

# Supplementary Materials: The Effects of Alcohol and Drugs of Abuse on Maternal Nutritional Profile During Pregnancy

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**Table 1.** Studies about the effects of alcohol and drugs of abuse exposure on maternal nutritional status preconception and after conception period.

| Type of study  | Nutritional status of mother      | Key results   | Reference   |                        |
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| <b>Alcohol Studies</b>   |                                   |   |   |                        |
| Alcohol use and iron status in pregnant women                    | Case-control                      | Very heavy drinkers had:<br>-higher iron depletion<br>-not anemia   | Drink pattern was not related to iron status except very heavy drinkers (> 8 drinks per day)  | Streissguth et al. 198 |
| Intake of micronutrients in non-pregnant alcohol abusers         | Population research               | Non-pregnant alcohol abusers had low intake vitamin A, B1,B2,B6, C, D, calcium, selenium, folic acid  | Low intake of micronutrients in alcoholic non pregnant population   | Manari et al. 2003     |
| Maternal Risk factors for FAS before, during and after pregnancy | Population research case- control | FAS mother had less BMI before and during pregnancy than control mothers  | FAS mothers had:<br>- More age<br>- Binge pattern of drinking or heavy drinking<br>- Longer drinking career before pregnancy<br>- Low BMI                                   | May et al. 2004        |
| Zinc and copper levels of heavy drinking pregnant women          | Case-control                      | Zn and Cu concentration were low in heavy drinking pregnant women   | -Lower means values of minerals were observed in the alcohol exposed groups than in the controls  | Keen et al. 2010       |
| Nutrition profile in mothers of FASD children                    | Population research case- control | FASD mother had low intake of vitamin A, C, D, E, B2, calcium, omega-3, choline than control mothers  | In FASD mothers<br>-Low BMI<br>- Inadequate intake of micronutrients  | May et al. 2014        |
| Alcohol exposure and maternal nutritional supplements            | Case-control                      | Moderate to heavy drinking pregnant women had similar blood levels of choline than non-drinking mothers<br>-Alcohol was related to higher intake of phosphorus, choline and vitamin B12 | Multivitamin supplementation was associated to better score of Bayley scale in 6- months babies   | Coles et al. 2015      |
| Maternal alcohol use and nutrition during pregnancy              | Case-control                      | -Drinking frequency was associated with lower intake of vitamin C and occasional drink with more intake of vitamin D<br>- Alcohol was not related to anthropometric features            | -All women gained less weight in pregnancy<br>- >85% of both group of pregnant women had insufficient intake for 10 of 22 key nutrients and >50% for additional 3 nutrients | Carter et al. 2016     |
| <b>Metamphetamine (MA) studies</b>                               |                                   |   |   |                        |
| Addiction in Pregnancy   | Review                            | -Abuse have all been associated with poor maternal weight gain and nutritional status<br>-These substances are mixed, with powerful appetite suppressant properties.                    | MA use was associated to:<br>-Poor maternal nutritional status<br>-Fetal growth insufficiency   | Keegan DO, et al. 2010 |

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| Effects of prenatal MA during gestation                               | Animal Study                    | <ul style="list-style-type: none"> <li>-Sometimes little can be done to change established maternal behaviours in regard to nutrition</li> <li>-Fetal growth insufficiency has been associated with MA use in pregnancy. It is unclear if this is related to a direct effect of the agent on the placenta or fetus or whether this represents a nutritional problem in patients who use MA</li> <li>- Anorexia and blood pressure are increased by misuse of MA in mother</li> <li>- MA abuse can decrease food intake and appetite</li> <li>- Fetus and placenta weight decreased</li> </ul> | <ul style="list-style-type: none"> <li>- MA abuse increased anorexia</li> <li>- Finally poor nutrition may affect pregnancy outcomes</li> </ul>   | Khoradmehr M.Sc, et al. 2015     |
| Maternal alcohol and drugs abuse and nutrition during pregnancy       | Case-control                    | <p>Mother consuming MA showed:</p> <ul style="list-style-type: none"> <li>-smaller biceps skinfold thickness</li> <li>-lower BMI</li> <li>-lower intake of vitamin C and carbohydrates</li> </ul>   |   | Carter et al. 2016               |
| <b>Cocaine Studies</b>  |                                 |   |   |                                  |
| Maternal nutrition profile and daily cocaine administration           | Animal Study                    | <p>Cocaine administration was associated to:</p> <ul style="list-style-type: none"> <li>-Less weight gain during pregnancy</li> <li>-Weight recovery after parturition</li> </ul>   | <ul style="list-style-type: none"> <li>- High risk of mother and fetus mortality at 60mg/kg/day cocaine.</li> <li>- Less weight gain during pregnancy related to dosage.</li> <li>- Pronounced lag in weight recovery after parturition</li> </ul>  | Wiggins et al. 1990              |
| Serum illicit drug concentrations and maternal nutritional status     | Population research             | <p>Addicted subjects had:</p> <ul style="list-style-type: none"> <li>- lower serum folate and ferritine</li> <li>- higher leukocyte levels</li> </ul>   | <ul style="list-style-type: none"> <li>- Subjects whose serum values were above the ADAMHA/NIDA ranges for marijuana, PCP and cocaine had concentrations of folate and ferritin that were significantly lower than those of subjects with lower serum drugs levels.</li> <li>- High maternal serum concentration of illicit drugs were accompanied by a significant increase in leukocyte count</li> <li>- The level of maternal cocaine during the third trimester was inversely correlated with birth weight and head circumference</li> <li>- Maternal weight gain and food consumption showed dose-dependent decreases</li> </ul> | Knight et al. 1994               |
| Maternal and fetal body composition related to cocaine                | Animal studies                  | <ul style="list-style-type: none"> <li>- Maternal weight gain and food consumption showed dose-dependent decreases</li> </ul>   | <ul style="list-style-type: none"> <li>- Maternal water consumption, by contrast, was significantly increased</li> <li>- Undernutrition was a sufficient cause of fetal weight reduction at dose of 50mg/kg/day</li> </ul>  | Church et al. 1995               |
| <b>Cannabis studies</b>   |                                 |   |   |                                  |
| Effects of marihuana on the solution of anagrams, memory and appetite | Experimental study              | <p>Marihuana smokers consumed significantly more marshmallows</p>   | <p>Subjects who smoked marihuana recalled significantly fewer items than the control subjects and there were significantly more erroneous recalls</p>   | Abel EL, 1971                    |
| Interactive effects of nutrition and cannabis upon rat perinatal      | Clinical trial<br>Animal models | <p>Female Wistar rats were exposed to cannabis smoke, placebo smoke, or no smoke while concurrently</p>   | <p>-12 variables affected by the low-protein diet, 8 were significantly potentiated when under nutrition was combined with cannabis</p>   | Charlebois AT and Fried PA, 1980 |

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| development  |                        | consuming 1 of 3 diets differing in protein concentration (8%, 24%, 64%)   | treatment<br>-these included a lengthened gestation period, an increase in occurrence of stillbirths and litter destruction, and decreased activity in the rat pups  |                                 |
| An investigation of prenatal cannabis exposure and minor physical anomalies in a low risk population                                   | Case-control           |  | None of the anomalies noted occurred more frequently among the offspring of cannabis users   | O'Connell CM and Fried PA, 1984 |
| Effects of maternal marijuana and cocaine use on fetal growth  | Case-control           |  | -Infants whose mothers had positive urine assays for marijuana, as compared with the infants whose mothers were negative according to both interviews and urine assays, had a 79-g decrease in birth weight and a 0.5-cm decrement in length<br>-Women who had positive assays for cocaine, as compared with nonusers, had infants with a 93-g decrease in birth weight (a 0.7-cm decrement in length and a 0.43-cm-smaller head circumference | Zuckerman B et al. 1989         |
| Relationships of serum illicit drug concentrations during pregnancy to maternal nutritional status                                     | Case-control study     | Fasting blood samples, drawn during each trimester of pregnancy and at delivery, were screened for concentrations of cocaine, phencyclidine and marijuana Serum folate, vitamin B12, ferritin and ascorbic acid<br>-Women who reported use of any illicit drug were less likely to have used folic acid in the periconception period   | -Subjects whose serum values were above the ADAMHA/NIDA ranges for marijuana, phencyclidine and cocaine had concentrations of folate and ferritin that were significantly less than those of subjects with lower serum drug levels   | Knight EM et al. 1994           |
| Characteristics of pregnant illicit drug users and associations between cannabis use and perinatal outcome in a population-based study | Population-based study | -Users were also more often underweight (BMI<18.5kg/m2) than women who did not report use of illicit drugs during pregnancy<br>-6.0% reported using marijuana in the month before pregnancy  | -Cannabis users were more likely than nonusers to have excessive weight gain during pregnancy  | Van Gelder MM et al. 2010       |
| Marijuana Use and Maternal Experiences of Severe Nausea During Pregnancy in Hawai'i  | Descriptive study      | -2.6% reported using marijuana during pregnancy<br>-21.2% reported severe nausea during pregnancy  | -Women who reported severe nausea during pregnancy were significantly more likely to report marijuana use during pregnancy (3.7% vs 2.3%)  | Roberson E et al. 2014          |
| <b>Heroin studies</b>  |                        |  |  |                                 |
| Burden and nutritional deficiencies in Opiate addicted   | Review                 | -Unhealthy eating behaviors due to lack of nutritional knowledge, food preparation skills, and environments.<br>-During withdrawal from heroin, weight gain or loss occurs which is caused by major changes in food intake selection.<br>-Nutrition is related with conditions and diseases, such as diabetes which decreases sensitivity to dependence on morphine and vitamin D deficiency hat slows down morphine dependency as well as protein deprivation which generates preferential fat intake with low cocaine use. | -Opiate dependents have several deficiencies such as nutritional deficiencies and weight deficits -A good nutrition education and physical activity are quite effective for substance abusers to their withdrawal from opiates   | Nabipour et al. 2014            |

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| Women of childbearing age and opioids | Report | -Many opiate addicts have shown calcium and magnesium deficiencies | -Outreach and educational resources targeting younger pregnant women and women living below the federal poverty level about the dangers of misusing prescription pain relievers may be especially beneficial | Smith K et al. 2017 |
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