

# Cannabis and cardiometabolic risk factors

Cannabis use is associated with lower body mass index (BMI), and lower BMI is related to lower levels of risk of other cardiovascular risk factors, according to a study published in *Psychosomatic Medicine* (2019; 81:281–288).

“Despite some research suggesting that cannabis acutely increases risk of myocardial infarction and stroke, the longer-term associations between cannabis use and cardiovascular risk are unclear,” wrote psychology professor Madeline Meier, PhD and her colleagues at Arizona State University and the University of Pittsburgh.

As a result, they decided to study associations between cannabis use and cardiometabolic risk factors that underlie the development of cardiovascular diseases.

The researchers followed participants from the Pittsburgh Youth Study prospectively to ~32 years of age (n=253; all male). They assessed frequency of cannabis use annually from ~age 12 to 20 years and then at ages 26, 29, and 32 years (approximately). They also assessed the following cardiometabolic

risk factors at age 32 years: BMI, waist-hip ratio, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, triglycerides, fasting glucose, insulin resistance, blood pressure, interleukin 6, and C-reactive protein.

## Cannabis users had lower BMI

Dr. Meier and her team found that greater cannabis exposure was associated with relatively lower BMI, smaller waist-hip ratio, better high- and low-density lipoprotein cholesterol, lower triglycerides, lower fasting glucose, lower insulin resistance, lower systolic and diastolic blood pressure, and fewer metabolic syndrome criteria.

Although cannabis users had lower BMI than non-users, their BMI was still above the threshold for overweight (BMI  $\geq 25$ ). However, cannabis users’ mean levels on the other cardiometabolic risk factors were generally below the clinical cutoffs for high risk.

Most associations between cannabis use and cardiometabolic risk factors remained after adjusting for tobacco use, childhood socioeconomic status, and childhood health.

Cannabis joint-years was not associated with lower childhood BMI or with a diet of fruit and vegetables, greater physical activity, or reduced alcohol use in adulthood.

After adjusting for adult BMI, cannabis joint-years was no longer associated with smaller waist-hip ratio, lower triglycerides, lower systolic blood pressure, or fewer metabolic syndrome criteria. Mediation tests suggest that cannabis users’ lower BMI might explain their lower risk of other cardiometabolic risk factors.

“It is currently unclear why recreational cannabis use would be associated with lower BMI, especially given evidence that cannabis acutely increases appetite,” wrote the researchers. “Chronic cannabis use might lead to a reduction in the number and signalling efficiency of CB1 receptors, which play a role in the regulation of food intake and energy expenditure. Thus, whereas short-term cannabis use might be associated with acute increases in appetite and higher BMI, long-term cannabis use might be associated with lower BMI.”

—Sherene Chen-See, *CJMC Correspondent*

## Commentary Madeline Meier, PhD Tempe, Ariz. U.S.A.

**GIVEN CANNABIS LEGALIZATION** in the U.S., policy makers, practitioners, and the public seek information about whether or not cannabis use is associated with problems later in life.

Some studies have suggested that cannabis might acutely increase the risk of stroke and heart attack, but associations over the longer-term are unclear.

In this study, we prospectively followed 253 men from the youngest cohort of the Pittsburgh Youth Study (PYS) to ~age 32.<sup>1</sup> (Members of the youngest cohort were selected because they took part in a parent study in which cardiovascular biomarkers were collected.)

We assessed participants’ cannabis use annually from ~ages 12 to 20 and then again at ~ages 26, 29, and 32. We also assessed cardiometabolic risk factors (body mass index [BMI], waist-hip ratio, high density lipoprotein cholesterol, low density lipoprotein cholesterol, triglycerides, fasting glucose, insulin resistance, blood pressure, interleukin 6, and C-reactive protein) at ~age 32.

We found that cannabis users had slightly lower BMI in adulthood compared with non-users. Interestingly, we observed this same association between cannabis use and lower BMI in another longitudinal cohort.<sup>2</sup> Yet, in both cohorts, cannabis

users were still overweight, dispelling any notion that cannabis makes a person thin.

In the PYS, cannabis use was also generally associated with lower levels of risk on other cardiometabolic risk factors. However, after adjusting for adult BMI, these associations were no longer apparent. We concluded that cannabis use is associated with lower BMI, and lower BMI is related to lower levels of risk on other cardiometabolic risk factors.

Observational studies like ours are excellent for demonstrating associations between cannabis use and health but are not well-suited for identifying specific causes of these associations. However, cannabis users in our study did not have lower BMI as children or healthier diets as adults. They also did not exercise more or drink less alcohol. One theory is that cannabis use might lead to a reduction in the number and signaling efficiency of cannabinoid type 1 receptors, which might reduce energy storage and increase metabolic rates.

## References

1. Meier MH, Pardini D, Beardslee J, Matthews KA: Associations between cannabis use and cardiometabolic risk factors: A longitudinal study of men. *Psychosomatic Medicine* 2019; 81:281–288.
2. Meier MH, Caspi A, Cerdá M, et al: Associations between cannabis use and physical health problems in early midlife: A longitudinal comparison of persistent cannabis vs tobacco users. *JAMA Psychiatry* 2016 Jul 1; 73(7):731–740.

.....  
Dr. Meier is assistant professor, Department of Psychology, Arizona State University, Tempe, Ariz.





# Cannabis use and acute coronary syndrome

As reported in

## Clinical Toxicology

2019; DOI: 10.1080/15563650.2019.1601735

Smoked cannabis is known to cause an immediate increase in heart rate and blood pressure, and a review published recently in *Clinical Toxicology* shows an increased risk of acute coronary syndrome. The review was reported by Dr. John Richards, a professor in the Department of Emergency Medicine, and colleagues at University of California Davis Medical Center.

Dr. Richards was motivated to study the possible connection between cannabis use and acute coronary syndrome because of a few of his own patients, who had smoked cannabis and suddenly started having chest pains severe enough to require a visit to the cardiac catheterization lab.

The researchers systematically analyzed the medical literature pertaining to smoked cannabis use and acute coronary syndrome. There were no randomized blinded controlled studies specifically addressing this connection but there were wide-ranging systematic reviews. The research team reviewed five systematic reviews (referred to as Level I); 14 Level II studies (well-designed controlled trials without randomization; prospective comparative cohorts) of 83,961 subjects; and 14 Level III studies (case-control studies; retrospective cohort studies) of 457,495 subjects.

### Level I: Systematic reviews

Nawrot, et al<sup>1</sup> determined cannabis to be the third-highest ranking trigger of non-fatal myocardial infarction, after cocaine use and eating a heavy meal. Desbois, et al<sup>2</sup> found cannabis use to be associated with myocardial infarction, stroke, and peripheral arteritis. Jouanjus et al<sup>3</sup> determined that the risk of stroke with cannabis use was higher than with other cardiovascular diseases such as myocardial infarction. On the other hand, Pradhan, et al<sup>4</sup> showed a reduced risk among cannabis users in terms of in-hospital mortality, and Ravi, et al<sup>5</sup> found insufficient evidence either way.



Dr. John Richards

### Level II studies

Mittleman, et al<sup>6</sup> found a significantly increased risk of myocardial infarction within one hour of smoking cannabis, and the risk went back to normal after one hour. Mukamal, et al<sup>7</sup> concluded that cannabis was associated with three-fold higher total mortality after myocardial infarction. Frost, et al<sup>8</sup> showed a 29% higher mortality rate with myocardial infarction among cannabis users compared to non-users.

Reece, et al<sup>9</sup> studied 1,553 subjects and found that cannabis use significantly accelerated cardiovascular age and thus risk for acute coronary syndrome. James, et al<sup>10</sup> determined that, of 54 adolescents presenting with chest pain, one-quarter tested positive for cannabis metabolite. Zaurova, et al<sup>11</sup> found that, of 3,739 patients, 70 with phytogenic cannabis overdose had associated cardiotoxicity. In a study of 3,498 young adults by Auer, et al,<sup>12</sup> cannabis plus tobacco use was associated with subclinical atherosclerosis.

In a prospective cross-sectional study of 138 patients, Draz, et al<sup>13</sup> found increased ST-segment elevation myocardial infarction, cardiomyopathy, and coronary artery disease in cannabis users compared to non-users. Yankey, et al<sup>14</sup> found cannabis use was

significantly associated with increased hypertension-related mortality.

Two other Level II studies (Sidney, et al<sup>15</sup>; Reis, et al<sup>16</sup>) indicated no harm from cannabis use with regard to cardiovascular disease.

### Level III studies

All Level III studies except one suggested an association between cannabis use and acute coronary syndrome.

Jouanjus, et al<sup>17</sup> described cardiovascular complications associated with acute cannabis use, and their follow-up study<sup>18</sup> showed a higher incidence of acute coronary syndrome and cardiac arrest compared to the general population.

Thankavel, et al<sup>19</sup> detailed seven pediatric patients of a total 32 with vasospasm and myocardial infarction associated with prior cannabis use; Ramphul, et al<sup>20</sup> studied 333 teenagers with acute myocardial infarction and found an odds ratio of 5.03 [3.5-7.3] for myocardial infarction after cannabis use.

A large study of 35,771 subjects, by Desai, et al<sup>21</sup> found the odds of developing myocardial infarction increased by 8% in patients using cannabis. Lorenz, et al<sup>22</sup> studied 558 male patients with HIV and determined that heavy cannabis use had an odds ratio of 2.5 [1.3-5.1] for cardiovascular events compared to occasional or non-users. Abouk, et al<sup>23</sup> discovered that U.S. states with more liberal cannabis rules had higher cardiac-related mortality rates.

In a study of 31,397 cannabis users, Kalla, et al<sup>24</sup> found cannabis to be an independent risk factor of acute cardiovascular events.

### Discussion of review

Cannabis use was associated with increased risk of acute coronary syndrome in 25 of 28 published studies and three of five systematic reviews.

One possible reason for this could be because “[smoked] cannabis is a stimulant for the first hour,” explained Dr. Richards. “It increases heart rate and blood pressure acutely, and this puts a person at risk of heart attack. Smoked cannabis reaches the bloodstream, and that seems the most important factor in having a heart attack.”

As a result, clinicians and nurses should ask their patients presenting with chest pain, dysrhythmia, and/or unexplained syncope whether they have used cannabis.

### References

1. Nawrot TS, Perez L, Kunzli N, et al: Public health importance of triggers of myocardial infarction: a comparative risk assessment. *Lancet* 2011; 377:732–740.
2. Desbois AC, Cacoub P: Cannabis-associated arterial disease. *Ann Vasc Surg* 2013; 27:996–1005.
3. Jouanjus E, Raymond V, Lapeyre-Mestre M, et al: What is the current knowledge about the cardiovascular risk for users of cannabis-based products? A systematic review. *Curr Atheroscler Rep* 2017; 19:26.
4. Pradhan RR, Pradhan SR, Mandal S, et al: A systematic review of marijuana use and outcomes in patients with myocardial infarction. *Cureus* 2018; 10:e3333.
5. Ravi D, Ghasemiesfe M, Korenstein D, et al: Associations between marijuana use and cardiovascular risk factors and outcomes: a systematic review. *Ann Intern Med* 2018; 168:187–194.
6. Mittleman MA, Lewis RA, Maclure M, et al: Triggering myocardial infarction by marijuana. *Circulation* 2001; 103:2805–2809.
7. Mukamal KJ, Maclure M, Muller JE, et al: An exploratory prospective study of marijuana use and mortality following acute myocardial infarction. *Am Heart J* 2008; 155:465–470.
8. Frost L, Mostofsky E, Rosenbloom JI, et al: Marijuana use and long-term mortality among survivors of acute myocardial infarction. *Am Heart J* 2013; 165:170–175.
9. Reece AS, Norman A, Hulse GK: Cannabis exposure as an interactive cardiovascular risk factor and accelerant of organismal ageing: a longitudinal study. *BMJ*

—continued on page 24