'Extreme' exposure to secondhand cannabis smoke causes mild intoxication

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Non-smoking volunteers are exposed to cannabis smokers' secondhand smoke for one hour in an experimental chamber at Johns Hopkins. When ventilation fans were turned off, as in this image, all non-smokers showed detectable levels of cannabis' active ingredient in blood and urine, and reported feeling effects of the drug. Credit: Courtesy of Johns Hopkins Medicine.

Secondhand exposure to cannabis smoke under "extreme conditions," such as an unventilated room or enclosed vehicle, can cause nonsmokers to feel the effects of the drug, have minor problems with memory and coordination, and in some cases test positive for the drug in a urinalysis. Those are the findings of a Johns Hopkins University School of Medicine study, reported online this month in the journal *Drug and Alcohol Dependence*.

Cannabis is the most widely used illicit drug in the world. "Many people are exposed to secondhand cannabis smoke," says lead author Evan S. Herrmann, Ph.D., a postdoctoral fellow in psychiatry and behavioral sciences at Johns Hopkins. "The scenario we looked at was almost a worst-case scenario. It could happen in the real world, but it couldn't happen to someone without him or her being aware of it."

"We found positive drug effects in the first few hours, a mild sense of intoxication and mild impairment on measures of cognitive performance," says senior author Ryan Vandrey, Ph.D. , an associate professor of psychiatry and behavioral sciences at Johns Hopkins. "These were relatively slight effects, but even so, some participants did not pass the equivalent of a workplace drug test."

The new research is the most comprehensive study of secondhand cannabis smoke and its effects since the 1980s, when researchers found the drug's active ingredient, tetrahydrocannabinol, or THC, and other cannabis byproducts could turn up in nonsmokers' bodies after an hour or more spent in extreme conditions with heavy smokers in an enclosed space. That finding needed updating, since the average potency of street cannabis has tripled since the 1980s, the Johns Hopkins researchers wrote. Additionally, many earlier studies did not look at whether the nonsmokers reported feeling the drug's effects, or whether their behavior and thinking were affected by secondhand smoke, as the new study did.

Researchers recruited seven people ages 18 to 45 who said they smoked cannabis at least twice per week and tested positive for THC, but who tested negative for other drugs, and 12 others in the same age range who said they had not used cannabis in the past six months and tested negative for cannabis, other drugs, and alcohol. None of the participants were pregnant, and none of the nonsmokers took part in more than one session.

Six smokers and six nonsmokers spent an hour sitting side by side in a 10-by-13-foot, acrylic-walled room in two different experimental sessions. Each smoker was given 10 high-potency cannabis cigarettes to smoke. In one session, the room's ventilation fans were turned on. In another session, the fans were turned off, and the room became smoke-filled. This was a realistic simulation of home ventilation conditions. At the end of the exposures, smokers' and nonsmokers' blood, urine, saliva and hair were tested at regular intervals for THC.

All six nonsmokers who spent an hour exposed to secondhand smoke in the unventilated room under extreme conditions had detectable amounts of THC in their urine and blood. THC in blood was observed immediately after exposure and for up to three hours afterwards. Four hours after the experiment ended, one nonsmoker tested positive for THC on a urine test with the same cutoff (50 nanograms per milliliter) used in the Federal Workplace Drug Testing Program. At intervals between two and 22 hours after the experiment, four of the six nonsmokers tested positive for THC in their urine at a lower cutoff (20 nanograms per milliliter) sometimes used in commercial drug testing programs.

None of the nonsmokers exposed to secondhand smoke in the ventilated room tested positive for THC on either the more sensitive or the less sensitive urinalysis. (All the cannabis smokers tested positive for THC afterward.)

Nonsmokers exposed to secondhand smoke with fans running reported no effects other than being hungry. Those who were exposed in the unventilated experiment reported feeling "pleasant," more tired and less alert. When the nonsmokers were asked to duplicate grid patterns they saw on a computer monitor or perform a basic numbers drill, those in the unventilated study responded faster but made more mistakes than they did before they were exposed to the cannabis smoke, the researchers found.

"The behavioral and cognitive effects were minor and consistent with a mild cannabis effect," Herrmann says.

"This study is a significant update in our knowledge of cannabis smoke effect on nonsmokers and has implications in many arenas, including drugs and driving," says co-author Edward J. Cone, Ph.D., a Johns Hopkins adjunct professor of psychiatry and behavioral sciences who performed the early passive inhalation studies in the 1980s.

The study's limitations included its small size and the lack of a placebo trial using cannabis that contained no THC. The study was supported by the Substance Abuse and Mental Health Services Administration (SAMHSA), an agency in the U.S. Department of Health and Human Services that sets standards for federal workplace drug testing. Information about the effects of secondhand smoke on drug test results were being sought to support different ways of measuring drug use or drug exposure, Vandrey says. Funding came from SAMHSA and the National Center for Research Resources of the National Institutes of Health. The cannabis used in the experiment was provided by the National Institute on Drug Abuse.

Provided by Johns Hopkins University School of Medicine