

Blood cannabinoids levels and effects on cognitive performance and behaviour as a function of joint smoking procedure and inhalation technique

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Studies on the effects of cannabis smoking on cognitive and behavioral performance in humans are influenced by the great diversity by which the subjects prepare and smoke cannabis joints. In toxicological studies, joints are generally smoked according to a paced procedure, with a fixed duration of inhalation, breath-holding and interpuff interval. This should provide a greater dosing consistency across subjects and reduce the risks of under- or over-dosage.

We present a case report involved in a placebo-controlled, double blind cannabis smoking administration study in which one subject out of 22 had smoked a joint (11% THC) at 2 separate sessions, once as usual according to the same protocol as the other volunteers, a second time according to an imposed and more carefully controlled procedure. This male subject, aged 26, was an occasional cannabis smoker (about 2 joints per month) since 3-4 years.

Resulting in a very low THC blood concentration (highest level: 3.3 ng/ml), the first joint had been puffed without inhaling (“crapoter”). In the second session in which keeping the smoke in the mouth without inhaling was not possible, the whole blood THC concentration measured by GC-MS/MS reached a maximum value of 94.6 ng/ml.

“Crapoter” or smoking the placebo did not alter the heart pulse rate while a 43%-increase was observed after effective smoking. A strong, moderate, and inexistent feeling of “high” and of intoxication were felt after effective or ineffective inhalation of the cannabis joint, or of the placebo, respectively. A similar decrease or lack of change was observed in the self-assessment of the capability to drive and the willingness to drive under various fictitious circumstances.

Surprisingly, a slight decrease in critical task performance was noticed after inefficient smoking only. Quantification of the performance by measuring the precision of the behavioral responses in a fMRI dual tracking task with distractors (i.e. % of time of correct tracking and reaction times to distractors) showed a decrement in the performance after inefficient and efficient smoking compared to the control condition.

By comparing BOLD responses between the efficient THC inhalation and placebo condition, we found an activation pattern comparable to the same results in the whole smoking group. The same comparison between the inefficient inhalation and the placebo condition failed to reveal the same differences. However, robust differences were mainly observed in a statistical group analysis.

These results show that standardization of the cannabis smoking procedure is difficult and that self-report of cannabis usage, for epidemiological investigations remains unconvincing unless confirmed by cannabinoids quantification.

Key Words: Cannabis smoking procedure, blood concentrations, cognitive performances