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Early Antibiotic Exposure and Childhood Obesity

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Abstract

Obesity is becoming a growing concern in today’s population. Over the last thirty years, obesity rates have doubled in adults and quadrupled in adolescents. One of the more recent theories is that childhood obesity is influenced by early exposure to antibiotics. The purpose of this project is to discuss how antibiotics alter the human gut microbiota and how this affects nutrient consumption, which can lead to childhood obesity. There is a focus on the current research studies that address if, indeed, there is a link between childhood obesity and early antibiotic exposure. Through a review of several electronic databases and several peer reviewed research articles, my research has found that there is a link between early life antibiotic exposure and childhood obesity. Studies have shown that the younger the child is at the time of antibiotic exposure, the higher the risk of obesity. In addition, the more frequent the antibiotic exposure the higher the risk, and overall, males have a higher risk than females. These findings could have an impact on future clinical practice and probiotic use.

Research Question

Is antibiotic exposure in early childhood associated with an increased risk of obesity in later childhood and adolescence? Does the timing, frequency of antibiotic exposure, the pharmaceutical class of antibiotic, or the individual’s gender make a difference in weight gain?

Discussion

Two studies have shown increased risk of obesity in children whose mothers were exposed to antibiotics during pregnancy. One study showed an increased risk in obesity if the exposed mother is of normal weight but showed a decrease in obesity if the exposed mother was obese. One study did not show any relationship to obesity and exposure to antibiotics in utero but did show an increased risk if child is exposed in the first year. Eight studies have shown that there is an increase in childhood obesity when children are exposed to antibiotics in the first year of life. More often than not the studies showed this was especially true in males and with repeated antibiotic exposure.

Background of the Human Gut Microbiota

The gut microbiota functions to help extract energy from foods, protect against colonization with harmful pathogens and microorganisms, and regulate proliferation and differentiation of epithelial cells. (Villanueva-Mañan et al., 2015) Alterations in any of these can lead to dysbiosis. "Dysbiosis is an abnormal colonization or imbalance of microbes inhabiting a certain part of the body" (Houghteling & Walker, 2015). Antibiotics alter the gut microbiota and increase the risk of obesity due to lasting effects on the immunity and metabolism capabilities of the gut. (Houghteling & Walker, 2015)

Potential Treatment Modalities

Probiotics have been used to maintain gut microbiota and are currently being suggested as a potential treatment for obesity. At this time there has been limited research on this topic especially in regard to children. However, a series of studies by Kadooka et al. (2013) has shown that consumption of Lactobacillus gasseri (LB2055) at concentrations of 10^8 cfu have shown reduction in visceral fat, BMI, and hip and waist circumference. This study does show that continuous supplementation is needed to preserve this effect.

References


Early exposure to Antibiotics and Childhood Obesity

<table>
<thead>
<tr>
<th>Author</th>
<th>Sample</th>
<th>Treatment</th>
<th>Finding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayala et al., 2011</td>
<td>28,334 women/children pairs</td>
<td>Antibiotics given to normal weight mothers increased risk of children being overweight (OR 1.34, 95% CI: 1.06-1.7)</td>
<td>Antibiotics given to obese mothers children had a decreased risk of becoming overweight (OR 1:05, 95% CI: 0.8:1.8)</td>
<td>Height and weight were unreported</td>
</tr>
<tr>
<td>Trasande et al., 2012</td>
<td>11,322 children</td>
<td>Children of normal weight exposed to antibiotics at less than six months of age had a 29.4% increase in being overweight at 36 months.</td>
<td>In males any exposure and the younger the child is at time of exposure the greater the impact on increased BMI. Largest difference when boys were exposed to macrolides two or more times.</td>
<td></td>
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<tr>
<td>Saari et al., 2012</td>
<td>6,414 boys and 3,584 girls</td>
<td>Five or more broad spectrum courses of antibiotics increased obesity risk p=0.02</td>
<td>Children exposed to antibiotics in the first two years of life especially repeating doses of antibiotics there was a 25% relative increase for risk of childhood obesity.</td>
<td></td>
</tr>
<tr>
<td>Bailey et al., 2014</td>
<td>64,580 children</td>
<td></td>
<td>Children exposed to antibiotics in the first two years of life especially repeating doses of antibiotics there was a 25% relative increase for risk of childhood obesity.</td>
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<tr>
<td>Scott et al., 2016</td>
<td>27,946 children</td>
<td></td>
<td>In those exposed to antibiotics in the first two years of life especially repeating doses of antibiotics there was a 25% relative increase for risk of childhood obesity.</td>
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</table>

Acknowledgements

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