

Effects of Δ^9 -THC and cannabidiol vapor inhalation in male and female rats.

Abstract

RATIONALE:

Previous studies report sex differences in some, but not all, responses to cannabinoids in rats. The majority of studies use parenteral injection; however, most human use is via smoke inhalation and, increasingly, vapor inhalation.

OBJECTIVES:

To compare thermoregulatory and locomotor responses to inhaled Δ^9 -tetrahydrocannabinol (THC), cannabidiol (CBD), and their combination using an e-cigarette-based model in male and female rats. **METHODS:** Male and female Wistar rats were implanted with radiotelemetry devices for the assessment of body temperature and locomotor activity. Animals were then exposed to THC or CBD vapor using a propylene glycol (PG) vehicle. THC dose was adjusted via the concentration in the vehicle (12.5-200 mg/mL) and the CBD (100, 400 mg/mL) dose was also adjusted by varying the inhalation duration (10-40 min). Anti-nociception was evaluated using a tail-withdrawal assay following vapor inhalation. Plasma samples obtained following inhalation in different groups of rats were compared for THC content.

RESULTS:

THC inhalation reduced body temperature and increased tail-withdrawal latency in both sexes equivalently and in a concentration-dependent manner. Female temperature, activity, and tail-withdrawal responses to THC did not differ between estrus and diestrus. CBD inhalation alone induced modest hypothermia and suppressed locomotor activity in both males and females. Co-administration of THC with CBD, in a 1:4 ratio, significantly decreased temperature and activity in an approximately additive manner and to similar extent in each sex. Plasma THC varied with the concentration in the PG vehicle but did not differ across rat sex.

CONCLUSION:

In summary, the inhalation of THC or CBD, alone and in combination, produces approximately equivalent effects in male and female rats. This confirms the efficacy of the e-cigarette-based method of THC delivery in female rats.