The Association Between Breastfeeding and Insulin Resistance in Prepubertal Children

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Introduction

- In 2017, The National Survey of Children's Health stated that 19.1 percent of Louisiana children ages 10 to 17 were obese.
- This percentage is much higher than the national average of 15.8 percent.
- Children with obesity are more likely to suffer from insulin resistance and type II diabetes mellitus.
- The idea of breastfeeding having an influential role in the prevention of obesity is a matter of scientific debate.
- There are limited studies pertaining to the influence of breastfeeding on the development of type II diabetes in young children.
- The purpose of this study was to determine if breastfeeding has protective properties against the development of insulin resistance in prepubertal children which can lead to type II diabetes.

Methods

- Data was collected from children (N=94, male=41, female=53) with a mean age of 8.1±0.8 years.
- The sample study included Black, White, Asian, Pacific Islander, and Hispanic children. However, these groups were separated into "White" and "non-White" due to the low enrollment of non-Black minority groups.
- Height and weight measurements were used to calculate BMI. Fasting insulin and insulin resistance by homeostatic model assessment (HOMA-IR) were measured as well. Mothers were asked via telephone if they breastfed exclusively, formula-fed exclusively, or employed a mixed feeding method.
- Comparisons were made between children who breastfed (n=65) or formula fed (n=33) exclusively via independent samples t-test. Comparisons were also made based on BMI groups (obese, n=21 and non-obese, n=73).

Data

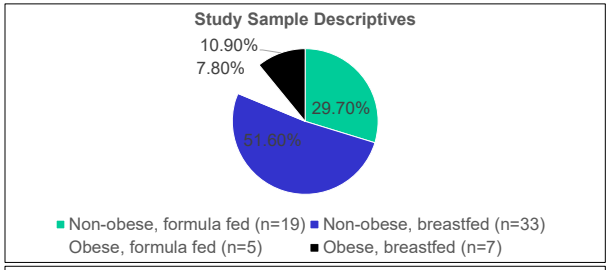

Figure 1. Description of the study sample based on BMI (obese or non-obese) and infant feeding practice (formula fed or breastfed).

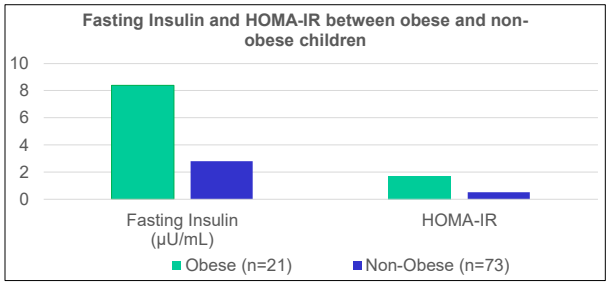

Figure 2. Comparison of fasting insulin (uIU/mL) and HOMA-IR in participants with obesity and participants who were not obese.

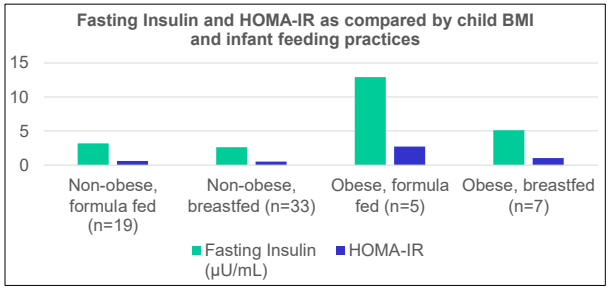

Figure 3. Comparison of four participant groups: non-obese and formula fed, non-obese and breastfed, obese and formula fed, and obese and breastfed. These groups were compared based on fasting insulin and HOMA-IR.

Results

- Fasting insulin and HOMA-IR were higher in non-breastfed children but were not statistically significant.
- Children with obesity had significantly higher average fasting insulin levels and HOMA-IR than those children who were not obese (8.4±6.7 uIU/mL vs. 2.8±1.7 uIU/mL, p<0.001, and 1.7±1.5 vs. 0.5±0.3. p<0.001, respectively).
- Children with obesity who were breastfed had a lower fasting insulin and HOMA-IR than those children with obesity who were formula fed (5.1±1.2 uIU/mL vs. 12.9±8.7 uIU/mL, p=0.05 and 1.0±0.2 vs. 2.7±2.1, p=0.04, respectively).

Conclusions

- Breastfeeding appeared to be beneficial in terms of insulin resistance and the development of type II diabetes with and without obesity.
- New mothers should be encouraged to breastfed, if possible, with the suggestion that doing so could prevent onset of insulin resistance in their children.
- More studies are needed to determine the precise mechanisms of how breastfeeding reduces risk in children.

References

Bennett B, Larson-Meyer DE, Ravussin E, Volaufova J, Soros A, Cefalu WT, Chalew S, Gordon S, Smith SR, Newcomer BR, Goran M, Sothern M. Impaired insulin sensitivity and elevated ectopic fat in healthy obese vs. nonobese prepubertal children. Obesity (Silver Spring). 2012 Feb;20(2):371-5. doi: 10.1038/oby.2011.264. Epub 2011 Aug 25. PMID: 21869763; PMCID: PMC4410716.

Child and Adolescent Health Measurement Initiative. 2016-2017 National Survey of Children's Health (NSCH) data query. Data Resource Center for Child and Adolescent Health supported by the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau (MCHB). Retrieved [mm/dd/yy] from [www.childhealthdata.org].

Larson-Meyer DE, Newcomer BR, Ravussin E, Volaufova J, Bennett B, Chalew S, Cefalu WT, Sothern M. Intrahepatic and intramyocellular lipids are determinants of insulin resistance in prepubertal children. Diabetologia. 2011 Apr;54(4):869-75. doi: 10.1007/s00125-010-2022-3. Epub 2010 Dec 23. PMID: 21181394; PMCID: PMC3053439.

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