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 |
|---------------|-----------------------------|-------------|-----------|
| Alcohol use and iron status in pregnant women | Very heavy drinkers had: -higher iron depletion -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 | 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 FAS mothers had: - More age - Longer drinking career before pregnancy - Low BMI | Manari et al. 2003 |
| Maternal Risk factors for FAS before, during and after pregnancy | FAS mother had less BMI before and during pregnancy than control mothers | - Binge pattern of drinking or heavy drinking - Inadequate intake of micronutrients | May et al. 2004 |
| Zinc and copper levels of heavy drinking pregnant women | 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 | FASD mother had low intake of vitamin A, C, D, E, B2, calcium, omega-3, choline than control mothers | -Multivitamin supplementation was associated to better score of Bayley scale in 6-12 months babies | Coles et al. 2015 |
| Alcohol exposure and maternal nutritional supplements | Moderate to heavy drinking pregnant women had similar blood levels of choline than non-drinking mothers - Alcohol was related to higher intake of phosphorus, choline and vitamin B12 | -All women gained less weight in pregnancy ->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 |

Metaphenamine (MA) studies

| Addiction in Pregnancy | Review | MA use was associated to: -Poor maternal nutritional status -Fetal growth insufficiency | Keegan DO, et al. 2010 |
| Study Title                                                                 | Study Type      | Findings                                                                                                                                                                                                 |
|---------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effects of prenatal MA during gestation                                   | Animal Study    | - Sometimes little can be done to change established maternal behaviours in regard to nutrition  
- 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  
- Anorexia and blood pressure are increased by misuse of MA in mother  
- MA abuse can decrease food intake and appetite  
- Fetus and placenta weight decreased  
- MA abuse increased anorexia  
- Finally poor nutrition may affect pregnancy outcomes  |
| Maternal alcohol and drugs abuse and nutrition during pregnancy            | Case-control    | Mother consuming MA showed:  
- smaller biceps skinfold thickness  
- lower BMI  
- lower intake of vitamin C and carbohydrates  |
| Maternal nutrition profile and daily cocaine administration               | Animal Study    | Cocaine administration was associated to:  
- Less weight gain during pregnancy  
- Weight recovery after parturition  
- High risk of mother and fetus mortality at 60mg/kg/day cocaine.  
- Less weight gain during pregnancy related to dosage.  
- Pronounced lag in weight recovery after parturition  |
| Serum illicit drug concentrations and maternal nutritional status          | Population research | Addicted subjects had:  
- lower serum folate and ferritin  
- higher leucocyte levels  
- High maternal serum concentration of illicit drugs were accompanied by a significant increase in leucocyte count  
- The level of maternal cocaine during the third trimester was inversely correlated with birth weight and head circumference  
- Maternal weight gain and food consumption showed dose-dependent decreases  |
| Maternal and fetal body composition related to cocaine                    | Animal studies  | - Maternal weight gain and food consumption showed dose-dependent decreases  
- Maternal water consumption, by contrast, was significantly increased  
- Undernutrition was a sufficient cause of fetal weight reduction at dose of 50mg/kg/day  |
| Cannabis Studies                                                          |                 | Subjects who smoked marhuana recalled significantly fewer items than the control subjects and there were significantly more erroneous recalls  |
| Effects of marihuana on the solution of anagrams, memory and appetite     | Experimental study | Marihuana smokers consumed significantly more marshmallows  |
| Interactive effects of nutrition and cannabis upon rat perinatal          | Clinical trial   | Female Wistar rats were exposed to cannabis smoke, placebo smoke, or no smoke while concurrently  
-12 variables affected by the low-protein diet, 8 were significantly potentiated when under nutrition was combined with cannabis  |
|                                                                           | Animal models   |                                                                                                                                          |
| Study Title                                                                 | Design          | Summary                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Development of 3 diets differing in protein concentration (8%, 24%, 64%)   |                 | -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                                                                                                                                                                                                                                              |
| 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                                       |
| Relationships of serum illicit drug concentrations during pregnancy to maternal nutritional status | Case-control study | -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)                                                                                           |
| Characteristics of pregnant illicit drug users and associations between cannabis use and perinatal outcome in a population-based study | Population-based study | -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 |
| Marijuana Use and Maternal Experiences of Severe Nausea During Pregnancy in Hawai’i | Descriptive study | -Cannabis users were more likely than nonusers to have excessive weight gain during pregnancy                                                                                                                                                                                                                                         |
| Burden and nutritional deficiencies in Opiate addicted                    | Review          | -Women who reported severe nausea during pregnancy were significantly more likely to report marijuana use during pregnancy (3.7% vs 2.3%)                                                                                                                                   |
| -Unhealthy eating behaviors due to lack of nutritional knowledge, food preparation skills, and environments. |                 | -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 |
| -During withdrawal from heroin, weight gain or loss occurs which is caused by major changes in food intake selection. |                 |                                                                                                                                                                                                                                                                             |
| -Nutrition is related with conditions and diseases, such as diabetes which decreases sensitivity to dependence on morphine and vitamin D deficiency that slows down morphine dependency as well as protein deprivation which generates preferential fat intake with low cocaine use. |                 |                                                                                                                                                                                                                                                                             |

**Table continued...**

**Heroine studies**

-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.
| 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
