National Safety Council
Committee on Alcohol and Other Drugs

Position on the use of Cannabis (Marijuana) and Driving

Adopted August 14, 2012 by the NSC CAOD

The National Safety Council (NSC) was requested to develop a policy on the impact of medical marijuana. As a result of this request the NSC Committee on Alcohol and Other Drugs conferred to provide a position statement to the NSC and the public on Cannabis (marijuana) and Driving. The NSC CAOD, as a part of its mission to provide recommendations to the NSC and the public on drugs and alcohol and public safety, recommends the following policy on cannabis and driving.

It is the position of the National Safety Council's Committee on Alcohol and Other Drugs that it is unsafe to operate a vehicle or other complex equipment while under the influence of cannabis (marijuana), its primary psychoactive component, Δ9-tetrahydrocannabinol (THC), or synthetic cannabinoids having comparable cognitive and psychomotor effects, due to the increased risk of death or injury to the driver and the public.

National Safety Council's Committee on Alcohol and Other Drugs

This position statement reflects the views of the members of the NSC Committee on Alcohol and Other Drugs and may or may not be an official policy of the National Safety Council.

Commentary

Nearly two-thirds of U.S. trauma center admissions are due to motor vehicle accidents, with almost 60% positive for drugs or alcohol (*1*). In 2009, 12.0% of Americans age 12 or older drove under the influence of alcohol at least once in the past year, and 10.5 million people reported driving under the influence of illicit drugs (*2*). Despite real or perceived impairment, individuals report willingness to drive if they have a good reason to do so (*3-4*) or they believe they have developed tolerance (*5*). Alcohol and cannabis are the most frequently detected drugs in drivers (*6*).

Cannabis (marijuana) is the most widely-consumed illicit substance worldwide (*7*). In 2009 the UNODC estimated 125-203 million individuals ages 15-64 ingested cannabis (*7*). In the U.S. in 2009, there was an increase over the previous 2 years to 6.6% of those 12 years or older smoking cannabis in the last month (*2*). The 2007 National Roadside Survey reported that cannabis was the most common drug quantified in drivers' blood or oral fluid (OF) with 8.6% of nighttime drivers' positive for Δ^9-tetrahydrocannabinol (THC) (*6, 8*). Thus, driving under the influence of cannabis is a growing public health concern.

Acute cannabis intoxication produces dose-related impairment in cognitive and psychomotor functioning, as well as risk-taking behavior (9-*14*). Reaction time (RT),

perception, short-term memory and attention, motor skills, tracking, and skilled activities are altered (*15-17*). These cannabis-induced decrements can impair driving skills.

Early epidemiological studies had difficulty documenting increased odds ratios (OR, risk of an accident) for motor vehicle accidents or driving fatalities for four primary reasons: (i) the cannabis-exposed group included individuals positive for THC or its inactive metabolite 11-nor-Δ^9-carboxy-THC (THCCOOH) in blood or urine, (ii) sample collection was delayed after the event and THC concentrations decrease rapidly, (iii) there were few cannabis only cases as many drivers ingested multiple drugs, and (iv) the cannabis-driving population demographics are similar to other high-risk driving populations, young, male, high-risk taking and high incidence of drunk driving; thus, after adjusting for these confounders, many results were equivocal. In 2004, Drummer et al. accrued sufficient cannabis-only cases to demonstrate a statistically significant increase in adjusted driver crash responsibility OR (2.7) when any blood THC was measureable relative to drug-free drivers (*18*). This increased to OR 6.6, comparable to culpability associated with a 0.15 g/100mL BAC, when blood THC was ≥5 ng/mL. Driving within one hour of smoking cannabis increased crash risk (ORs 1.84 (*19*) and 2.61 (*20*)), even after adjustment for demographic characteristics. In France, drivers in fatal crashes with detectable THC in blood had a 3.17 OR for crash responsibility (1.7 adjusted for demographics, BAC, blood THC concentration, and time of crash) (*21*). Drivers who are responsible for an accident have an increased OR with increasing blood THC. Crude (adjusted) ORs were 2.18 (1.57), 2.54 (1.54), 3.78 (2.13), and 4.72 (2.12) for <1, 1-2, 3-4, and ≥5 ng/mL, respectively. Two recent meta-analyses, each evaluating data from 9 epidemiological studies (only 2 in common) documented significantly increased motor vehicle accident risk (OR [95% CI]: 2.66 [2.07-3.41] (*22*) and 1.92 [1.35-2.73] (*23*)), even after controlling for confounding variables.

Driving simulator studies are useful for measuring THC effects on driving because they have greater validity than laboratory studies of individual psychomotor or cognitive tasks, while eliminating crash risk to participants. Simulators also allow measurement of specific performance decrements in ways unachievable in real-road driving experiments. Reaction time (RT), road tracking, speed, and standard deviation of speed (SD) were the most commonly measured outcomes. Four of 6 experiments evaluating RT showed THC dose-dependently increased this measure (*24-29*). When RT was measured including a secondary task (divided attention), lower (13 and 17 mg) THC doses produced significant and dose-dependent increases (*24*), suggesting divided attention is particularly sensitive to THC effects.

Only one simulator experiment included a headway maintenance task; 19 and 38 mg smoked THC significantly and dose-dependently increased mean and SD headway relative to placebo (*25*). The most sensitive road tracking measure was standard deviation of lateral position (SDLP). In one study, both 13 and 17 mg smoked THC increased SDLP relative to placebo in light (1-4x/month) smokers (*24*), while two other studies showed no significant SDLP increase after 13 mg in 1-4x/month smokers (*3*) or after 22.9 mg in 1-10x/month smokers (*29*). In contrast, 19 and 38 mg THC significantly increased SDLP 4 and 7 cm, respectively (*25*). Percent time in lane (*30*), and "straddled line" (*31*) demonstrated significant THC-induced impairment 60-330 min (*30*) and 80 min (*31*) after doses ranging from 14-52 mg.

In a 22-km road-tracking closed course test, 100, 200, and 300 µg/kg (~7, ~14, and ~ 21 mg) smoked THC increased SDLP relative to placebo with no significant differences in mean or SD speed (*4*). A second experiment conducted on the highway administered THC (100, 200, 300 µg/kg) in an ascending-dose order for safety reasons. Beginning 45 min after the start of smoking, 16 participants performed a 64 km road-tracking segment (approximately 50 min) (*32*). THC increased SDLP in a dose-dependent manner, such that the lowest dose produced a slight and non-significant elevation, the medium dose a significant but modest increase, and the highest dose a highly significant and substantial increase.

Multiple studies showed increased crash and culpability risks, even after adjusting for potential confounders such as age, sex, risky behaviors, and polydrug use. Elevated blood THC concentrations and driving several hours after smoking were strongly associated with higher crash and culpability risks. Human laboratory controlled drug administration studies showed THC-induced decrements in driving performance began within the first hour and lasted several hours after smoking, consistent with epidemiological data.

Laboratory-based impairment experiments identified divided attention tasks and executive function as most sensitive to cannabis' effects. Studies evaluating actual driving performance demonstrated dose-dependent THC impairment in road tracking, even following low to moderate THC doses that were required due to safety concerns.

Driving under the influence of cannabis is an important public safety concern. Impaired driving endangers those both inside and outside the driver's vehicle. Smoking or eating cannabis with or without alcohol prior to driving is a common occurrence and increases the risks of motor vehicle accidents and fatalities. The National Safety Council's Committee on Alcohol and Other Drugs' position is that smoking or ingesting cannabis, THC or synthetic cannabinoids prior to or during driving increases the risk of death or injury to the driver and the public.

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