

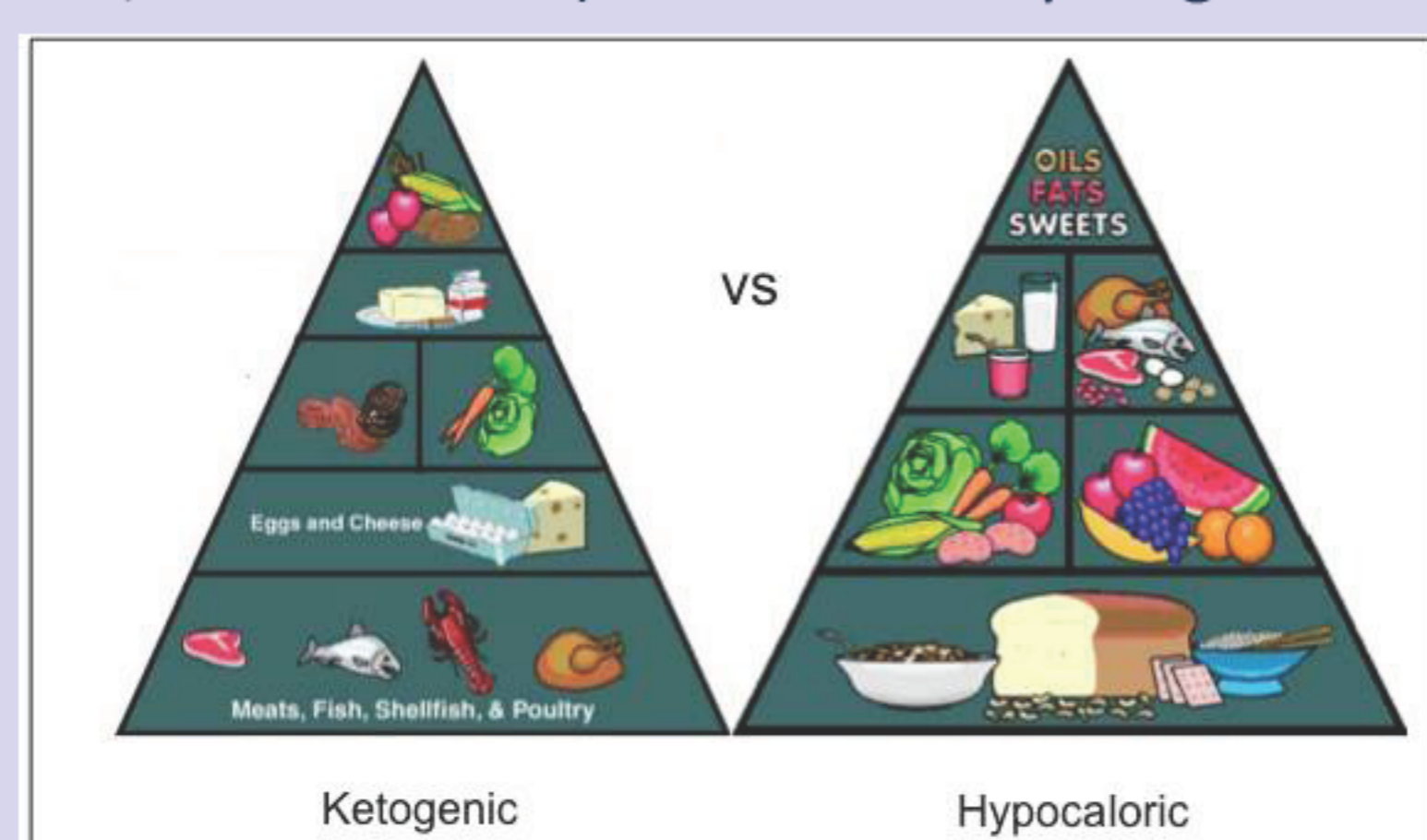


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## BACKGROUND

- ✓ 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 ( $\leq 20$ -50 gr of carbohydrates/daily) dietary plans (**ketogenic**) for many different diseases (e.g. epilepsy, diabetes, PCOs, cancer, acne and CVD) <sup>1</sup> 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 <sup>2-4</sup>. A recent meta-analysis reported that subjects following a ketogenic diet achieved significantly greater, long-term reduction in weight <sup>5</sup>.
- ✓ Therefore, **Ketogenic** diets may be an alternative tool against childhood obesity <sup>5</sup>.

## 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:

- $\leq 20$  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.

### Reassessment (6.8 $\pm$ 1.7 years after weight loss)

- ◆ Out of the 38 children at baseline 31 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  $\pm$  1.7

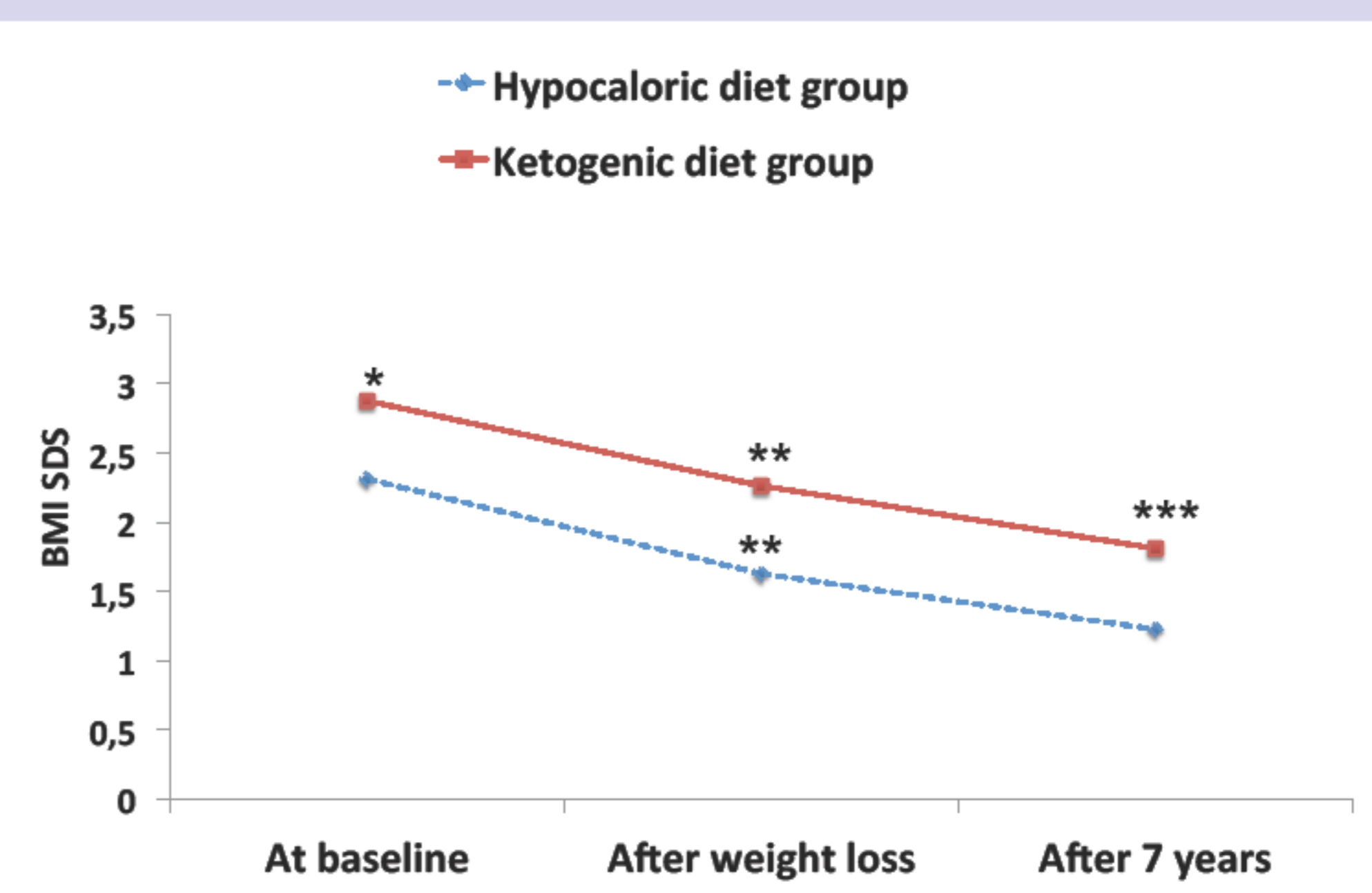
- ◆ Differences were estimated according to type of diet, gender and difficulty to retain the weight loss.

## RESULTS

Table 1	Ketogenic Diet	Hypocaloric Diet	p value
N	19	12	-
F/M	9/10	6/6	-
Age at baseline (yrs)	14.87 $\pm$ 2.92	12.87 $\pm$ 2.79	0.039
Age currently (yrs)	22.1 $\pm$ 3.6	17.4 $\pm$ 6.79	NS
BMI SDS at baseline	2.92 $\pm$ 0.76	2.37 $\pm$ 0.58	0.019
Morbidly obese (BMI SDS > 2.5, %)	15 (71.4%)	7 (58.3%)	0.026
BMI SDS after weight loss	2.20 $\pm$ 0.84	1.72 $\pm$ 0.64	NS
Fold change after weight loss	0.65	0.63	NS
BMI SDS currently	1.85 $\pm$ 1.20	1.22 $\pm$ 0.74	NS
Fold change currently	0.84	0.7	NS

- 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



- The ketogenic children had a significantly lower BMI SDS at baseline in comparison to the children following the hypocaloric diet. (\* p=0.019)
- The children in both diet groups significantly reduced their BMI SDS with their dietary plan. (\*\*p<0.05)
- The children in the ketogenic diet group significantly reduced their BMI SDS further after their initial weight loss and were able to maintain it for at least 7 years. (\*\*\*) p=0.005)

## 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

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The authors have nothing to disclose

