International Journal of Nutrition Sciences

Journal Home Page: ijns.sums.ac.ir

SHORT COMMUNICATION

Comparison of Dietary Habits of Children with Epilepsy to Healthy Children

Mohammadreza Mahdavipoor[1], Fakhreddin Shariatmadari[2], Javad Javaheri[3], Parsa Yousefichaijan[1], Fatemeh Azizi-Soleiman[4*]

1. Amirkabir Hospital, Arak University of Medical Sciences, Arak, Iran
2. Department of Pediatrics, Arak University of Medical Sciences, Arak, Iran
3. Arak Community and Preventive Medicine Specialist, Community Medicine Group, Faculty of Medicine, Arak University of Medical Sciences, Arak, Iran
4. Department of Nutrition, School of Health, Arak University of Medical Sciences, Arak, Iran

ARTICLE INFO

Keywords:
Epilepsy
Nutrition
Dietary intake
Macronutrients
Micronutrients

**Corresponding author:*
Fatemeh Azizi-Soleiman, PhD;
Department of Nutrition,
School of Health,
Arak University of Medical Sciences, Arak, Iran.
Tel: +98 8633662024
Fax: +98 8633686443
Email: azizi.s@arakmu.ac.ir
Received: February 26, 2025
Revised: May 21, 2025
Accepted: May 27, 2025

ABSTRACT

Background: Researches on the dietary adequacy of children with epilepsy in comparison to healthy counterparts are limited. This study aimed to assess the food consumption and nutrient intake patterns of children with epilepsy in comparison to healthy children.

Methods: In a case-control study, 55 epileptic children and 55 healthy controls were involved; while matched according to age and sex. Dietary intake was evaluated using 3-day (including 1 weekend day) food records. An independent t-test or its non-parametric counterpart was used to determine if there was a mean difference in dietary intake between cases and controls.

Results: The mean age of participants was 8.12±3.1 years. Compared to control group, epileptic children consumed more vegetables (p=0.001) and meat (p=0.036) and lower fats (p=0.03). In epileptic children, a significant higher intake of protein (37.56±7.8 g/d) was found when compared to healthy controls (34.05±7.4 g/d, p=0.02). The children with epilepsy consumed significantly more caffeine (p=0.001), riboflavin (p=0.024), and iron (p=0.002) and less vitamin A (p=0.01) and niacin (p=0.009) in their diet when compared with controls.

Conclusion: Our findings suggest that certain food groups and nutrients require attention for children with epilepsy, highlighting the need for more comprehensive dietary guidance for children that can be presented by epilepsy specialists.

Please cite this article as: Mahdavipoor MR, Shariatmadari F, Javaheri J, Yousefichaijan P, Azizi-Soleiman F. Comparison of Dietary Habits of Children with Epilepsy to Healthy Children. Int J Nutr Sci. 2025;10(2):doi:

Introduction

Epilepsy is a common neurological disease that can affect anyone regardless of age, race, or social class. It is characterized by a predisposition to seizures and can have various cognitive, psychological, and social consequences (1, 2). Seizures are recurrent events with distinct behavioral patterns that stem from the brain's neural mechanisms. The diagnosis involves ruling out other conditions that cause similar symptoms. The cause of epilepsy is often unknown, with genetic factors and environmental risks playing a role (3, 4). The disease can impact

quality of life due to recurring seizures and side effects of treatment (5, 6). Incidence is the highest in the youngest and oldest age groups, with a peak in children in low to middle-income countries (7, 8). Undernutrition in children with epilepsy can lead to poor quality of life and increased mortality and morbidity. This may be due to factors such as inadequate intake, vomiting, chewing and swallowing difficulties, and cognitive impairment (9, 10). Undernutrition can also affect seizure control by lowering the seizure threshold through biochemical alterations, electrolyte abnormalities, and immunological vulnerability (11, 12). Several studies have shown that undernutrition is common in children with epilepsy and can vary based on socioeconomic and demographic factors, comorbid conditions, clinical presentation, and treatment-related factors (13-15). A systematic review showed that people with epilepsy had poorer diet and nutritional status when compared to control group or a reference standard (16). A study in children with treatment-resistant epilepsy showed that the average energy intake, the percentage of total energy intake from carbohydrates and some nutrients such as iron and zinc, thiamin, riboflavin and niacin was less than the recommended amount for age and gender (17). However, based on our search, few studies have investigated the adequacy of the diet of children with epilepsy in comparison with healthy children. The purpose of this study was to assess the pattern of food groups and nutrient intake of children with epilepsy, compared with the intake patterns of healthy children.

Materials and Methods

This case-control study was conducted from 2023 to 2024 at Amirkabir Hospital Clinic affiliated to Arak University of Medical Sciences in Arak city, Iran. This investigation followed the principles outlined in the Declaration of Helsinki, with a detailed study protocol explanation provided to all participants (18). Each patient completed and signed an informed consent form. Approval for the study protocol was granted by the Ethical Committee of Arak University of Medical Sciences (IR.ARAKMU.REC.1402.079), Arak, Iran. The eligibility criteria were to be children and adolescent patients who suffered from epilepsy according to the International League Against Epilepsy (ILAE, 2017) classification (19) for at least 1 year.

The recruitment process was conducted on a continuous basis through the Amirkabir Hospital Clinic. The control group was consisted of 55 healthy subjects matched according to age and sex. Participants were excluded if they were non-compliant, suffered from a disease that causes a significant impairment in nutritional status (malignancy, chronic infections), had an endocrinal disorder to cause alterations in energy metabolism (hyper-hypothyroidism), diabetic patients, patients on specific dietary regimens such as ketogenic diet or were pregnant or lactating at the time of the study. Dietary intake was assessed using 3-day (including 1 weekend day) food records. Families were instructed by a general physician in detail to report anything the child consumed.

Dietary intake data were collected and analyzed using "Nutritionist 4" software (First Databank, Hearst Corp, San Bruno, California, USA). Data analysis in this study utilized SPSS software (version 23.0, Chicago, IL, USA). Normality was assessed through the Kolmogorov-Smirnov test and variance homogeneity through Levene's test. Quantitative data was represented by mean ±standard deviation (SD). An independent t-test or its non-parametric counterpart was used to determine if there was a mean difference in dietary intake between cases and controls. All nutritional data were presented as energy-adjusted to account for calorie differences. A significance threshold of $p<0.05$ was applied to all tests.

Results

One hundred and twenty children aged 6 months to 18 years who met the inclusion criteria were studied. Seventy-eight (65%) were males (male:female ratio=1:0.5). The age group of 5 to 10 years accounted for 67.3% of the study participants as shown in Table 1. Compared to control group, epileptic children consumed more vegetables ($p=0.001$) and meat ($p=0.036$) and lower fats ($p=0.03$) (Table 2). Table 3 shows energy and macro- and micronutrients intake of the study groups. The mean energy of the patients (3687±1263 kcal/d)

Table 1: Distribution of study participants according to age and sex.

Age (years)	Male, *n* (%)	Female, *n* (%)	Total, *n* (%)
0 to <5	8 (13.1)	4 (8.2)	12 (10.9)
5 to <10	43 (70.5)	31 (63.3)	74 (67.3)
10 to <15	6 (9.8)	10 (20.4)	16 (14.5)
≥15	4 (6.6)	4 (8.2)	8 (7.3)
Total	61 (100)	49 (100)	110 (100)

Table 2: The mean daily intake of food groups.

Variable	Case	Control	*P* value[a]
Grains (ser/d)	3.0±1.15	2.86±1.23	0.54
Fruits (ser/d)	1.09±0.69	1.24±1.25	0.45
Vegetables (ser/d)	0.39±0.7	0.18±0.66	0.001
Dairies (ser/d)	0.36±0.42	0.39±0.36	0.54
Meat (ser/d)	1.31±0.69	1.01±0.76	0.036
Fats (ser/d)	1.9±0.84	2.48±1.09	0.03

Table 3. The mean daily intake of nutrients.

Variable	Case	Control	*P* value[a]
Energy (kcal/d)	3687±1263	3838±2450	0.96
Carbohydrate (g/d)	133±20	131±25	0.6
Protein (g/d)	37.56±7.8	34.05±7.4	0.02
Total fat (g/d)	34.63±12.41	38.22±10.05	0.72
Dietary fiber (g/d)	7.35±3.88	7.28±3.39	0.919
Caffeine (mg/d)	8.84±12.33	3.28±9.13	0.001
Vitamin A(RAE)	615.47±705.16	1039.31±942.86	0.01
Vitamin E (mg/d)	3.52±2.21	4.97±5.91	0.365
Vitamin C (mg/d)	39.79±36.96	50.99±45.13	0.159
Thiamine(mg/d)	0.78±0.29	0.79±0.29	0.49
Riboflavin (mg/d)	0.78±0.57	0.60±0.26	0.024
Niacin (mg/d)	9.28±5.74	10.14±3.74	0.009
Pyridoxine (mg/d)	2.51±13.34	0.67±0.30	0.731
Folate (mcg/d)	111.99±78.75	134.60±248.76	0.926
Cobalamin (mcg/d)	1.68±1.26	1.37±0.82	0.320
Calcium (mg/d)	350.94±133.53	338.10±179.84	0.320
Iron (mg/d)	15.34±59.20	9.15±3.95	0.002
Zinc (mg/d)	4.20±2.73	4.09±1.82	0.432

did not differ from that of the control group (3838±2450 kcal/d) (p>0.05). In epilepsy children, a significantly higher intake of protein (37.56±7.8 g/d) was found compared to healthy controls (34.05±7.4) (p=0.02). The pediatrics with epilepsy consumed significantly more caffeine (p=0.001), riboflavin (p=0.024), and iron (p=0.002) and less vitamin A (p=0.01) and niacin (p=0.009) in their diet than the controls.

Discussion

Neurological diseases such as Alzheimer's disease and epilepsy have been investigated before revealing the important role of biological medications and nutrient intake patterns in these patients (20, 21). So this study was undertaken to evaluate the food consumption and nutrient intake patterns of children with epilepsy in comparison to healthy children. Our findings revealed that children with epilepsy consumed more vegetables and meat and lower fats when compared to healthy controls. In addition, intakes of protein, caffeine, riboflavin, and iron were higher in the children with epilepsy; while intakes of vitamin A and niacin were lower among this population. Few studies have investigated the intake of food groups in people with seizures, especially in children. Elliott *et al.* reported that patients with a history of epilepsy consumed significantly fewer servings of salad and greater amounts of non-diet soda compared to the non-epilepsy population (22). Szałwińska *et al.* showed that individuals with epilepsy consumed less fruits, pulses, nuts and seeds, sugar, honey, sweets, and coffee and drank more sugary drinks compared to control group (23). These results are not consistent with our study which demonstrated that epileptic children consumed more vegetables and meat and less fats in comparison to healthy children.

There was no difference in the intake of macronutrients between the two groups in the present study, except for higher intake of protein among pediatrics with epilepsy. In Volpe *et al.*'s study, compared to healthy children, those with intractable epilepsy had lower intakes of energy, macronutrients, and dietary fiber (24). Considering that frequent seizures are accompanied by prolonged postictal states and reduced periods of wakefulness, they can adversely impact food consumption, overall energy level, and nutrient absorption and it is possible that the seizure management in the children

we examined was more effective (24). Another study in adults with epilepsy revealed high carbohydrate and protein intakes among this group compared with dietary reference intakes (DRIs) (25). A similar finding has been observed in another study. More protein intake in the present study is related to more meat consumption (26).

Caffeine consumption by children with epilepsy in our study was more than healthy children in the control group. Unlike the present study, in adults, less coffee consumption was reported in comparison to healthy subjects (23). Previous studies have suggested that the intake of coffee may intensify seizure occurrences in some patients that is linked to its effects on the central nervous system (27, 28). Nonetheless, caffeine is not currently viewed as a trigger for seizures (29). Those suffering from epilepsy may be utilizing higher levels of caffeine to alleviate the sedative properties associated with antiepileptic medications (22).

The results of our investigation demonstrated that riboflavin and iron intake was significantly greater among children with epilepsy, while their intake of vitamin A and niacin was notably lower than that of their healthy peers. A similar study showed a significant lower intake of vitamins A, E, and B-12, riboflavin, niacin, pyridoxine, folate, calcium, magnesium, phosphorus, zinc, selenium and copper in children with intractable epilepsy in comparison to healthy children (24). According to the findings of Bertoli and colleagues, children with refractory epilepsy demonstrated insufficient levels of intake for calcium, iron, and zinc (17).

Inadequate intake of potassium, magnesium, vitamins C, E and B12, niacin and folate as well as suboptimal intake of vitamin A, thiamin, pyridoxine, zinc, and calcium was demonstrated among adults with epilepsy (26). Findings from a study grounded in the National Health and Nutrition Examination Survey (NHANES) suggest that salad eaters demonstrate improved consumption of vitamins C and E, folic acid, and carotenoids compared to non-consumers (30). Perhaps the reason for the difference in the results of the studies related to the consumption of vegetables and meat is more in the children studied. The strength of our work was its population-based methodology. The limitation of this study was the lack of possibility to assess micronutrients levels in serum and comparing children with controlled and uncontrolled epilepsy patients to provide a better understanding of the role of nutrients intake in seizure control.

Conclusion

Children with epilepsy were shown to have lower intakes of fats, vitamin A, and niacin when compared to their healthy peers. This research emphasized the need for healthcare professionals for these children to recognize the decline in nutrient intake and educate families on the importance of a balanced diet, while considering vitamin and mineral supplementation as necessary too.

Acknowledgment

We want to express our gratitude to everyone who took part in the study.

Funding

This work was supported by the Arak University of Medical Sciences (grant number: 6860).

Authors' Contribution

As a team, all authors contributed to the conception and design of the study. F.A.S, F.SH, J.J, and P.Y.CH conceived and developed the idea for the study and under the supervision of F.A.S, revised the manuscript. This study is being conducted by MR.M as part of his MD thesis (6860). Final approval of the manuscript was obtained from all authors.

Conflict of Interest

The authors declare that they have no conflicts of interest.

References

1 Sirven JI. Epilepsy: A Spectrum Disorder. *Cold Spring Harb Perspect Med*. 2015;5:a022848. DOI:10.1101/cshperspect.a022848. PMID:26328931.

2 Dhaliwal JK, Ruiz-Perez M, Chari A, et al. Deep brain stimulation for epilepsy: A systematic review and meta-analysis of randomized and non-randomized studies of thalamic targeting. *Epilepsy Res*. 2025;216:107607. DOI: 10.1016/j.eplepsyres.2025.107607. PMID: 40516441.

3 Ottman R, Annegers JF, Risch N, et al. Relations of genetic and environmental factors in the etiology of epilepsy. *Ann Neurol*. 1996;39:442-9. PMID:8619522. DOI:10.1002/ana.410390406.

4 Akamatsu N. Differentiation Between Epilepsy and Psychogenic Non-epileptic Seizures from the Perspective of Neurology. *Brain Nerve*. 2025;77:685-689. DOI: 10.11477/mf.1881609607700606685. PMID: 40518577.

5 Baranowski CJ. The quality of life of older adults with epilepsy: A systematic review. *Seizure*. 2018;60:190-7. DOI:10.1016/j.seizure.2018.06.002.

6 Defelippe VM, Brilstra EH, Otte WM, et al.

Blueprint for clinical N-of-1 strategies with off-label precision treatments in monogenic epilepsies. *Orphanet J Rare Dis*. 2025;20:309. DOI: 10.1186/s13023-025-03750-z. PMID: 40524218.

7 Fiest KM, Sauro KM, Wiebe S, et al. Prevalence and incidence of epilepsy: A systematic review and meta-analysis of international studies. *Neurology*. 2017;88:296-303. DOI:10.1212/wnl.0000000000003509. PMID:27986877.

8 Adisu MA, Zemariam AB, Derso YA, et al. Global patterns and predictors of anti-seizure medication adherence in pediatric epilepsy: A systematic review and meta-analysis. *Epilepsy Behav*. 2025;172:110544. DOI: 10.1016/j.yebeh.2025.110544. PMID: 40499262.

9 Genet GB, Teshager NW, Toni AT. Six in ten children with epilepsy visiting the University of Gondar comprehensive specialized hospital were undernourished: a cross-sectional study. *BMC Nutr*. 2022;8:112. DOI:10.1186/s40795-022-00606-8. PMID:36224637.

10 Fooladi F, Sohrabi Z, Akbarzadeh M. Association of Quality of Life with Serum Phenylalanine Level and Socioeconomic Status in Patients with Phenylketonuria: A Review. *Int J Nutr Sci*. 2019;4:109-112. DOI: 10.30476/IJNS.2019.83209.1032.

11 Gomes TK, Oliveira SL, Castro RM. Malnutrition and experimental epilepsy. *J Epilepsy Clin Neurophysiol*. 2011;17.

12 Kapur J, Clarke D, Etienne M, et al. American Epilepsy Society/International League Against Epilepsy-North America Joint Task Force for Epilepsy Health Care Disparities in the United States. *Epilepsy Curr*. 2025:15357597251342227. DOI: 10.1177/15357597251342227. PMID: 40502806.

13 Tekile AK, Woya AA, Basha GW. Prevalence of malnutrition and associated factors among under-five children in Ethiopia: evidence from the 2016 Ethiopia Demographic and Health Survey. *BMC Rese Notes*. 2019;12:391. DOI: 10.1186/s13104-019-4444-4. PMID: 31296269.

14 Ahmed ME, Tiwari S, Verma DK, et al. Anthropometric profile and nutritional status in children with generalized epilepsy. *Int J Contemp Med Res.* 2019;6:4-7.

15 Aaberg KM, Bakken IJ, Lossius MI, et al. Comorbidity and childhood epilepsy: a nationwide registry study. *Pediatrics*. 2016;138:e20160921. DOI: 10.1542/peds.2016-0921. PMID: 27482059.

16 Thowfeek S, Kaul N, Nyulasi I, et al. Dietary intake and nutritional status of people with epilepsy: A systematic review. *Epilepsy Behav*. 2023;140:109090. DOI: 10.1016/j.yebeh.2023.109090. PMID: 36702056.

17 Bertoli S, Cardinali S, Veggiotti P, et al. Evaluation of nutritional status in children with refractory epilepsy. *Nutr J*. 2006;5:14. DOI:10.1186/1475-2891-5-14. PMID:16640779.

18 Zadeh MM, Dehghan P, Eslami Z. Effect of date seed (Phoenix dactylifera) supplementation as functional food on cardiometabolic risk factors, metabolic endotoxaemia and mental health in patients with type 2 diabetes mellitus: a blinded randomised controlled trial protocol. *BMJ Open*. 2023;13:e066013. DOI: 10.1136/bmjopen-2022-066013. PMID: 36931666.

19 Scheffer IE, Berkovic S, Capovilla G, et al. ILAE classification of the epilepsies: Position paper of the ILAE Commission for Classification and Terminology. *Epilepsia*. 2017;58:512-21. DOI:10.1111/epi.13709. PMID:28276062.

20 Malekzadeh S, Edalatmanesh MA, Mehrabani D, et al. Dental Pulp Stem Cells Transplantation Improves Passive Avoidance Memory and Neuroinflammation in Trimethyltin-Induced Alzheimer's Disease Rat Model. *Galen Med J.* 2021;10:e2254.

21 Malekzadeh S, Owoyele BV, Khodabandeh Z, et al. Porphyromonas gingivalis, Neuroinflammation and Alzheimer's. *Niger J Physiol Sci.* 2022;37:157-64. DOI: 10.54548/njps.v37i2.1. PMID: 38243562.

22 Elliott JO, Lu B, Moore JL, McAuley JW, Long L. Exercise, diet, health behaviors, and risk factors among persons with epilepsy based on the California Health Interview Survey, 2005. *Epilepsy Behav*. 2008;13:307-15. DOI: 10.1016/j.yebeh.2008.04.003. PMID: 18490199.

23 Szałwińska K, Cyuńczyk M, Kochanowicz J, et al. Dietary and lifestyle behavior in adults with epilepsy needs improvement: a case-control study from northeastern Poland. *Nutr J*. 2021;20:1-14. DOI: 10.1186/s12937-021-00704-6. PMID: 34187474.

24 Volpe SL, Schall JI, Gallagher PR, et al. Nutrient intake of children with intractable epilepsy compared with healthy children. *J Am Diet Assoc.* 2007;107:1014-8. DOI: 10.1016/j.jada.2007.03.011. PMID: 17524723.

25 Fernandez RdA, Corrêa C, Bianchin MM, Perry IDS. Anthropometric profile and nutritional intake in patients with epilepsy. *Nutricion Hosp.* 2015;32(2):817-22. DOI: 10.3305/nh.2015.32.2.9205. PMID: 26268116.

26 Ismail RS, Kishk NA, Rizk HI, et al. Nutritional intake and its impact on patients with epilepsy: an analytical cross-sectional

study. *Nutritional Neurosci*. 2022;25:1813-22. DOI: 10.1080/1028415X.2021.1905371. PMID: 33779528.

27 Bonilha L, Li LM. Heavy coffee drinking and epilepsy. *Seizure*. 2004;13:284-5. DOI: 10.1016/S1059-1311(03)00079-7. PMID: 15121141.

28 Blaszczyk B. Infuence of coffee drinking on epilepsy control. *J Pre-Clini Clin Res*. 2007;1.

29 Chrościńska-Krawczyk M, Jargiełło-Baszak M, Wałek M, Tylus B, Czuczwar SJ. Caffeine and the anticonvulsant potency of antiepileptic drugs: experimental and clinical data. *Pharmacol Rep*. 2011;63:12-8. DOI: 10.1016/s1734-1140(11)70394-2. PMID: 21441607.

30 Su LJ, Arab L. Salad and raw vegetable consumption and nutritional status in the adult US population: results from the Third National Health and Nutrition Examination Survey. *J Am Diet Assoc*. 2006;106:1394-404. DOI: 10.1016/j.jada.2006.06.004. PMID: 16963344.