



# Sex, Gender and Cannabis Routes of Administration

## What are various Routes of Administration?

- Smoking, vaping, eating/drinking, topical use (creams, lotions, salves), and use of oils and concentrates (e.g. shatter, wax) are among the Cannabis may be smoked with tobacco. Blunts involves rolling cannabis in a tobacco leaf wrapper, and “spliffs” are joints containing both cannabis and tobacco.

## Who is using which ROA?

Routes of administration are not evenly used across all subpopulations for either recreational or medical use. There is only limited information on gendered and age-related patterns of use:

- *Young adults* - Greater use of e-cigarette devices to vaporize cannabis have been found among high school aged boys [1], or no difference between girls and boys [2].
- *Adults* - Men report greater use of: joints, blunts, vaporizers and concentrates [3], and water pipes and bongs [4].
- *Pregnant women* - Limited data on cannabis use by pregnant women indicate that smoking is preferred [5].
- *Medical Use*- both women and men report smoking cannabis as it is convenient, easier to monitor dosage and affordable [6].
- *Problematic use* - For men, use of an increasing number of cannabis ROAs was associated with more problematic cannabis use, and using water pipes/ bongs was linked with heavy use [7].

## What we need to know

1. What sex-based factors affect the health effects and intoxication impact of various ROAs?
2. What gender-based factors affect choice, marketing and trends in ROAs?
3. What are the long-term effects of vaping cannabis on males and females?

## ROA & effects on health

We have very limited information on the sex specific biological effects of cannabis ROA from animal and human studies.

- *Cannabis use disorder* - Concurrent use of cannabis and tobacco (not mixing as in blunts or spliffs) has been found to increase the risk of dependence *among women* [8].
- *Reproductive health* - Concurrent use of cannabis and tobacco results in changes to the menstrual cycle [9].
- *Maternal use* - Concurrent use of cannabis and tobacco during pregnancy has been found to increase the risk of preeclampsia and adverse perinatal health outcomes, and is associated with poor emotional regulation, decreased immunity and greater risk for substance use disorder in offspring [10-13].

## ROA effects in medical use

Limited studies have examined optimal ROA for treating specific health conditions in samples of men or women. Some of the observed effects include:

- moderate sleep enhancing effects of oral THC in a sample of men who used cannabis daily [14];
- relief from adverse drug reactions following the HPV vaccine in young women who used sublingual CBD drops [15]; and
- relief of some chronic prostatitis symptoms in a sample of men, the majority of who smoked or vaped cannabis [16].

### What we need to know

- Much more information on the effects of cannabis ROAs on a wider range of sex specific conditions and diseases

## ROA & social consequences

- *Impaired Driving* – Research on gender and ROAs related to impairment in driving has not yet been documented.
- *Poisonings* –No sex/gender-based analysis of outcomes has been done related to poisoning among children who have ingested edibles.
- *Injuries* - Research on gender and injuries associated with cannabis ROAs is limited to two studies on manufacturing of butane hash oil use, where burns in men were more common in hospital admissions [17,18].
- *Second hand smoke* - There is a lack of evidence on the effects of involuntary exposure to cannabis smoke on human health. One study found metabolites of cannabis smoke were detected in some children hospitalized with bronchiolitis, and one metabolite was more commonly detected in children with concurrent tobacco smoke exposure [19].

### What we need to do

- Funding of more basic and social science research that investigates sex, as well as gender related issues in ROAs
- Focus groups and public opinion research to develop gendered prevention messages for specific subpopulations
- Incorporate ROA harm reduction messages into all treatment programs

### References

1. Morean, M.E.; Kong, G.; Camenga, D.R.; Cavallo, D.A.; Krishnan-Sarin, S. High school students' use of electronic cigarettes to vaporize cannabis. *Pediatrics* **2015**, *136*, 611.
2. Eggers, M.E.; Lee, Y.O.; Jackson, K.; Wiley, J.L.; Porter, L.; Nonnemaker, J.M. Youth use of electronic vapor products and blunts for administering cannabis. *Addictive behaviors* **2017**, *70*, 79-82.
3. Cuttler, C.; Mischley, L.K.; Sexton, M. Sex differences in cannabis use and effects: A cross-sectional survey of cannabis users. *Cannabis and Cannabinoid Research* **2016**, *1*, 166-175.
4. Noack, R.; Hofler, M.; Lueken, U. Cannabis use patterns and their association with dsm-iv cannabis dependence and gender. *European Addiction Research* **2011**, *17*, 321-328.
5. Westfall, R.E.; Janssen, P.A.; Lucas, P.; Capler, R. Survey of medicinal cannabis use among childbearing women: Patterns of its use in pregnancy and retroactive self-assessment of its efficacy against 'morning sickness'. *Complementary therapies in clinical practice* **2006**, *12*, 27-33.
6. Bortorff, J.L.; Bissell, L.J.; Balneaves, L.G.; Oliffe, J.L.; Kang, H.B.; Capler, N.R.; Buxton, J.A.; O'Brien, R.K. Health effects of using cannabis for therapeutic purposes: A gender analysis of users' perspectives. *Substance Use & Misuse* **2011**, *46*, 769-780.
7. Baggio, S.; Deline, S.; Studer, J.; Mohler-Kuo, M.; Daeppen, J.B.; Gmel, G. Routes of administration of cannabis used for nonmedical purposes and associations with patterns of drug use. *Journal of Adolescent Health* **2014**, *54*, 235-240.
8. Agrawal, A.; Lynskey, M.T.; Madden, P.A.F.; Pergadia, M.L.; Bucholz, K.K.; Heath, A.C. Simultaneous cannabis and tobacco use and cannabis-related outcomes in young women. *Drug and Alcohol Dependence* **2009**, *101*, 8-12.
9. Lammert, S.; Harrison, K.; Tosun, N.; Allen, S. Menstrual cycle in women who co-use marijuana and tobacco. *Journal of addiction medicine* **2018**, *12*, 207-211.
10. Chabarria, K.C.; Racusin, D.A.; Antony, K.M.; Kahr, M.; Suter, M.A.; Mastrobattista, J.M.; Aagaard, K.M. Marijuana use and its effects in pregnancy. *American journal of obstetrics and gynecology* **2016**, *215*, 506. e501-506. e507.
11. Ashford, K.; Fallin-Bennett, A.; McCubbin, A.; Wiggins, A.; Barnhart, S.; Lile, J. Associations of first trimester co-use of tobacco and cannabis with prenatal immune response and psychosocial well-being. *Neurotoxicology and teratology* **2019**, *73*, 42-48.

12. Stroud, L.R.; Papandonatos, G.D.; McCallum, M.; Kehoe, T.; Salisbury, A.L.; Huestis, M.A. Prenatal tobacco and marijuana co-use: Impact on newborn neurobehavior. *Neurotoxicology and teratology* **2018**, *70*, 28-39.
13. De Genna, N.M.; Goldschmidt, L.; Richardson, G.A.; Cornelius, M.D.; Day, N.L. Trajectories of pre-and postnatal co-use of cannabis and tobacco predict co-use and drug use disorders in adult offspring. *Neurotoxicology and teratology* **2018**, *70*, 10-17.
14. Gorelick, D.A.; Goodwin, R.S.; Schwilke, E.; Schroeder, J.R.; Schwoppe, D.M.; Kelly, D.L.; Ortemann-Renon, C.; Bonnet, D.; Huestis, M.A. Around-the-clock oral thc effects on sleep in male chronic daily cannabis smokers. *American Journal on Addictions* **2013**, *22*, 510-514.
15. Palmieri, B.; Laurino, C.; Vadala, M. Short-term efficacy of cbd-enriched hemp oil in girls with dysautonomic syndrome after human papillomavirus vaccination. *Israel Medical Association Journal: Imaj* **2017**, *19*, 79-84.
16. Tripp, D.A.; Nickel, J.C.; Katz, L.; Krsmanovic, A.; Ware, M.A.; Santor, D. A survey of cannabis (marijuana) use and self-reported benefit in men with chronic prostatitis/chronic pelvic pain syndrome. *Canadian Urological Association Journal* **2014**, *8*, E901-905.
17. Bell, C.; Slim, J.; Flaten, H.K.; Lindberg, G.; Arek, W.; Monte, A.A. Butane hash oil burns associated with marijuana liberalization in colorado. *Journal of medical toxicology* **2015**, *11*, 422-425.  
Miller, B.L.; Stogner, J.M.; Miller, J.M. Exploring butane hash oil use: A research note. *Journal of psychoactive drugs* **2016**, *48*, 44-49.  
Wilson, K.M.; Torok, M.R.; Wei, B.; Wang, L.; Robinson, M.; Sosnoff, C.S.; Blount, B.C. Detecting biomarkers of secondhand marijuana smoke in young children. *Pediatric research* **2017**, *81*, 589.

