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Original Research Article

# Role of Dietary Therapy in Managing Epilepsy in Children

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**Abstract:**

**Background:** Millions of people worldwide suffer with epilepsy, a persistent neurological illness that affects a large number of children. Drug-resistant epilepsy (DRE) affects about 30% of patients even with advancements in antiepileptic medications (AEDs). Refractory epilepsy can now be effectively managed with dietary therapy, especially the ketogenic diet (KD), especially in children. With an emphasis on seizure frequency, quality of life, adherence, and side effects, this study attempts to assess the safety and effectiveness of nutritional therapy in treating epilepsy in paediatric patients.

Methods: 110 paediatric epileptic patients who satisfied the inclusion requirements were included in the study. Medical records, in-person interviews, and routine follow-ups were used to gather information on the frequency of seizures, quality of life, and negative consequences. The statistical analysis was done with SPSS 20.0.

**Results:** The study found a significant reduction in seizure frequency from 8.5 to 4.1 episodes per month ($p < 0.001$) after 12 months of dietary therapy. Quality-of-life scores improved from 50.3 to 68.9 ($p < 0.001$). High adherence rates were observed, with 85% of participants maintaining the diet. Common side effects included gastrointestinal disturbances (18.2%), nutritional deficiencies (13.6%), and hyperlipidemia (9.1%), all of which were manageable.

**Conclusion:** Paediatric epilepsy patients' quality of life is much improved and seizure frequency is considerably reduced by dietary therapy, especially the ketogenic diet. Maintainable side effects and high adherence rates lend credence to the viability of long-term dietary therapies.

Recommendations: Healthcare providers should consider dietary therapy as a viable option for managing pediatric DRE. Future research should focus on long-term outcomes, potential biomarkers for response, and strategies to improve adherence.

**Keywords:** Pediatric epilepsy, Ketogenic diet, Drug-resistant epilepsy, Seizure frequency, Quality of life



## Introduction

About 50 million people worldwide, a large percentage of them are children, suffer from epilepsy, a chronic neurological illness marked by frequent, unprovoked seizures. About 30% of individuals still have seizures after antiepileptic medication (AED) advancements; this is known as drug-resistant epilepsy (DRE) [1]. Alternative therapies are essential for these people, and one such effective option is nutritional therapy, specifically the ketogenic diet (KD).

The goal of the ketogenic diet is to induce ketosis by following a high-fat, low-carb, and adequate-protein diet that simulates the metabolic state of fasting. The diet has a long history; it was first created in the 1920s to treat epilepsy before the development of contemporary AEDs. With the introduction of these medications, its use declined, but in recent decades, growing data confirming its effectiveness has caused a revival [2]. Although the Modified Atkins Diet (MAD) and the Low Glycemic Index Treatment (LGIT) have not received as much attention as the standard ketogenic diet, they have showed potential, especially in the case of paediatric populations [3].

The usefulness of ketogenic dietary therapy in treating DRE in children has been demonstrated in recent research. Ketogenic diets dramatically decreased the frequency of seizures in children with DRE, according to a comprehensive review and meta-analysis, with many patients reporting a

reduction in seizures of more than 50% [3]. Another thorough analysis confirmed the effectiveness and safety of ketogenic diets, pointing out that they may help paediatric patients with seizure management and quality of life (QoL) issues [4].

The mechanism by which ketogenic diets exert their anti-seizure effects is not fully understood but is thought to involve multiple pathways, including metabolic changes that enhance energy production and neurotransmitter stabilization. Studies have also suggested that ketogenic diets may influence gut microbiota composition, contributing to their therapeutic effects [2].

Despite the promising outcomes, adherence to ketogenic diets can be challenging due to their restrictive nature. Side effects such as gastrointestinal disturbances, nutritional deficiencies, and hyperlipidemia are common but generally manageable under medical supervision [5]. Long-term studies and multicenter trials are needed to further elucidate the benefits, potential biomarkers for response, and strategies to improve adherence and minimize adverse effects.

Overall, dietary therapy, particularly ketogenic diets, represents a significant advance in the management of pediatric epilepsy, offering hope to children who do not respond to conventional treatments. As research continues to evolve, these dietary interventions may become a cornerstone in the comprehensive care of pediatric epilepsy patients.

The present study was design to investigate the role of dietary therapy in managing epilepsy in children.

## Methodology

**Study Design:** A prospective observational study.

**Study Setting:** The study took place at Bankura Sammilani Medical College (B.S.M.C.H.), Bankura, West Bengal, India, from February 2015 to January 2016 (1 year).

### Participants

A total of 110 pediatric patients diagnosed with epilepsy were included in the study.

### Inclusion Criteria

- Children aged 2 to 18 years
- Diagnosed with epilepsy by a neurologist
- Parents/guardians provided informed consent
- No prior dietary therapy for epilepsy

### Exclusion Criteria

- Children with metabolic or genetic disorders
- Those already on dietary therapy
- Patients with severe comorbidities that could interfere with dietary therapy

**Bias:** To minimize selection bias, participants were consecutively enrolled. Blinding was not possible due to the nature of dietary interventions. However, outcome assessors were blinded to the intervention groups.

**Variables:** Variables included type of dietary therapy, frequency of seizures, quality of life, side effects, adherence to diet.

**Data Collection:** Data was collected through medical records review, direct interviews with patients and guardians, regular follow-ups and monitoring of seizure frequency.

### Procedure

1. Baseline data on seizure frequency, type of epilepsy, and demographic details were collected.
2. Patients were assigned to appropriate dietary therapy based on their medical condition and nutritional needs.
3. Follow-ups were conducted monthly to assess adherence, seizure frequency, and side effects.
4. At the end of the study period, the frequency of seizures, QoL (using standardized questionnaires), and any adverse effects were evaluated.

**Statistical Analysis:** Data analysis was done with SPSS 20.0. The baseline characteristics were compiled using descriptive statistics. By comparing the frequency of seizures before and after the intervention, paired t-tests were used to assess the efficacy of dietary therapy. ANOVA was utilised to analyse the quality-of-life scores. Statistical significance was attained when the p-value was less than 0.05.

**Ethical Considerations:** The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

## Result

A total of 110 pediatric patients with epilepsy were included in the study. The demographic and baseline characteristics of the participants are summarized in Table 1.

**Table 1: Participant Characteristics**

| Characteristic | Number (Percentage) |
|---|---|
| Total Participants | 110 |
| Age (years) | |
| 2-6 | 30 (27.3%) |
| 7-12 | 40 (36.4%) |
| 13-18 | 40 (36.4%) |
| **Gender** | |
| Male | 58 (52.7%) |
| Female | 52 (47.3%) |
| Type of Epilepsy | |
| Generalized | 70 (63.6%) |
| Focal | 40 (36.4%) |

The decrease in the frequency of seizures was the main result that was measured. Following the dietary intervention, the results revealed a significant decrease in the frequency of seizures (Table 2).

**Table 2: Seizure Frequency**

| Seizure Frequency | Baseline | After 12 Months | p-value |
|---|---|---|---|
| All Participants | 8.5 ± 3.2 | 4.1 ± 2.5 | <0.001 |
| Ketogenic Diet | 9.0 ± 3.1 | 3.5 ± 2.0 | <0.001 |
| Modified Atkins Diet | 8.0 ± 3.4 | 4.7 ± 2.8 | <0.001 |

A standardised questionnaire was used to measure QoL; scores ranged from 0 to 100, with higher numbers denoting greater QoL. Following the dietary intervention, there was a noteworthy enhancement in the quality-of-life scores (Table 3).

**Table 3: Quality of Life**

| Quality of Life Score | Baseline | After 12 Months | p-value |
|---|---|---|---|
| All Participants | 50.3 ± 12.7 | 68.9 ± 15.3 | <0.001 |
| Ketogenic Diet | 48.7 ± 13.0 | 70.1 ± 14.9 | <0.001 |
| Modified Atkins Diet | 51.9 ± 12.4 | \| 67.7 ± 15.6 | <0.001 |

Adverse effects were monitored throughout the study period. Table 4 shows the incidence of common side effects.

**Table 4: Adverse Effects and Adherence**

| Adverse Effect | Number (Percentage) |
|---|---|
| Gastrointestinal | 20 (18.2%) |
| Nutritional Deficiencies | 15 (13.6%) |
| Hyperlipidemia | 10 (9.1%) |

Adherence to dietary therapy was assessed through monthly follow-ups. Adherence rates were found to be high, with 85% of participants maintaining good adherence throughout the study period.

Dietary therapy dramatically decreased seizure frequency and increased quality of life, according to the statistical study. From the beginning to the end of the trial, there was a substantial decrease in the frequency of seizures ($p < 0.001$) and an increase in QoL ($p < 0.001$), according to paired t-tests.

## Discussion

This study looked into how well paediatric patients with epilepsy responded to nutritional therapy. 110 kids between the ages of 2 and 18 took part in the study; of them, 63.6 percent had generalised epilepsy and 36.4 percent had focal epilepsy. The main objectives of the study were quality of life and seizure frequency, with additional goals being adherence to dietary changes and adverse effect assessments.

All subjects' seizure frequency significantly decreased, according to the data. Seizures occurred on average less frequently—from 8.5 to 4.1 events per month ($p < 0.001$). The results of separate analyses indicated that the modified Atkins diet and the ketogenic diet were equally effective. However, the modified Atkins diet showed a reduction in seizures from 8.0 to 4.7 episodes per month, $p < 0.001$, while the ketogenic diet showed a slightly greater reduction from 9.0 to 3.5 episodes per month. This statistically significant decrease in seizures suggests that nutritional therapy can significantly enhance seizure control in children with epilepsy.

Quality of life, as measured by a standardized questionnaire, also showed a significant improvement. The mean QoL score increased from 50.3 at baseline to 68.9 after 12 months of dietary

therapy ($p < 0.001$). Both dietary interventions contributed to this improvement, with the ketogenic diet group showing a rise in scores from 48.7 to 70.1 and the modified Atkins diet group from 51.9 to 67.7. These findings suggest that, beyond seizure control, dietary therapy positively impacts the overall well-being and daily functioning of children with epilepsy.

Adherence to the dietary therapy was high, with 85% of participants maintaining good adherence throughout the study period. This high adherence rate highlights the feasibility of implementing dietary interventions in a real-world clinical setting. However, some adverse effects were reported, including gastrointestinal issues (18.2%), nutritional deficiencies (13.6%), and hyperlipidemia (9.1%). These side effects were manageable and did not outweigh the benefits of seizure reduction and improved quality of life.

All things considered, this research offers compelling evidence in favour of using dietary therapy—specifically, the modified Atkins and ketogenic diets—to treat paediatric epilepsy. The noteworthy decrease in the frequency of seizures and enhancement in quality of life highlight the possibility of these dietary interventions as efficacious non-pharmacological therapy alternatives. High adherence rates and manageable side effects further validate their practicality for long-term use. These findings advocate for the broader adoption of dietary therapy in clinical practice for pediatric epilepsy management.

In paediatric epilepsy, dietary therapy has emerged as a critical non-pharmacologic therapeutic option, especially for situations of drug resistance. Numerous dietary plans, such the ketogenic diet (KD) and its variations, have demonstrated a strong ability to lower the frequency of seizures and enhance the quality of life for paediatric patients. In order to effectively manage nutritional therapy, a study highlighted the significance of a multidisciplinary strategy comprising qualified neurologists and dietitians. They emphasised that in order to maximise efficacy and adherence in paediatric epileptic patients, customised nutritional treatments are required [6].

A study reviewed various dietary regimens, including the KD and modified Atkins diet, noting their role in reducing epileptogenesis through ketosis. The study highlighted the need for personalized dietary protocols based on a deeper understanding of the underlying biochemical mechanisms [7]. Another study updated the guidelines for managing children on ketogenic dietary therapies, providing insights into patient selection, diet implementation, supplementation, and monitoring. The study emphasized the standardization of protocols for better clinical outcomes [8].

A study reviewed the efficacy of ketogenic diets in managing epilepsy-related syndromes such as Rett syndrome and Dravet syndrome. The study reported favorable outcomes within the first three months of dietary intervention, suggesting the need for increased awareness and application of these therapies [9]. The effectiveness and safety of several dietary interventions were compared by a systematic review and meta-analysis. The modified Atkins diet had greater tolerability and equivalent efficacy to the ketogenic diet, according to the study, which indicated that all dietary interventions were helpful in reducing the frequency of seizures [10].

The advantages of less stringent dietary therapy, like the modified Atkins diet and low glycemic index treatment, were covered in another study. These diets are good substitutes for the traditional ketogenic diet because they preserve seizure control and enhance compliance [11]. An analysis of the long-term effects of ketogenic diets on paediatric patients found that while seizure frequency was significantly reduced, there were side effects that included growth impairment and digestive problems [12].

## Conclusion

The study's findings show that nutritional therapy, such as the modified Atkins diet and the KD, is beneficial in lowering seizure frequency and enhancing QoL for young epileptic patients. Given its high rates of adherence and tolerable side effects, nutritional therapy appears to be a promising long-term treatment choice for childhood epilepsy.

**Limitations:** The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of comparison group also poses a limitation for this study’s findings.

**Recommendation:** Healthcare providers should consider dietary therapy as a viable option for managing pediatric DRE. Future research should focus on long-term outcomes, potential biomarkers for response, and strategies to improve adherence.

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**List of abbreviations:**

AEDs - Antiepileptic Drugs

DRE - Drug-Resistant Epilepsy

KD - Ketogenic Diet

LGIT - Low Glycemic Index Treatment

MAD - Modified Atkins Diet

QoL - Quality of Life

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