A Comparison of Anxiolytic Behavior in Long-Evans Rats Consuming Cannabidiol (CBD) and TgF344-AD Fischer Rats in an Elevated Plus Maze

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Introduction

- Cannabidiol (CBD) is one of 70 cannabinoids that are part of the cannabis plant, *Cannabis sativa*. Evidence suggests that CBD has no psychoactive effects but has been found to act as an anxiolytic.
- Research suggests that CBD can treat epilepsy and anxiety in children with Dravet syndrome when ingested orally (20 mg/kg) (Devinsky et al., 2017).
- Bergamaschi et al. (2011) observed an anxiolytic effect of CBD in human participants that were given a 600 mg oral dose of CBD when being given the simulated public speaking test and observing physiological measures such as blood pressure and heart rate.
- Little research has been done to examine the anxiolytic effects of CBD in rats when ingested orally; however, CBD has been found to have anxiolytic effects on rat behavior when injected using an elevated plus maze as a test (Blessing et al., 2015).
- Pentkowski et al. (2018) has found that the TgF344-AD Fischer rat, a rat model for Alzheimer's disease, was more anxious when observing anxiolytic behavior on an elevated plus maze compared to its wildtype (WT) counterpart.
- **Experiment 1:** Potential anxiolytic effects of voluntary oral consumption of non-pharmaceutical grade CBD oil (60 mg/kg) compared to a control coconut oil (COC) were observed in Long-Evans rats using an elevated plus maze.
- **Experiment 2:** To further test the apparatus and method of measurement of Experiment 1, anxiety-like behavior of the TgF344-AD rat and WT rat was observed.

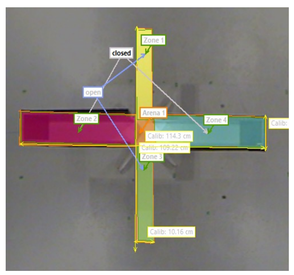
Method

Experiment 1:

- *Subjects*. 16 Long-Evans hooded rats (CBD, $n = 8$, COC, $n = 8$).
- *Test*. 5-min on elevated plus maze
- *Hypothesis*. If CBD acts as an anxiolytic, rats receiving CBD should spend more time in the open arms than COC rats.

Experiment 2:

- *Subjects*. 7 Fischer rats (AD, $n = 3$, WT, $n = 4$)
- *Test*. Same as Experiment 1.
- *Hypothesis*. If the elevated plus maze is a sufficient measure of anxiety, WT rats should spend more time in the open arms than AD rats.



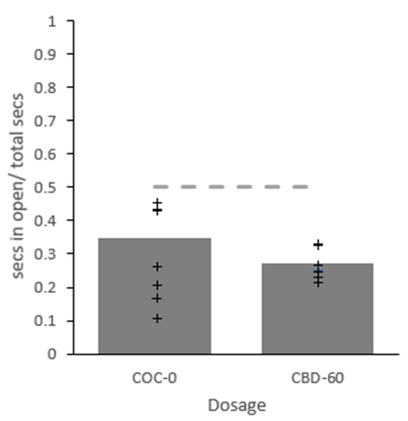
Exp	n	IV	DV	Type of Test	Fed
1	16	0 vs. 60 mg/kg	Sec in open/total sec	Acute	2 hours prior to test
2	7	WT vs. AD	Sec in open/total sec		

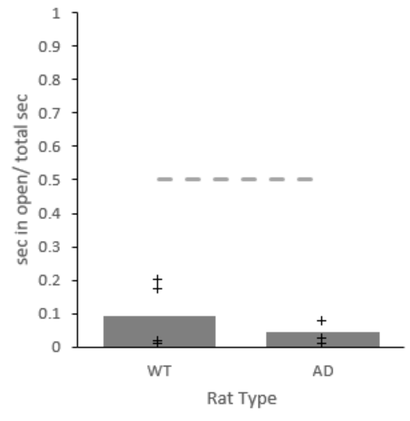
Results

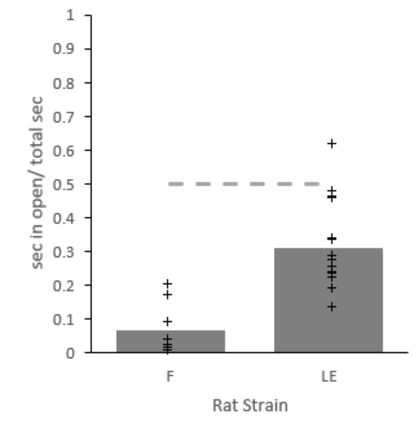
Experiment 1:
A one-way ANOVA was conducted on the ratio with group being the between-subjects factor (CBD vs. COC). There was no effect of Group, $F(1, 14) = 1.50$, $p = .24$, indicating that the CBD rats and the coconut oil rats were on the open arms of the maze for a similar amount of time. A single samples t-test against chance (.5) found that the ratio in each group was significantly below chance, $ps \leq .04$, indicating a preference for the closed arms.

Experiment 2:
A one-way ANOVA was conducted on the ratio with group being the between-subjects factor (WT vs. AD). There was no effect of Group, $F(1, 5) = .58$, $p = .48$, indicating that WT and AD rats were on the open arms of the maze for a similar amount of time. A single samples t-test against chance (.5) found that the ratio in each group was significantly below chance, $ps \leq .004$, indicating a preference for the closed arms.

Experiment 1 vs. 2:
A one-way ANOVA was conducted on the ratio with strain being the between-subjects factor [(Long-Evans (LE) vs. Fischer (F)]. There was an effect of Strain, $F(1, 21) = 21.48$, $p \leq .001$, indicating that the Fischer rats, regardless of genotype, were in the closed arms more than the Long-Evans rats, suggesting that the Fischer rats were more anxious.







Discussion

- In Experiment 1, both groups spent similar amounts of time on the open arms of the maze revealing no anxiolytic effect of CBD.
- Experiment 2 compared two groups of Fischer rats (AD and WT), where previous research has shown AD rats tend to show more anxious behavior. There was no difference in time spent in the open arms between AD and WT rats.
- Long-Evans rats in Experiment 1 spent more time in the open arms of the maze than the Fischer rats in Experiment 2, indicating that overall, the Fischer rats exhibit more anxious behavior than Long-Evans rats.
- Future experiments will continue to observe anxiolytic behaviors in Long-Evans hooded rats through modifying CBD dosages and type of CBD.

References

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