/2022	Yes	No
Results article		01/03/2018	04/10/2022	Yes	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes