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A study comparing delta-9-tetrahydrocannabinol and cannabis extract on thermal nociception and central nervous system effects in mice

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Introduction: Δ^9-Tetrahydrocannabinol (THC) is the major psychoactive component of cannabis. It is unclear whether pharmacological activity of cannabis is due only to THC or to other cannabinoids[1,2]. The aim of this study was to compare thermal analgesic, anti-depressive, and hypothermic effects of pure THC and cannabis extract.

Methods: Extract was prepared from cannabis flowers using hexane liquid-liquid extraction, and analysed for cannabinoid content by HPLC. Adult female CD1 mice (25-30 g) were assigned to receive intravenous injection of THC (0.1-6.0 mg/kg), extract (0.1-4.9 mg/kg THC), or vehicle (18:1:1 saline: ethanol: ethoxylated castor oil) using a blinded randomized block design (n = 6-8/group). Thermal analgesia was measured using a ramped hotplate[3] with a temperature range of 32.1℃ to 52.1℃. Mice were habituated to their environment (30 min) prior to pre-treatment. Animals were video recorded for duration of the experiment with video analysis of withdrawal latency by a blinded observer. Latency measurements were taken at 2.5 min post-treatment. Mice that reached the cut-off point (52.1℃) were excluded from analysis. Forced-tail suspension[4] was performed immediately after treatment and total immobility time over 6 minutes was recorded. Rectal temperature (℃) was then measured. A three-parameter log(agonist) vs. response logistic non-linear regression equation was used. ANOVA was performed where appropriate ($\alpha = 0.05$). Data are presented as mean with 95% CI.

Results: THC and extract dose-dependently produced respective increases in latency with ED_{50} = 3.1 mg/kg (1.5-7.8, n = 8) and 0.6 mg/kg (0.3-1.4, n = 8). The total immobility time increased with dose for both THC (ED_{50} = 0.7 mg/kg; CI 0.06-NE, n = 7) and extract (ED_{50} = 0.8 mg/kg; CI 0.2-5.6, n = 6). In a comparison with vehicle, extract at 1,3 and 6 mg/kg decreased rectal temperature (39.2 [38.8-39.6] ℃ vs. 38.4 [37.9-39.0], 38.0 [37.4-38.7], 37.9 [37.3-38.4] ℃; P = 0.04, 0.001, 0.0002; n = 6). Surprisingly, the changes observed between THC and their control were not statistically significant.

Conclusion: There were no significant differences between THC and the extract in all assays. The similarity between the curves indicates THC is an appropriate representative for the cultivar and our procedure maintained the pharmacological profile expected of the extract's THC content.

References:

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