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High Maternal Dietary Glycemic Index and Sugar Consumption and Their Association with Birth Defects and Pregnancy Complications

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Introduction

- Birth defects occur in 1 in every 33 babies in the United States, and 7.8 million babies worldwide (1).
- Having a child with a birth defect can be costly for the family not only in the money spent on medical bills, but also the emotional toll (2).
- In 2004, hospital costs for children with birth defects in the United States were $2.6 billion (3).
- There are many environmental and genetic factors that can lead to birth defects, including the mother’s nutritional habits before and during pregnancy (1).
- Increased sugar intake (including glucose, fructose, or sucrose), or high dietary glycemic index (DGI), by the mother could be a risk factor for the formation of birth defects.
- Neural tube defects (NTD’s) are a main outcome associated with a high DGI in the mothers (4).
- Over 300,000 babies worldwide are born with a NTD, which cause major problems with the brain and spine (5).
- Pregnancy complications, mainly preeclampsia, have also been linked to increased sugar consumption (6).

Methods

PubMed was the primary database used for this systematic review.
- The key terms used were “pregnant women” OR “pregnancy” AND “glycemic index” AND “congenital abnormalities”.
- A MeSH search using these key terms resulted in 10 articles, five of which were chosen (Figure 1).
- Cases were excluded if there were no human subjects or the mother had pre-gestational diabetes.
- There had to be mention of an exposure of high DGI or sugar intake (including glucose, fructose or sucrose), and the risk for birth defects or pregnancy complications for a study to be included in this review.
- The other articles in this study were obtained by looking at the references of the five that were originally chosen (Figure 1).

References

- Acknowledgements

Types of neural tube defects

Source: [https://www.google.com/search?q=types+of+neural+tube+defects&sourceid=chrome&ie=UTF-8](https://www.google.com/search?q=types+of+neural+tube+defects&sourceid=chrome&ie=UTF-8)

Results

Eight out of nine studies showed an increased risk for pregnancy complications and birth defects.

Birth Defects

The six case-control studies looked at birth defects, mainly neural tube defects (NTD’s), as the outcome for high DGI and/or sugar intake. Only one study did not find an increased risk (7).
- Of the five studies that found and increased risk for NTD’s: three looked at DGI as the exposure (4,8,9) one looked at sugar consumption (10) one looked at both (11)
- The studies that looked at high DGI found an increased risk for NTD’s; one study also found that the risk for gastrointestinal and musculoskeletal defects increased (9).
- One case found that NTD mothers had a 45% higher consumption of sugar (primarily sucrose) than the control group mothers ($p < 0.05)$ (10).

Complications

Three cohort studies looked at increased sugar intake as a risk factor for pregnancy complications (6, 12, 13).
- Two studies found preeclampsia to be an outcome associated with the risk factor (6, 12).
- One study found that an increased glucose concentration resulted in early birth by 1.8 days ($p < 0.05$) and 4.8 days ($p < 0.01)(13)$.
- Mothers who consumed more natural sugars were at a lower risk for preeclampsia, but added sugars resulted in a higher risk ($p < 0.009)(12)$.

Public Health Implications and Recommendations

- Mothers with a higher DGI and/or sugar intake are at an increased risk for pregnancy complications and having children with birth defects.
- Mothers should be conscious of dietary intake before and during pregnancy in order to avoid birth defects and pregnancy complications.
- Further research should be done on the causes of preeclampsia, and a larger variation of study types should be performed on the entire topic discussed in this review.

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