

## Up In Smoke: Marijuana and Breastfeeding Handout

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While Cannabis (marijuana) has been used for more than 5000 years as a medicinal and ceremonial herb, its use as a recreational and daily medicine has spiked over the past decade. Legalization and anti-punitive laws for both medicinal and recreational use of Cannabis around the world has increased its use, in the mainstream population and also during pregnancy and lactation. Women who use Cannabis during the perinatal period believe the herb to be natural and less toxic to their bodies and their babies than pharmaceutical medications and alcohol. With little in the way of quality human research, medical and lactation professionals are left wondering how to guide and counsel their clients.

Today Cannabis is the most commonly used illicit substance during pregnancy in Western societies. It is the world's third most popular recreational drug, after alcohol and tobacco. Cannabis is by far the most widely consumed and available illicit drug in France, as well as in Europe (Costes, 2009). In France, there are 17 million lifetime users. There are estimated to be 1.4 million regular users of the drug and 700,000 daily users according to the French Observatory of Drugs and Addictions (OFDT).

What about use during pregnancy and breastfeeding? Moore et al. (2010) found that in British communities, Cannabis was the ONLY illicit drug that pregnant women continued to use to term. A 2010 study on Cannabis use during pregnancy in France found that out of 13,545 self-reporting women, 1.2% freely admitted to using the drug (Saurel-Cubizolles, 2010). Fifteen percent of those women reported using marijuana at least 10 times a month. Due to the fact that there are severe penalties for Cannabis use in France, and the fact that women know that it is frowned upon to use marijuana during pregnancy, the authors stated that they believed that there was significant under-reporting of usage. Even so, this survey estimated that at least an estimated 9900 fetuses are exposed to Cannabis in utero every year in France alone.

The European Union classifies Cannabis as both a Narcotic and a Psychotropic drug (EMCDDA, 2015). Narcotic drugs are classified and placed under international control by the 1961 UN Single Convention on Narcotic Drugs, as amended in 1972. It is considered both a Schedule I and Schedule IV drug as a narcotic meaning that it is regarded as having addictive properties and a high risk of abuse, as well as very little medical or therapeutic value. Psychotropic substances are placed under international control by the 1971 United Nations Convention on Psychotropic Substances. As a psychotropic drug it is considered a drug with high risk of abuse with serious threat to public health and little to no therapeutic value.

Cannabis is a flowering plant with three species – indica, sativa, and ruderalis. Indica and sativa species are the plants that are associated with human consumption. Cannabis sativa is a tall and thin plant, with light green leaves and high

concentrations of tetrahydrocannabinol (THC). It tends to be known for a brain high. Cannabis indica is a short and dense version of the plant with dark green leaves. C. Indica tends to be higher in Cannabidiol (CBD), and thus is known for a body high instead of for its psychotropic effects. This is the version that tends to be home grown because it does not grow very tall. Most marijuana on the market today is a genetically modified version of the two herbs that have been hybridized for specific qualities.

These modified versions of marijuana are not the same chemically as what one would find naturally growing in the wild. Today the marijuana that is sold on the street and over the counter is genetically modified to produce the either high levels of THC for its psychotropic effects or high levels of CBD for its medical qualities, such as reducing seizures. In the 1970's the level of THC was approximately 1%. Since that time, the THC levels have steadily been climbing, and today one finds THC levels an average of 12% potency in the dried herb and 20-60% in hashish preparations around the world. In France, the average herbal potency is 13% and resin is 20.7%, according to the INPS (National Forensic Science Institute).

Cannabis can be consumed in a myriad of ways. As a dried herb it can be smoked as cigarette, placed in a water bong, vaporized in a vaping system, or smoked in a pipe. Hashish is the extracted resin from the marijuana plant, and can be smoked or added to edibles. Marijuana oil is the oil from the Cannabis buds that has been extracted with a solvent. This oil is used to enhance cigarettes or using in edibles. This form of marijuana has a much higher concentration of THC, from 20%-60%. Edibles have a higher bioavailability of THC, from 6-20%, and thus can be longer acting and more intense for the user. Many cannabis users have switched from smoking or vaping Cannabis to edibles to reduce the lung cancer risk. Those who use Cannabis for pain relief medicine may also use it as transdermal patch or topical crème. There are two forms of pharmaceutical Cannabis. The first is Dronabinaol, which is synthetic THC. It is used in US for nausea associated with chemotherapy and HIV. The second medication is Sativex. This is synthetic THC and CBD, used primarily throughout Canada and Europe and recently legalized in France, for the treatment of neuralgia associated with Multiple Sclerosis.

While there are hundreds of chemicals in Cannabis, the most studied and well known are the cannabinoids, of which there are 109. THC and CDB are the most well known. In the raw plant material, THC and CBA are found in acid form, that of THCA and CBDA. They must be heated to transform to the active ingredients THC and CBD. This why you can't just eat raw Cannabis plant and get high. The plant material must first be heated, which is why you have to bake or cook edibles, or use the extracted hashish or marijuana oil, which has already been heat processed. The half-life of THC is one to 2.3 days, but the metabolites can stay in the body's system for 4-6 weeks. CBD is the chemical sought after for medical treatments, such as arthritis, diabetes, alcoholism, MS, chronic pain, schizophrenia, PTSD, antibiotic-resistant infections, and epilepsy. It is a non-psychotropic medicine and there are now strains of Cannabis that are low or no THC and high CBD.

When someone inhales marijuana, the smoke goes in to the lungs and immediately passes through the membranes and enters the bloodstream. From here it dilates the blood vessels, which can make the user feel warm and also cause the bursting of the small blood vessels in the eyes, giving the typical red eye appearance of marijuana smoking. Marijuana reaches the brain within seconds. With ingestion, this process can take much longer, from 30-60 minutes. When marijuana enters the brain it affects the following regions and causes the following outcomes:

- Hippocampus/Hypothalamus> Regulates hunger> Leads to “munchies”, improves appetite, reduces nausea
- Hippocampus> Affects short-term memory> Leads to lack of memory
- Cerebellum> Coordination> Lack of coordination
- Amygdala> Regulates fear> Feeling paranoid
- Limbic System> Releases dopamine> Feelings of pleasure

Once in the brain, the cannabinoids hijack the brain's natural endocannabinoid receptors, CB1 and CB2. The endocannabinoid system is an incredibly important system in the body. It provides homeostasis for most organ systems in the body. The human body naturally produces endogenous cannabinoids, Anandamide (AEA) and 2-arachidonoyl glycerol (2-AG). These ligands attach to the body's endocannabinoid receptors, CB1 and CB2. There are CB1 receptors in the human nervous system, connective tissue, glands, gonads, and organs. The CB2 receptors are found in the immune system and associated structures. Marijuana has such a powerful effect on the human body because the molecular shape of THC and CBD closely approximates the body's own endogenous cannabinoids. THC and CBD can take over the systems that employ the cannabinoid receptors.

The endocannabinoid system is multifunctional. It works with human memory and learning, can impact anxiety and depression, affects appetite and addiction behavior, and provides neuro-protection. Marijuana can alter these systems by preventing or forcing out the endogenous cannabinoids, AEA and 2-AG, from binding to the receptors. There is potential risk to the function of these systems long-term from chronic Cannabis exposure, particularly when the systems are being formed in utero and the first years of life. Kenney et al. (1999) found that the placenta has CB1 and CB2 receptors. They suggested that marijuana use in pregnancy could potentially affect placental clearance of serotonin, which could have an impact on mood, sexual desire and function, appetite, sleep, memory and learning, temperature regulation, and some social behavior. Animal studies several decades ago showed that when THC was directly administered to rhesus monkeys, the THC readily passed the placenta to the fetus. The THC in the fetus did not seem to convert to the first THC metabolite, 11-nor-9-carboxy-THC (Bailey, 1987). While this is an old and non-human study, it leaves questions about the endocannabinoid role of the placenta, and how marijuana can impact the fetus.

The fetal endocannabinoid system exists in the preimplantation stage of the embryo. There are CB1 receptors detected at week 14 in the cerebral cortex, hippocampus,

caudate nucleus, putamen and cerebellar cortex. In gestational week 20 there is intense receptor expression in amygdala and hippocampus. In early fetal and newborn life the endocannabinoid system modulates neuronal generation, differentiation, migration and neural circuit wiring during development. It is intricately involved in the development of the human brain. How marijuana interacts with this system in human fetal life, we don't have clear answers. However, in animal studies there is pretty clear indication that marijuana exposure in the fetal and newborn period can disrupt synaptogenesis, interrupt endocannabinoid signaling, and alter serotonin, opioid, and dopamine receptors so crucial to mood stability. The most significant development to CB1R neural cell growth occurs in the zero to five year period, and endogenous AEA may cause the necessary neural differentiation for proper brain development. Researchers speculate that there is the potential for future issues with pain perception, cognition, emotional regulation, and addictive behaviors for those babies exposed to chronic marijuana (Wu, 2011).

There have been only three longitudinal studies looking at the impact of prenatal and postpartum exposure of marijuana to the fetus/newborn. These are the Ottawa Prenatal Prospective Study (OPPS), the Maternal Health Practices and Child Development Study (MHPCD), and the Generation R Study (Gen R). The OPPS study started in 1978 in Canada and was assessing prenatal exposure of tobacco and marijuana in a low-risk, mainly Caucasian and middle-class cohort (Fried, 1987). The MHPCD began in 1982. It looked at prenatal alcohol and marijuana exposure in a cohort of low socioeconomic Caucasian and African-American women living in Pittsburgh, Pennsylvania (Richardson, 2002). The Gen R Study was started in 2001 in the Netherlands and studied a multi-ethnic population focusing on cannabis use in both mothers and fathers (Marrun, 2009). With regard to birth weight, the studies all had differing results. OPPS showed no difference and Gen R showed reduced birth weight, while MHPCD actually showed increased birth weight after third trimester exposure. The OPPS study showed gestational age reduction with marijuana exposure. Both the MHPCD and Gen R showed growth restriction. MHPCD showed reduced birth length exposure after exposure in the first trimester and Gen R showed reduced fetal growth from 2<sup>nd</sup> trimester exposure.

In terms of infant behavior, only the OPPS study showed increased startles and tremors. It also found that exposure led to a reduced habituation to light and at 48 months the babies had lower memory and verbal skills. MHPCD also showed lower memory and verbal skills at 36 months. The OPPS and MHPCD both found more impulsivity and hyperactivity once the exposed babies became children (the Gen R has not studied this yet). Furthermore, the OPPS study also found that Cannabis exposed children had impaired visuo-perception function. MHPCD found increased inattention in exposed children. As far as adult behavior, only the OPPS study has published results on this aspect of prenatal marijuana exposure. They found as adults the exposed babies had response inhibition and an altered neural functioning during visuospatial working memory processing. Although inconsistent, these clinical studies indicate that prenatal exposure to heavy marijuana use may have:

little to no effect in early infancy, some specific cognitive or behavioral outcomes in childhood, and altered executive function in adolescence. The largest effects were seen with heavy users and in the Gen R study, results were dose dependent.

What about marijuana and exposure through breastmilk? Due to the lipophilic nature of THC, it is tremendously fat-soluble and therefore can access breastmilk readily. Due to the fact that the levels of THC have been increasing in marijuana consumables, this is particularly concerning. How much THC does get in to breastmilk? There have been just two publications that addressed this, totaling only 4 mothers. The Perez-Reyes study found that a mother who smoked marijuana only once day had a breastmilk concentration of 105 mcg/L (Perez-Reyes, 1982). The other mother in the study smoked 7-8 times daily and had a concentration of 340 mcg/L. In the Marchei study, they looked at two users who smoked an unknown amount of marijuana and both had breastmilk concentrations of 86 mcg/L (Marchei, 2011). There is simply not enough information from these published studies to know for certain how much marijuana exposure leads to THC concentration in breastmilk.

There are concerns that both prenatal exposure, as well as exposure through breastmilk, can have a significant impact on the child. The zero through 3-5 period is a critical period of development for both the brain and the endocannabinoid system. There is some evidence found by Friderici that the CB2 receptor in babies does have a role in both a baby's ability to suckle and also in milk ingestion (Friderici 2008; Friderici, 2003). Delta 9 THC has been found to inhibit gonadotrophin, prolactin, growth hormone, and thyroid stimulating hormone release and stimulates the release of corticotrophin which can potentially impact the quantity of breastmilk (Jaques, 2014). However, the duration of breastfeeding does not seem to be impacted.

Overall the potential risk for babies includes the following:

- Increase risk SIDS
- Positive urine screens
- Metabolites not found in human milk are found in infant feces (Perez-Reyes)
- Potential double exposure
- May cause epigenetic damage
- Potential for exposure to other drugs. Marijuana not always "clean".

Even though there are potential risks to the growing baby, what is not known is whether the negative consequences of not receiving breastmilk is more detrimental than that risk of slight THC exposure through breastmilk. In the United States, most healthcare organizations and researchers have come out with statements that support continuation of breastfeeding even if a mother uses cannabis. Lactmed states "...it appears preferable to encourage mothers who use marijuana to continue breastfeeding while minimizing infant exposure to marijuana smoke and reducing marijuana use." In *Cannabis, the pregnant woman and her child; weeding out the myths*, the researchers concluded that, "Depending on family circumstances, the



benefits of breast feeding, even with continued cannabis use, may outweigh the negative side-effects, especially in infrequent cannabis users. Each institution should work towards a policy of ensuring best practices for their particular population of cannabis users.” The updated Academy of Breastfeeding Medicine Protocol #21 advises healthcare professionals to counsel those who admit marijuana use and strongly advise those with a positive screen to avoid or reduce use, advise on long-term neurobehavioral risks, and avoid direct exposure of smoke to infant (ABM, 2015).

The key to successful counseling when working with mothers who may be using cannabis during breastfeeding (or pregnancy) is to have open-ended conversations with the families. We already have wonderful models for talking to parents about using substances of concerns in a manner that is advisory and not punitive. For example, we know that alcohol and cigarette are not ideal for the breastfeeding woman, and yet healthcare providers do not tell a woman that she has to stop breastfeeding. The US Surgeon Generals Call to Action to Support Breastfeeding asks health care providers to make the following considerations when counseling family on drug use:

- Benefit of drug for mother
- Impact of not taking med for mother and infant (Example: untreated maternal depression has negative impact on both mother and infant)
- Impact of drug on milk supply
- Quantity of drug infant receives
- Impact of drug exposure on infant
- Risk of NOT breastfeeding

It is always advised to use the three step counseling model – Ask, Affirm, and Counsel. The first step is asking open-ended questions. Ask about marijuana use with non-judgmental approach. Ask about the frequency and amount of use. Ask why she is using Cannabis, as there may be better alternative for pain or medical management during breastfeeding. Ask about who is caring for child when use occurs. Ask if mother is open to alternative forms of medication. The next step is to affirm her feelings. Assure the mother that she is not alone in her feelings. Let the mother know that her reasons for using are understood, but there are other options. Validate the mother’s feelings without validating her choice of substance use. Finally offer appropriate counseling. Educate on potential risks of use, including the potential of having social service take the baby away if it has a positive urine screen. Talk to mother about alternatives during breastfeeding. Offer services/counseling/cognitive behavior therapy. Suggest specific screening for developmental milestone. Depending on chronic or occ. use – advise appropriately.

Remember, that use does not equal abuse. We also need to keep in mind that the lack of quality data also does not necessarily mean that marijuana is safe. Parents have a right to the current information available, and deserve the right to act autonomously once they have made their decisions regarding Cannabis without

punitive actions on behalf of healthcare works considering the fact that most major organization still support breastfeeding even during use of Cannabis.

Questions:

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