Long-term effects of a ketogenic versus a hypocaloric diet in children and adolescents with obesity

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BACKGROUND

✓ The prevalence of childhood obesity has increased to alarmingly high rates in the past few years worldwide.
✓ Childhood obesity predisposes to metabolic disorders during childhood and adulthood.
✓ Many dietary approaches have been proposed to reduce this prevalence, with the dietary plan that restricts energy intake (hypocaloric) being the most common strategy.
✓ Weight loss protocols are considered successful, if they deliver more consistent/permanent results.
✓ Recent data show a therapeutic potential in very low carbohydrate (≤20-50 gr of carbohydrates/daily) dietary plans (ketogenic) for many different diseases (e.g. epilepsy, diabetes, PCOS, cancer, anorexia, cancer and cVD) and currently long-term weight loss.

✓ The majority of randomized controlled trials comparing ad libitum ketogenic vs hypocaloric diets have found greater weight loss over 6 months in children, adolescents and adults

✓ A recent meta-analysis reported that subjects following a ketogenic diet achieved significantly greater, long-term reduction in weight.

✓ Therefore, Ketogenic diets may be an alternative tool against childhood obesity.

OBJECTIVE

To evaluate and compare long-term body weight changes among obese children and adolescents who had lost at least 10% of their initial weight with either a ketogenic or a hypocaloric diet approximately 7 years ago.

METHODS

Sample at Baseline (2005-2010)
✓ 38 obese children & adolescents
✓ 55% followed a ketogenic diet
✓ 45% followed a hypocaloric diet

Types of Diet
✓ Ketogenic diet
  a dietary plan with a daily intake:
  • ≤20 gr carbohydrates
  • free total calorie intake
  and daily measurements of urinary ketone concentrations with dipsticks
✓ Hypocaloric diet
  a dietary plan of a 500 calorie reduction of the calories required daily per age group

Children in both dietary plans were instructed to take a multivitamin with mineral supplements and to have at least 1 hr of daily exercise or play activity. Both plans were followed with a goal to lose and maintain at least 10% of their initial body weight for at least 12 months.

Preassessment (6.8 ± 1.7 years after weight loss)
✓ Out of the 38 children at baseline 33 were found and reassessed
✓ 12 (70.6% response rate) on the hypocaloric diet group
✓ 19 (90.5% response rate) on the ketogenic diet group
✓ Follow up of BMI SDS
  • At baseline
  • After weight loss
  • After approximately 6.8 years ± 1.7

Differences were estimated according to type of diet, gender and difficulty to retain the weight loss.

RESULTS

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Ketogenic Diet</th>
<th>Hypocaloric Diet</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>12</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td>F/M</td>
<td>9/3</td>
<td>6/6</td>
<td></td>
</tr>
<tr>
<td>Age at baseline (yrs)</td>
<td>14.87 ± 2.192</td>
<td>12.87 ± 2.79</td>
<td>0.019</td>
</tr>
<tr>
<td>Age currently (yrs)</td>
<td>21.3 ± 3.6</td>
<td>17.4 ± 6.79</td>
<td></td>
</tr>
<tr>
<td>BMI SDS at baseline</td>
<td>2.92 ± 0.76</td>
<td>2.37 ± 0.58</td>
<td>0.019</td>
</tr>
<tr>
<td>Morbidity obese (BMI SDS &gt; 2.5, %)</td>
<td>25 (57.4%)</td>
<td>7 (36.8%)</td>
<td>0.026</td>
</tr>
<tr>
<td>BMI SDS after weight loss</td>
<td>2.30 ± 0.54</td>
<td>1.72 ± 0.64</td>
<td>0.63</td>
</tr>
<tr>
<td>Fold change after weight loss</td>
<td>0.95</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>BMI SDS currently</td>
<td>1.95 ± 1.30</td>
<td>1.22 ± 0.74</td>
<td>NS</td>
</tr>
<tr>
<td>Fold change currently</td>
<td>0.84</td>
<td>0.75</td>
<td></td>
</tr>
</tbody>
</table>

✓ The ketogenic children in comparison to the children following the hypocaloric:
  • started at an older age,
  • started with a higher BMI SDS (Figure 1)
  • were mostly (71%) morbidly obese.

✓ All children significantly decreased their initial BMI SDS with a similar fold change (0.64).
✓ BMI SDS decreases were significant and irrespective to the diet type or difficulty to maintain long-term weight loss (Figure 1).
✓ All children further decreased their BMI SDS (BMI SDS 2) by approximately 0.4 in the last 7 years after the dietary intervention, with those on the ketogenic diet group showing a significant further decrease (Figure 1).
✓ It is of interest that the only two children in the ketogenic diet group, that had great difficulty losing and maintaining body weight, underwent bariatric surgery as young adults.
✓ Most of the children in both diet groups (hypocaloric diet group: 75% and ketogenic diet group: 60%) were able to maintain and increase their weight loss and are currently lean or overweight (BMI SDS <2).

Figure 1

CONCLUSIONS

✓ Our data reveals the importance of life style intervention during childhood in childhood & adolescent obesity.
✓ A BMI SDS decrease of at least 0.5 during childhood is of great importance and can be retained and decreased further during young adulthood irrespective of the diet followed.

REFERENCES


The authors have nothing to disclose.