ENVIRONMENTAL EXPOSURE AND RISK FOR MISCARRIAGE

SREEH FINAL PRESENTATION

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MISCARRIAGE

- Miscarriage is defined as the death of a fetus before 20-24 gestational weeks
- An estimated 10-15 out of 100 pregnancies end in miscarriage for women who know they are pregnant.
- Some women may miscarry before they know they are pregnant
- Most miscarriages occur in the 1st trimester

- Center for Disease Control and Prevention (CDC), 2020
- March of Dimes, 2017

MISCARRIAGE AS A PUBLIC HEALTH CONCERN

- Miscarriage is a public health concern as it effects many women, their partners, and their families across the world
- It may take weeks or months for the body to physically recover however, it can take years for emotional recovery to occur (March of Dimes, 2017)
  - Resources such as support groups and counseling are available to those who experience miscarriage
  - There is often a stigma surrounding miscarriage so many women never seek or receive help
- Environment may play a role in increasing the risk for miscarriage
  - Reducing specific toxins, chemicals, and/or pollutants may decrease the risk of miscarriage

RESEARCH METHOD

- PubMed was used to research the effects of environmental exposures on the risk for miscarriage
- An "umbrella review" approach was used
  - Review of the reviews
  - This method was used as it was the most efficient approach and an efficient way to research many topics
- Searched: " 'environment' and '(miscarriage or fetal loss or pregnancy loss)' review"
- Narrowed down findings to four main interests
  - Endocrine disrupters, incinerator emissions, indoor air pollution, occupational activity

ENDOCRINE DISRUPTERS

- Pregnancy occurs through a series complex endogenous hormonal interactions
- Environmental exposure to endocrine disrupting chemicals has the potential to interfere with endogenous hormone and chemical action (Kreig et al, 2016)
- Some endocrine disrupters studied in this review include Bisphenol A, dioxins, and phthalates
- This interference with normal chemical and hormonal processes can have adverse and even deleterious on the fetus
  - This is most likely to occur in early pregnancy when the hormonal environment after implantation is in especially delicate balance

- Krieg SA, Shahine LK, Lathi RB. Environmental exposure to endocrine-disrupting chemicals and miscarriage. *Fertil Steril*. 2016;106(4):941-947. doi:10.1016/j.fertnstert.2016.06.043

INCINERATOR EMISSIONS

- Incineration is the burning of waste. This can release toxic chemicals and pollutants into the air
- Chemicals include polyadenylated hydrocarbons, benzenes, and dioxins
- 9 out of 11 studies found adverse effects including miscarriage, congenital anomalies, and infant death for those residing in close proximity to incineration plants (≤5 miles) (Tait et al, 2019)
- There is little public knowledge about incineration and the consequences it may have
  - "Public health practitioners can offer clearer advice about adverse health effects from incinerators." (Tait et al, 2019)

- Tait PW, Brew J, Che A, et al. The health impacts of waste incineration: a systematic review. *Aust N Z J Public Health*. 2020;44(1):40-48. doi:10.1111/1753-6405.12939

https://www.ctpost.com/business/article/Bridgeport-trash-burning-plant-settle-assessment-10950832.php

INDOOR AIR POLLUTION

- Air pollution is the presence of excessive or harmful substances within the air
- This systematic review focused on particulate matter, carbon monoxide, and cooking smoke all of which affect indoor air quality (Grippo et al, 2018)
- Particulate matter exposure during the entire pregnancy has been found to increase miscarriage risk
- Carbon monoxide exposure during 1st trimester increases miscarriage risk
- Cooking smoke exposure during 1st trimester was found to increase stillbirth risk but not miscarriage risk

- Grippo A, Zhang J, Chu L, et al. Air pollution exposure during pregnancy and spontaneous abortion and stillbirth. *Rev Environ Health*. 2018;33(3):247-264. doi:10.1515/reveh-2017-0033

OCCUPATIONAL ACTIVITY

- Strenuous activities: Long work hours, heavy lifting, standing
- Disruption of circadian rhythm: working nights, working long hours, not enough rest between shifts
- Working consistent nights was associated with an increased risk of miscarriage (Bonde et al, 2013)
- Working 3-shift schedules, 40-52 hours a week, lifting more than 100kg a day, standing 6-8 hours were found to be associated with small risk increments (Bonde et al, 2013)
- There are few studies on this, currently the findings do not provide strong enough evidence to implement mandatory restrictions for work
  - Because there is limited evidence, it may be wise to advise women to avoid these exposures

- Bonde JP, Jørgensen KT, Bonzini M, Palmer KT. Miscarriage and occupational activity: a systematic review and meta-analysis regarding shift work, working hours, lifting, standing, and physical workload. *Scand J Work Environ Health*. 2013;39(4):325-334. doi:10.5271/sjweh.3337
- Savitz DA, Brett KM, Dole N, Tse CK. Male and female occupation in relation to miscarriage and preterm delivery in central North Carolina. *Ann Epidemiol*. 1997;7(7):509-516. doi:10.1016/s1047-2797(97)00078-1

FUTURE PLANS

- Choose one topic to research further
  - Occupational activity
- A more in-depth review of individual studies and possibly conduct meta-analysis on reported findings
- Manuscript for potential publication
- Racial disparities
  - Are there disparities in maternity leave availability? In hours worked? Amount paid and obligation to work more hours? Type of work? Etc.

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