SYSTEMATIC REVIEW OF THE EFFECT OF KETOGENIC OR HIGH-FAT DIET IN MITOCHONDRIAL DISEASES

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Introduction

The reason to start a ketogenic diet (KD) or high-fat diet (HFD) in patients with a mitochondrial disease (MD) differs among centers in the Netherlands as there is no clear guideline. The objective was to review the evidence and collect published cases to assess the clinical benefit.

Methods

- Pubmed search (April 2018) Reference lists were also reviewed.
- 2 authors independently screened and selected the papers.
- Discrepancies were resolved through discussion and consensus.

Inclusion: English publications, patients with a MD using a KD or HFD.

Exclusion: Cases without a reported outcome, cases with PDHC deficiency

Search terms: mitochondrial, disease, disorder, MELAS, Leigh, complex deficiency, respiratory chain defect, ketogenic diet, ketone bodies, modified Atkins, high-fat diet.

Results

766 Pubmed hits → 671 excluded

83 selected

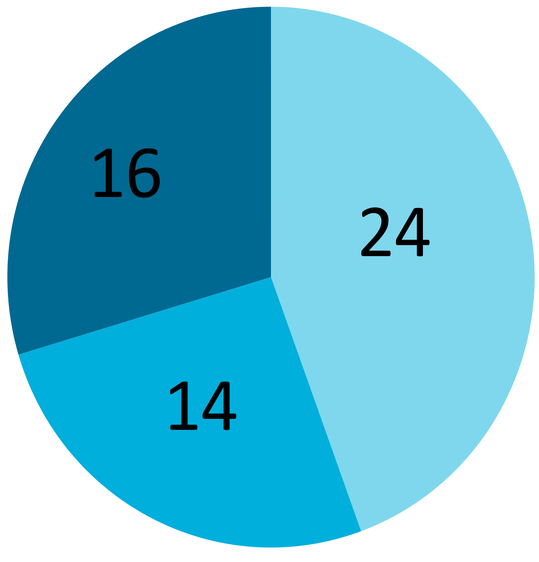
+12 from ref. list → 56 excluded

39 included

- 16 case reports/series: n=41 children and adults (0-26 year); 19 genetically confirmed*
  - n=30 with IE
  - n=12 without IE
- 1 cohort: n=24 children
  - n=24 with IE
- 3 trials: n=10 adults; 5 genetically confirmed*
  - n=10 without IE
- 16 animal
- 3 In vitro

Several animal and in vitro studies show promising results: stimulating mitochondrial biosynthesis, lowering ROS production and seizure control. 2/12 patients without IE showed some clinical improvement, possibly due to the fluctuating course of the disease. In 6/65 patients KD was stopped due to serious side effects: recurrent hypoglycemia, infections, metabolic acidosis and lethargy. In one trial (n=5 CPEO) all patients stopped the diet due to muscle damage.

Seizure reduction n=56



Conclusion

- KD in MD might be beneficial in the treatment of IE, for other symptoms there is no evidence.
- KD or a HFD should not be standard initiated after the diagnosis mitochondrial disease as the clinical effect seems very limited and side effects can be serious.

IE = intractable Epilepsy * 3243A>G (n=2), 13513G>A (n=2), SURF 1 (n=1), 3260A>G (n=1), NDUFV (n=1), POLG (n=11), SUCLA2 (n=1), MTO1 (n=5)

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