Potential anxiolytic effects of oral administration of over-the-counter CBD in rats

Sara Bond, Alanna Crowell, Margeaux Manshel, Brittney Anderson, Brennan Balzac, Jordan Nerz, & Ken Leising
Department of Psychology, Texas Christian University

Introduction

Background

Cannabidiol (CBD) is a cannabinoid derived from the *Cannabis sativa* plant that has been found to be an effective antiepileptic and anxiolytic. Unlike tetrahydrocannabinol (THC), CBD is not known to have any psychoactive effects.

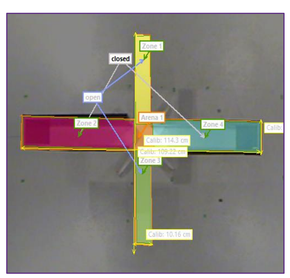
- The antiepileptic effects of CBD have been observed in children with Dravet syndrome (Devinsky et al., 2017) when a chronic oral CBD dose of 20 mg/kg revealed a reduction in seizures.
- Blessing et al. (2015) reviewed experiments with rats receiving CBD injections that revealed a reduction in anxiety-like behavior on an elevated plus maze. However, there is little research on the effects of oral CBD administration in animals.
- The Agriculture Improvement Act of 2018 legalized the production and purchase of CBD containing less than .3% THC, leading to an explosion in commercial oral use of CBD.
- Much of what is purchased or consumed is over-the-counter CBD, and pharmaceutical grade CBD is what is primarily used in research. Therefore, there's a need to evaluate over-the-counter CBD's effectiveness (Chesney et al., 2020).

Current experiment

- Explored the effectiveness of chronic oral consumption of over-the-counter CBD in reducing anxiety-like behavior in rats in an elevated plus maze and open field.
- It was expected that rats receiving CBD would spend more time in the open arms of the elevated plus maze and in the center of the open field compared to rats in the control group.

Method

Elevated plus maze (5-min)



Open Field (5-min)

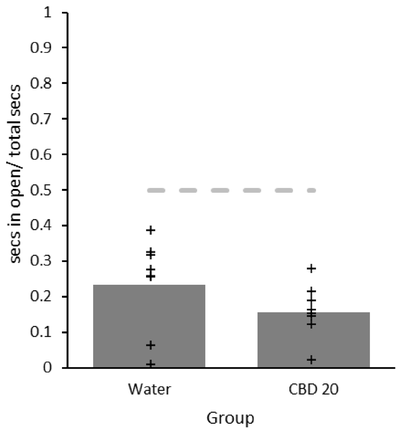
Group	n	Dosage	Method of delivery	Fed
CBD	8	20 mg/kg	Chronic (16 days)	2 hours prior to test
Control (Water)	8	20 mg/kg	Chronic (16 days)	2 hours prior to test

Anxiety Measure:

- Elevated Plus Maze – seconds spent on open arms/total seconds in open and closed arms
- Open Field – seconds spent on center/total seconds on arena

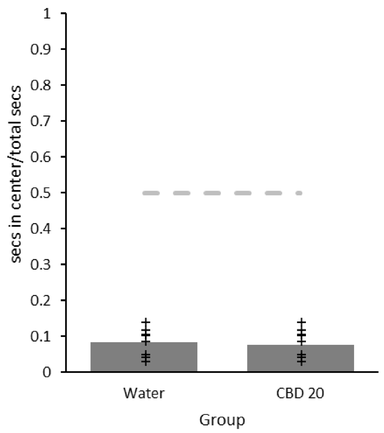
Results

Elevated Plus Maze



A one-way ANOVA revealed no significant main effect of Group, $F(1, 14) = 1.96$, $p = .18$. Single-samples *t*-tests conducted on the ratio on each group revealed a significant difference from .5, indicating a preference for the closed arms in both groups, $ps \leq .001$.

Open Field



A one-way ANOVA revealed no significant main effect of Group, $F(1, 14) = .14$, $p = .71$. Single-samples *t*-tests conducted on the ratio on each group revealed a significant difference from .5, indicating a preference for the outer area in both groups, $ps \leq .001$.

Discussion

- There were no significant differences in anxiety-like behavior between rats that consumed CBD and rats that consumed a water control on either the elevated plus maze or open field test.
- If anything, the rats in the CBD group appear to behave more anxiously.
- We plan to alter the concentration of CBD, as well as the oil it is dissolved in to continue to explore the effectiveness of voluntary oral consumption of CBD.

References

Blessing, E. M., Steenkamp, M. M., Manzanares, J., & Marmar, C. R. (2015). Cannabidiol as a Potential Treatment for Anxiety Disorders. *Neurotherapeutics : the journal of the American Society for Experimental NeuroTherapeutics*, *12*(4), 825–836. https://doi.org/10.1007/s13311-015-0387-1

Chesney, E., McGuire, P., Freeman, T. P., Strang, J., & Englund, A. (2020). Lack of evidence for the effectiveness or safety of over-the-counter cannabidiol products. Therapeutic advances in psychopharmacology, 10, 2045125320954992. https://doi.org/10.1177/2045125320954992

Devinsky, O., Cross, J. H., & Wright, S. (2017). Trial of Cannabidiol for Drug-Resistant Seizures in the Dravet Syndrome. *The New England journal of medicine*, *377*(7), 699–700. https://doi.org/10.1056/NEJMc1708349