International Headache Society
IHC 2025
Sep 10 - 13 2025
São Paulo | Brazil

Ketogenic diet as an alternative treatment for migraine and associated symptoms in pediatric patients

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Introduction

Headache is one of the most common disorders in childhood and adolescence, with primary headaches affecting up to 62% of the pediatric population. Among them, migraine is one of the most frequent forms, representing a highly disabling condition often accompanied by sleep disturbances and neuropsychological comorbidities. Treatment options for pediatric migraine are limited, generally less effective than in adults and not free from side effects. Recently, high-fat low-carbohydrate ketogenic diet therapies (KDTs) have attracted increasing attention as a potential therapeutic approach for migraine. KDT may counteract neuroinflammation, stabilize neuronal function and improve cellular metabolism, thus representing a promising alternative for pediatric migraine, particularly in drug-resistant cases or when pharmacological therapy is not suitable.

Aims

To evaluate the efficacy of ketogenic diet therapy (KDT) in adolescents with migraine, focusing on its impact on migraine-related disability and exploring secondary effects on sleep, quality of life, anthropometric measures and treatment adherence.

Methods

Prospective, monocentric, interventional non-randomized study.

- **Population:** adolescents aged 14–18 years with a diagnosis of migraine.
- **Exclusion criteria:** contraindications to KDT (e.g., fatty liver, kidney stones).
- **Intervention:** Classical KDT (up to 2:1) or Modified Atkins Diet
- **Assessments:** multidisciplinary evaluation at baseline (T0) and at 3 months (T1).

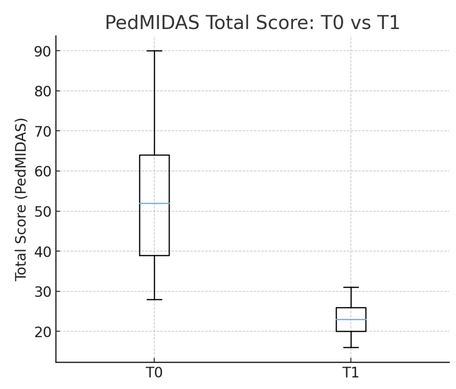
Results

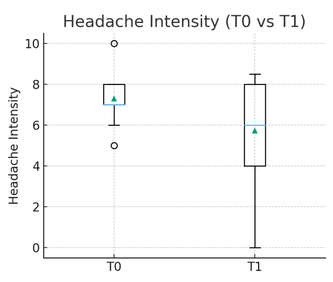
Participants: 26 adolescents enrolled, 19 began the diet (mean age 14.7±2.1 y; 89% female). 62% of patients were overweight at T0.

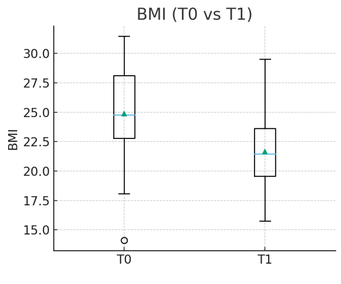
Most patients (76%) followed a 2:1 classical KDT.

At 3 months (T1):

- **PedMIDAS total score**: ↓ significantly (mean 53.4 → 28.2; $p = 0.03$) → marked reduction in migraine-related disability
- **Headache intensity**: ↓ significantly (7.3 ± 1.1 → 5.6 ± 2.3; $p = 0.02$)
- **BMI**: ↓ significantly (25.4 ± 5.1 → 23.6 ± 5.5; $p = 0.004$)
- **Headache frequency**: trend towards reduction ($p = 0.11$)
- **Sleep & QoL**: trend towards improvement (NS, limited sample size)
- ***Dropouts:*** lack of benefit (N=7), adherence difficulty (N=3), low compliance (N=1)







Conclusions

KDT significantly reduced migraine-related disability and headache intensity at 3 months follow-up. Although no significant changes were observed in sleep or quality of life, trends towards improvement were noted. Adherence remains a challenge, with notable dropout rates. Overall, KDT may represent a promising approach to reduce the burden of migraine in adolescents. These preliminary findings support further investigation in larger cohorts.

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