Dietary Factors and BMI in Children with Autism

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Obesity is a Major Health Problem For All

• 32% of children 2-19 years of age in the US are overweight or obese (BMI ≥ 85%), 17% are obese (BMI>95%)
• Childhood obesity increases health risk at younger ages for:
  – diabetes
  – cardiovascular disease
  – dyslipidemia
• Demographic and dietary factors are associated with overweight and obesity. The latter have been the focus of successful weight management programs.

Prevalence of Obesity in Children with ASD is at least as Great as in the General Population:

– Obesity rates in children with ASD range from 8-43%
– Core symptoms of ASD may alter risk factors:
  • Restricted and repetitive behaviors can lead to:
    – Selective and restricted diets
    – Sensory differences and perseveration further selectivity
    – Resistance to adult directed activities impact mealtime routines
  • Social Affective symptoms
    – Limit opportunities for active participation in sports and recreation

AS-ATN Diet & Nutrition Study

Demographics:

<table>
<thead>
<tr>
<th></th>
<th>2-3 yrs</th>
<th>4-8 yrs</th>
<th>9-11 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yrs, mean (sd)</td>
<td>5.5 (2.5)</td>
<td>2.7 (0.5)</td>
<td>5.7 (1.3)</td>
</tr>
<tr>
<td>BMI, mean (sd)</td>
<td>16.8 (2.7)</td>
<td>16.3 (1.7)</td>
<td>16.6 (2.8)</td>
</tr>
<tr>
<td>Male, n (%)*</td>
<td>244 (85)</td>
<td>66 (85)</td>
<td>142 (84)</td>
</tr>
<tr>
<td>Race/ethnicity, n (%)*</td>
<td>Non-Hispanic white 239 (83)</td>
<td>Non-Hispanic black 13 (5)</td>
<td>Hispanic 14 (5)</td>
</tr>
<tr>
<td>Annual household income, n (%)*</td>
<td>&lt;$25,000 27 (10)</td>
<td>$25,000-$49,999 69 (24)</td>
<td>$50,000-$74,999 185 (64)</td>
</tr>
</tbody>
</table>

Top Sources of Calories by Age Group:

<table>
<thead>
<tr>
<th></th>
<th>2-3 Year Olds</th>
<th>4-8 Year Olds</th>
<th>9-11 (ASD) 9-13 (NHANES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td>31 (19)</td>
<td>37 (18)</td>
<td>37 (18)</td>
</tr>
<tr>
<td>Lunch</td>
<td>17 (10)</td>
<td>16 (10)</td>
<td>16 (10)</td>
</tr>
<tr>
<td>Dinner</td>
<td>40 (24)</td>
<td>48 (29)</td>
<td>49 (26)</td>
</tr>
<tr>
<td>Snacks</td>
<td>25 (15)</td>
<td>26 (15)</td>
<td>31 (17)</td>
</tr>
<tr>
<td>Beverages</td>
<td>16 (10)</td>
<td>15 (10)</td>
<td>11 (6)</td>
</tr>
<tr>
<td>Sugar</td>
<td>13 (8)</td>
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<td>13 (8)</td>
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Top Sources of Calories:

<table>
<thead>
<tr>
<th></th>
<th>NHANES</th>
<th>ATN</th>
<th>*p&lt;0.05</th>
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AS-ATN Participants (ages 2-11y/o) recruited from five sites over two years.

3 Day Food Diary analyzed using NDSR
BMI calculated
N = 288

As per the table, children with autism have a higher prevalence of obesity compared to the general population, with rates ranging from 8% to 43%. The core symptoms of autism spectrum disorder (ASD) can alter risk factors, such as restricted and repetitive behaviors leading to selective and restricted diets. Sensory differences and perseveration further impact mealtime routines. Social and affective symptoms may also limit opportunities for active participation in sports and recreation.

The AS-ATN Diet & Nutrition Study involved 288 participants aged 2-11 years old recruited from five sites over two years. The study included a 3-day food diary analyzed using the National Database of Individuals in SmartRegimen (NDSR). BMI was calculated for each participant.

The top sources of calories by age group are as follows:
- Breakfast: 37 (18%) for ATN vs. 31 (19%) for NHANES
- Lunch: 15 (10%) for ATN vs. 17 (10%) for NHANES
- Dinner: 49 (26%) for ATN vs. 40 (24%) for NHANES
- Snacks: 31 (17%) for ATN vs. 25 (15%) for NHANES
- Beverages: 11 (6%) for ATN vs. 16 (10%) for NHANES
- Sugar: 13 (8%) for ATN vs. 13 (8%) for NHANES

Comparisons between ATN and NHANES are indicated by *p<0.05.
Limitations

- Sample limited in ethnic, SES, educational diversity
- Young age of sample
- Small sample size for quartiles
- 3 day diary relies on correct parental reporting
- No data on energy expenditure
- Factors associated with BMI not collected in this sample include: birth weight, parental weight, documentation of genetic syndromes, physical activity
- Analysis did not include medication use, presence/absence of GI symptoms, sleep problems
- No data on potential metabolic differences in ASD

Discussion:

- Behaviorally targeting food choice is appropriate for obesity management in children with/without ASD.
  - HEI is a useful way to measure overall quality of diet in research settings since it captures both quantity and quality of food
- Targeted education to decrease intake of sugar sweetened beverages for some children with autism as in the general population may also be helpful
- Since frequency of eating occasions is not significant between BMI percentiles and children with ASD are more likely to eat breakfast:
  - Programs developed to manage obesity in children with ASD may include but not focus on these factors
- Obesity management strategies will need to include expanding fruit and vegetable intake
  - Like in the general population: Parent and child education important
  - Unlike general population: Behavioral treatment of selectivity and sensory aversion need to be addressed in future research

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