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Nutritional Status of Epileptic Children in Rawalpindi, Pakistan; A Cross-Sectional Study

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Author`s Contribution

[1,2]Research ideas and data collection,[3]Manuscript methodology and analysis, support in the data collection process, Data entry, compilation, and analysis,[4-7]Active participation in methodology, Data analysis

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ABSTRACT

Objective: To assess the nutritional status of epileptic children treated at the Pediatric Clinic, to underline a relationship between food intake and disease prevalence.

Methodology: A cross-sectional study was conducted from July to December 2021, involving 240 children aged 2-10 years diagnosed with epilepsy. Data were collected using a 24-hour diet recall method and a food frequency questionnaire. Demographic and clinical characteristics were measured using validated tools, and nutritional status was assessed using the CDC growth chart. Descriptive and inferential analyses were performed using SPSS 22.

Results: Of the 240 children, 55% were under 5 years old, and 58% were male. The mean age was 6 years. Malnutrition prevalence was 58%, with 54% undernourished and 4% overnourished. Urban and rural residency was almost evenly split, and 57% of mothers were ≤30 years old, with 64% having primary education. Developmental delays were present in 45% of children, and 54% experienced poor seizure control. Dietary habits showed that 57% ate three times a day, 52% did not consume milk, and 73% followed special diets. Daily sunlight exposure exceeded an hour for 79%, and 60% did not take multivitamins regularly. A significant association was found between family history of epilepsy and the prevalence of malnutrition ($p < 0.005$).

Conclusion: Malnutrition is prevalent among epileptic children in Rawalpindi, with poor dietary intake contributing to undernutrition and increased disease prevalence, particularly in rural areas. Socioeconomic factors, family history, and dietary habits significantly affect the nutritional status of these children. Interventions are needed to improve their health outcomes.

Keywords: Nutritional status, Epileptic children, Cross-sectional study, Pakistan, Malnutrition, Food intake.

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Introduction

Epilepsy is a disease associated with abnormal activity in the brain. It is very important to understand the basic anatomy, physiology, and behavioral mechanisms that affect normal brain activity essential for understanding the abnormal phenomena and the development of SOPs for treatment plans other than the conventional anticonvulsant medications in use. Status epilepticus is closely associated with a high mortality rate and strange complications. It is reported among approximately 50 patients per 100,000 individuals each year, with recurrence occurring in more than 13 % of cases.[1] It is a condition during which the brain cells or neurons are triggered to release unpredictably in the absence of normal supra threshold stimulation, thus these stormy episodes describe the situation termed as seizures or status epilepticus.[2] The most significant risk factor for generalized convulsive seizure leading to status epilepticus is a previous history of epilepsy. Due to a combination of nutritional and non-nutritional factors, including neurological disabilities, children with epilepsy are at an increased risk of malnutrition. A poor dietary

habit, which is one of the most serious issues is because of feeding challenges the patient must suffer. Oropharyngeal dysphasia, which is associated with severe motor dysfunction develops in around 90% of preschool children with cerebral palsy (CP) and epilepsy during the infant phase of life, is one of the most common cause of feeding difficulties.[3] A potentially modifiable risk factor is that more than 15% of people with epilepsy have had at least one episode of status epilepticus due to low levels of antiepileptic medication in blood. Being too young, having a hereditary propensity, and having acquired brain damage are all issues. In children, fever is a common cause of death, while in adults; stroke is a prevalent cause of death. Children's mortality rates range from 3 to 15%, although adult mortality rates are significantly higher. In case of acute events, such as hyperthermia, pulmonary edema, as well as cardiac arrhythmias and circulatory collapse, are also possible.

The occurrence of long-time repercussions involving epilepsy (20% to 40% of patients), encephalopathy (6% to 15% of patients), and localized abnormalities related to neurology. Epilepsy and malnutrition are both significant public health concerns due to the significant medical, social, cultural, and economic ramifications of their respective conditions (Barnet et al). The purpose of this study is to assess the relationship of nutritional status among epileptic children and their seizures occurrence.

Poor nutrition is typically linked with stunted growth as a result impaired peripheral circulation and delayed wound healing, as well as elevated stiffness and irritation of the joints. The difficulty in assessing the prevalence of malnutrition among children with neurological impairment is due to the wide range of issues that they may suffer, according to Fernando, Corrêa, Bianchin, and Perry (2015). According to studies of W.H.O epilepsy affects 0.5 and 1% of the world's population.[4] One of the most common types of epilepsy is temporal lobe epilepsy (TLE), which affects 30 to 40% of the general population.[4] Frontal lobe epilepsy is the second most common type of epilepsy (20-30 %). Patients with epilepsy have a poor quality of life because of the high prevalence of associated co morbidities e.g. stroke, diabetes mellitus, hypertension, and renal failures. Diabetic patients are at a greater risk of being effected by cancer and high blood cholesterol.[4]

Furthermore, individuals with epilepsy are more likely than the general population to be overweight or obese, with higher body mass index (BMI) values and obesity rates than the general public.[4] Oropharyngeal dysphasia, which is associated with severe motor dysfunction develops in around 90% of preschool children with cerebral palsy (CP) and epilepsy during the infant phase of life, is one of the most common cause of feeding difficulties[3]. Few studies carried out to assess the nutritional status of already diagnosed epileptic children and relationships between food intake and disease prevalence, our study will provide sufficient evidence for designing a large-scale national wide intervention to control epileptic among children especially 2 to 10 years of age.

Methodology

A cross-sectional study was carried out in Rawalpindi among children between the ages of 2 to 10 years, diagnosed epileptic, who visited for checkups at Holy Family Hospital Rawalpindi from July 2021 to December 2021. 240 children were included in the study which are already diagnosed with epilepsy and taking anti-epileptic medications from the Holy Family Hospital Rawalpindi. A simple random technique was used to collect data from previously diagnosed epileptic children to assess their nutritional status, The study duration was 6 months after the approval of synopsis. Epileptic children aged 2-10 years reported at Peads Clinic of Holy Family Hospital Rawalpindi were considered while collecting data for assessment of nutritional status of epileptic children. Epileptic children who were not willing to participate in research study were not included in data collection. Children with any chronic disease and disability due to neurological impairment were not included in the study. Poorly compliant parents of epileptic children were not included in the study population.

A predesigned questionnaire was used to get socio-demographic data and dietary pattern which included a food frequency table. For assessment of nutritional status (i.e. Anthropometric and dietary methods). A Day food record by the help of questionnaire, 24-hour recall method and measuring tape was used. Quantities of food intake were determined by using common household measures such as cups and spoons.

Children who were previously diagnosed with epilepsy visited for checkups; data was taken from their parents through food frequency questionnaire. Nutritional assessment was done via Standard growth chart of CDC. The whole nutritional history was taken including diet and any other nutritional supplements, after collecting the data from hospital source during the allotted study time, it was analyzed, and results were generated.

The data were analyzed using SPSS 22 software. Descriptive statistics, including frequencies and percentages, were calculated to summarize the data. Inferential statistics were conducted using the chi-square test to determine any significant relationships or differences between variables.

Results

The study included 240 children with epilepsy, with 55% under 5 years and 45% between 6 and 10 years. Males made up 58% and females 42%. Most children lived in rural areas (51%). Mothers were primarily young (57% aged ≤30) with 64% having primary education, while fathers were mostly aged 30-45 and 76% had primary education or higher. Detailed sociodemographic characteristics are presented in Table I.

Approximately 45% of children with epilepsy exhibited developmental delays. Diagnoses were most common in children aged 1-5 years (40%), with 49% diagnosed within the first year. Seizure control varied: 54% had poor control, while 22% had well-controlled seizures. Additionally, 37% had other health conditions, and 22% required hospital admission in the past six months. Detailed clinical characteristics are available in Table I.

Approximately 45% of children with epilepsy exhibited developmental delays. Diagnoses were most common in children aged 1-5 years (40%), with 49% diagnosed within the first year. Seizure control varied: 54% had poor control, while 22% had well-controlled seizures. Additionally, 37% had other health conditions, and 22% required hospital admission in the past six months. Detailed clinical characteristics are available in Table II.

Among the children with epilepsy, 57% ate three times a day, while 28% had four or more meals. Milk was consumed by 48%, and 73% followed a special diet. Water intake varied, with 53% drinking more than three glasses daily. Junk food consumption was noted, with 40% having soda, 36% fried items, and 24% cookies or candies. Most children (68%) ate both fruits and vegetables, and 79% had over one hour of sunlight exposure daily. Dietary and activity details are summarized in Table III.

The overall percentage of malnutrition among epileptic children in this study was 58%(n=140) and 4% over nutrition, 42% of children was normal according to CDC growth chart the children below 4% were diagnosed as undernourished and children above 95 pectinates diagnosed as over nourished. However, it was observed that undernutrition was found significantly common among children with epilepsy between 2 to 10 years of age, hence study find that nutritional status of epileptic children is statistically significant that poor food intake causes undernourished and that leads to disease prevalence. Table IV.

Table I: Sociodemographic characteristics of children with epilepsy.

Variables	Category	N	%
Age	<=5years	131	55%
	6-10 years	109	45%
Gender	Male	139	58%
	Female	101	42%
Address	Urban	118	49%
	Rural	122	51%
Maternal age	<=30 years	137	57%
	30-45 years	90	38%
	45-60 years	7	3%
	> 60 years	6	3%
Maternal Education	No formal education	87	36%
	Primary and above	153	64%
Maternal Occupation	Employed	24	10%
	Housewife	126	53%
	Merchant	24	10%
	Farmer	11	5%
	Daily laborer	46	19%
	Other	9	4%
Paternal age	<=30 years	56	23%
	30–45 years	139	58%
	45–60 years	36	15%
	> 60 years	9	4%
Paternal Occupation	Employed	113	47%
	Merchant	24	10%
	Farmer	18	8%
	Daily laborer	68	28%
	Other	17	7%
Paternal Education	No formal education	58	24%
	Primary and above	182	76%

Table II: Clinical characteristics of children with epilepsy.

Variables	Category	N	%
Developmental Delay	Yes	107	45%
	No	133	55%
Age at diagnosis	<=1year	78	33%
	1-5years	95	40%
	5–10 years	67	28%
Duration before diagnosis of epilepsy	<=1year	117	49%
	1-5years	72	30%
	5–10 years	51	21%
Duration after diagnosis of epilepsy	<=1year	123	51%
	1-5 years	86	36%
	5–10 years	31	13%
Seizure control	Well-control	52	22%
	Good control	48	20%
	Poor control	130	54%
	Uncontrolled	10	4%
Other comorbidities	Yes	88	37%
	No	152	63%
Admission within the past 6 month	Yes	53	22%
	No	187	78%

Table III: Dietary pattern of children with epilepsy.

Variables	Category	N	%
Frequency of daily food intake	<=2 times	67	28%
	=3 times	136	57%
	>=4 times	37	15%
Consumption of milk	Yes	115	48%
	No	125	52%
Special diet (prepared meals)	Yes	174	73%
	No	66	28%
Daily water intake by epileptic children	<1 glass	45	19%
	2-3 glass	68	28%
	>3 glass	127	53%
Intake of junk food	Fried item (Pakora, fries)	87	36%
	Soda, beverages	96	40%
	Cookies/candies	57	24%
Fruits and vegetables	Fruits only	5	2%
	Vegetables only	71	30%
	Both	164	68%
Intake of Meat, fish	Meat	44	18%
	Fish	27	11%
	Poultry	128	53%
	Eggs	89	37%
Sunlight exposed children	<1 hours	51	21%
	>1 hours	189	79%
Duration of daily activity	Walking / Running	169	70%
	Outdoor Playing	71	30%
Multivitamin consumption	Yes	96	40%
	No	144	60%

Table IV: Nutrition status of epileptic children.

Variables		N	%
Nourished/Normal	Yes	100	42%
	No	140	58%
	Total	240	100%
Undernourished	Yes	140	58%
	No	100	42%
	Total	240	100%
Overnourished	Yes	10	4%
	No	230	96%
	Total	240	100%

Table V: Family history of epilepsies of unknown and prenatal developmental cause among male children with epilepsy.

Variables	Chi-square value	Df	P-value
Idiopathic/Unknown	220.4	1	0.005
Prenatal/Development	212.8	1	0.001
Male Children	8.81	1	0.003

Family history of epileptic children shows that there is a statistically significant association between the family history with idiopathic/ unknown with (χ2=220.4, p-value <0.005), prenatal/developmental with (χ2=212.8, p-value <0.001) and male children with (χ2=8.8, p-value <0.003) cause and the occurrence of epilepsy among male children. Table V.

Discussion

Nutritional deficiencies can cause malnutrition among children, which make the children more vulnerable to acquire infections, illness, poor cognitive abilities, ultimately increase disease burden and mortality in Pakistan. Researchers agreed upon evidence-based intervention to combat malnutrition among children, but unfortunately there is lack of quality research to develop evidence-based recommendation while eradicating malnutrition among children.

Our study was aimed to find out nutritional status of epileptic children aged 2-10 years. The nutritional status of the children was found significantly associated with poor food intake. Also supporting results were found in the study was conducted by university of Gondar in Ethiopia findings of study were 63% epilepsy children experiencing moderate while 64% experience severe malnutrition.[5]

Another supporting study was conducted in Nigeria study revealed that 15% of epilepsy children experience with severe malnutrition.[6] Another supportive study was conducted in sub-Saharan Africa and Asia results revealed that undernutrition contributes to nearly 50% of all annual deaths in children and undernourished children are more vulnerable to infectious pathogens and more likely to die from infectious diseases.[7]

Our study finds out that 45% of aged 1-5 years, seizure control varied, with 54% having poor control and 37% had accompanying health conditions, and 22% required recent hospitalization the epileptic children are facing delay developmental problems. Supporting study revealed toddlers found malnutrition and that is contributing factors to developmental delays. [8] Another supporting study was concluded delay development directly impact of cognitive process, among malnourished children aged 5-7 years and 8-10 years. [9]

And our results revealed that malnutrition found among epileptic children about 51% among rural residents rural population of Pakistan is facing severe problem of malnutrition specially children.[10] Another study conducted in rural Pakistan revealed that severe acute malnutrition among children contribute 61% of delay in development.[11] Another study found that Under-nutrition was particularly observed in rural areas where assessed, 117 (38.5%) were stunted, 58 (19.1 %) were wasted and 101 (33.2 %) were underweight.[12]

In our study around 52% of the children did not expend milk, while 48% had drain as portion of their eat less, 73%

of children taken after an extraordinary eat less with arranged suppers, whereas 28% did not, 53% expended more than three glasses of water day by day, taken after by 28% drinking 2-3 glasses, and 19% expending less than one glass per day, Different types of garbage nourishment were observed, with 40% consuming soda or beverages, 36% browned items like pakoras or fries, and 24% expending treats or candies, 68% of children devoured both natural products and vegetables, while 30% consumed vegetables as it were, and a minor extent (2%) devoured natural products solely, The dietary admissions included 53% of children expending poultry items whereas 37% are eggs, 18% of children consuming day by day meat and 11% fish.

Study concluded that family history of epileptic children shows that there is a statistically significant association between the family history with idiopathic/ unknown with (χ^2=220.4, p-value <0.005), prenatal/developmental with (χ^2=212.8, p-value <0.001) and male children with (χ^2=8.8, p-value <0.003) cause and the occurrence of epilepsy among male children. Supporting study concluded that family history of epilepsy children was observed 40% positive and age of children with epilepsy onset was significantly earlier in positive family history epileptic patients with (p-value <0.001). [13]

Another study shows risks for epilepsy may be impacted by genetic instruments the standardized incidence ratios were 8.3 (95% CI 2.93–15.31) for generalized epilepsy and 2.5 (95% CI 0.92–4.00) for central epilepsy. In relatives of probands with central epilepsy, standardized incidence ratios were 1.0 (95% CI 0.00–2.19) for generalized epilepsy and 2.6 (95% CI 1.19–4.26) for central epilepsy.[14]

Probably because of the nature and severity of disease Hypoxic –ischemic encephalopathy (HIE), can impair a range of aspects related to everyday life, including motor and cognitive functions as well as sensory capacities. When it came to developmental consequences for children, idiopathic causes had the least detrimental effect. In addition to the previously mentioned Benign (Rolandic) Seizures, Generalized Idiopathic seizures, and other forms of epilepsies with unknown etiology, there are several neurological disorders (unframed neurotransmission) can partially explain this.[15] According to the researchers, the cause of the seizures was the most significant element in terms of influence on the child's and mother's daily lives, with Hypoxic-ischemic encephalopathy being the most significant factor influencing the child's and mother's daily lives, respectively. [16]

Opposite study concluded that children with epilepsy have lower health related quality life as compared to normal there is less evidences found which associated with epilepsy diagnosis children .[17]

Compared to other syndromes, these have a better prognosis and a more compassionate course of action, which implies they have less impact. It is essential to remember that epilepsy and related syndromes and motor stereotypes.[1] Can be confounded, and that they might coexist, resulting in a more convoluted epilepsy presentation.[18]

There could be a reason for disparity, such as increased home nursing care, or changes in family structure between nations, such as the number of children living in the household and the amount of support provided by distant relatives. It is necessary to conduct more cross-cultural research in order to have a better appreciation and understandings of the disparities in the experiences of epileptic children and their families in other nations and cultures.[19]

LIMITATIONS OF THE STUDY: Being a single-center study conducted in a healthcare setting in Rawalpindi, Pakistan, our findings should not be generalized. We were unable to record treatment outcomes among the current set of patients, future research should investigate whether this effect is caused by these socioeconomic factors or by changes in the quality of healthcare services offered in different parts of the country.

Conclusion

Malnutrition among children in Pakistan is a serious issue that leads to increased vulnerability to infections, illness, and poor cognitive abilities. It is concluded that nutritional status of epileptic children is statistically significant that poor food intake causes undernourishment and that leads to disease prevalence in rural areas. The demographic socioeconomic conditions, poor food intake, child's, and mother's daily lives, with Hypoxic-ischemic encephalopathy being the most significant factor influencing the child's and mother's daily lives, respectively. Probably because of the nature and severity of disease Hypoxic –ischemic encephalopathy (HIE), can impair a range of aspects related to everyday life, including motor and cognitive functions as well as sensory capacities.

Recommendations: Our study recommended that improving the education level of parents regarding the proper nutrition for children is crucial to prevent undernutrition among epileptic children and decline of incidence in the rural population. Government should take steps towards improving the health

status of children through intervention to address important determinants of malnutrition among children aged 2-10 years.

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