Anthropometric Profile and Nutritional Status in Children with Generalized Epilepsy

Md Ehtasham Ahmed[1], Sunita Tiwari[2], Dileep Kumar Verma[3], Manish Bajpai[4], Sciddhartha Koonwar[5], Neeraj Kumar[6]

ABSTRACT

Background: Epilepsy is widespread in developing countries compared to that in developed countries. The reason of epilepsy in most cases is unknown. Considering the fact that the nutritional status of children in developing countries is generally poor, our objective was to determine possible relationship between nutritional status and epilepsy.

Material and methods: Towards this, we gather a dataset of 34 Cases from the Department of Pediatric and as many Controls from the local populace. The age group (5-8.5 years), sex, and gender data is also augmented with educational and socioeconomic history along with the results of clinical examinations, such as, weight, height and body mass index.

Results: Our statistical results unveil insignificant difference in socioeconomic status and educational levels in between the parents of Cases and Controls. Additionally, a significantly higher value of anthropometric measurements in Controls is observed compared to that of the Casesi.e. Height (117.38±6.05 vs. 112.21±6.82 cm; p value 0.002), Weight (21.29±2.83 vs. 18.14±2.94 kg; p value <0.001) and Body mass index(15.39±1.03 vs.14.33±1.26 kg/m^2; p value <0.001).

Conclusion: Our results show that generalized epilepsy may have effect on growth and development of children, reflecting that nutritional programs are required to improve the nutritional status in children with generalized epilepsy so as to optimize their growth and development.

Keywords: Anthropometric Profile, Nutritional Status, Generalized Epilepsy

INTRODUCTION

Epilepsy is a brain disorder characterized by an enduring predisposition to generate epileptic seizures. It is also characterized by the neurobiological, cognitive, psychological, and other varied social consequences of this condition.[1] Seizures provoked by reversible insults, e.g., fever, hypoglycemia, however, do not fall under the definition of epilepsy because of them being short-lived and other different secondary conditionsthat are not inherently chronic.[2]

There are approximately 50 million people living with epilepsy worldwide.[3] In particular, the proportion of population with active epilepsy, continuing seizures or with the need for treatment, at a time is estimated between 0.4% and 1.0%. The studies suggestrelatively higherproportion of epilepsy in the low- and middle-income countries[4] (between 0.7% and 1.4%), as high as four timesto that in the developed countries.[5] Additionally, 2.4 million people are estimated to be diagnosed with epilepsy each year. In high-income countries, annual new cases are estimated between 3% and 5% of the population,[6] and in low- and middle-income countries, this figure may go up by 2 times. The high rate in the low- and middle-income countries can be attributed to increased risk of endemic conditions such as central nervous system infection (malaria or neuro-cysticercosis),[7] higher traffic injuries, birth-related injuries and scanty availability of appropriate medical infrastructure and effective preventive health programs and accessible healthcare. A 2005 WHO (World Health organization) report also states that 80% of people with epilepsy live in low- and middle-income countries.[8]

In India, prevalence rates for epilepsy are 5.59-10 persons for every 1000.[9] The effect is shown to be independent of gender and geography. However, most of the cases of epilepsy (approximately 75%) build up during childhood reflecting the susceptibility of the developing brain to seizures. Malnutrition in early stages of life also has irreversible effects on the development of brain, suggesting that early malnutrition may lead to increase in risk of seizures in the following stages of life.[10] Moreover, malnutrition leads to increased chances of cerebral insultalong with abnormal skeletal growth and stunting and skeletaldisproportion,as potential markers of early under-nutrition.[11]

While prior studies have analyzed epilepsy for different geography, no effort has been put to understand the effects in north Indian context, nor have there been any study to extrapolate the findings in north Indian context. In this work, we work towards filling the gap. In particular, we gather data from the Pediatric-Neurology OPD, and analyze different parameters to correlate the artifacts.

[1]Junior Resident, Department of Physiology, K.G.M.U, Lucknow, [2]Professor and Head, Department of Physiology, KGMU, Lucknow, [3]Professor, Department of Physiology, KGMU, Lucknow, [4]Professor, Department of Physiology, KGMU, Lucknow, [5]Associate Professor, Department of Pediatrics, KGMU, Lucknow, [6]Associate Professor, Department of Neurology, KGMU, Lucknow, India

Corresponding author: Manish Bajpai, Professor, Department of Physiology, KGMU, Lucknow, India

How to cite this article: Md Ehtasham Ahmed, Sunita Tiwari, Dileep Kumar Verma, Manish Bajpai, Sciddhartha Koonwar, Neeraj Kumar. Anthropometric profile and nutritional status in children with generalized epilepsy. International Journal of Contemporary Medical Research 2019;6(5):E1-E4.

DOI: http://dx.doi.org/10.21276/ijcmr.2019.6.5.35

Dataset and Methodology

We performed a case–control study to find out any possible relationship between malnutrition and generalized epilepsy in U.P (India). The study was conducted in Exercise Laboratory, Department of Physiology, King George's Medical University; Lucknow (UP) from September 2017 to August 2018. The cases enrolled for the study were taken from Pediatric-Neurology OPD in the Department of Pediatrics. The epileptic cases were diagnosed in the department of Pediatrics by history, clinical assessment and EEG (Electroencephalography). Computerized tomography (CT) or magnetic resonance imaging (MRI) was performed in patients to rule in or rule out any structural pathology. Thirty four cases with generalized seizure in the age group of 5 to 8.5 years were selected. The starting time and frequency of seizure attacks have been obtained from the patients' history and were ranging from 1month to 48 months (mean 14.32 months), 4 ± 3 seizure attacks per year, respectively. Thirty four, age and sex matched normal children without a history of developmental delayor neurological deficit were also enrolled for comparison. Demographic data collected included age, sex, age at seizure onset, duration of seizure attacks, seizure type, seizure frequency, and anyassociated deficits for each patient and each control subject. An approval from the Institutional ethical committee of KGMU, Lucknow was taken.

The cases having generalized tonic or generalized tonic clonic seizures (according to recommendations of the International League against Epilepsy 2017) and controls free from seizure or seizure like activities (pseudo seizures) were included in our study. Any known history of cardiac arrhythmia, diabetes, hypertension, chronic renal disease, chronic liver disease, malignancies, HIV, psychiatric illness, fever, thyrotoxicosis, anemia, trauma, alcohol, tobacco and caffeine abuse,use of vasopressor or vagolytic agents, Carbamazepine,[12] any abnormal finding in respiratory and cardiovascular examination were excluded from the study.

ForWeight measurement, the scale is placed on a flat, hard, even surface, child was in minimum clothing during weighing, removed his/her shoes, communication with the child in a sensitive, non-frightening way and recorded the child's weight to the nearest 100 Grams.

For height measurement, it was measured by using stadiometer, standing for a child with minimum clothing without shoes and socks, standing with feet parallel on an even platform stretching fullest, arms hanging on the sides, and buttocks and heels touching the rod, the head held erect with lower border of the eye orbit in the same horizontal plane as the external canal of the ear (Frankfort plane) and the head piece lowered to touch the top of the head.Body mass index (BMI), the ratio of weight in kilogram to the square of height in meters (wt/ht^2) were recorded.

BMI = Weight (kg)/ Height $(meter)^2$

STATISTICAL ANALYSIS

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 21.0 statistical Analysis Software. The values were represented in Number (%) and Mean±SD.

RESULTS

Age of subjects enrolled in the study ranged between 5 and 8.50 years, mean age of subjects was 6.50±0.81 (median 6.50) years. Though mean age of Controls (6.66±0.75 years) was found to be higher as compared to Cases (6.34±0.85 years) but this difference was not found to be statistically significant (table-1).

Preponderance of males was observed among overall (69.12%) population as well as among Cases (67.65%) and Controls (70.59%). Difference in gender of Cases and Controls was not found to be statistically significant

Group	No. of children	Min.	Max.	Median	Mean	SD
Cases	34	5.00	8.00	6.25	6.34	0.85
Controls	34	5.00	8.50	6.50	6.66	0.75
Total	68	5.00	8.50	6.50	6.50	0.81
't'=1.668; p=0.100						

Table-1: Comparison Between Case and Control: Age (in years)

SN	Gender	Cases (n=34)		Controls (n=34)		Total (n=68)	
		No.	%	No.	%	No.	%
1-	Female	11	32.35	10	29.41	21	30.88
2-	Male	23	67.65	24	70.59	47	69.12
χ^2=0.069 (df=1); p=0.793							

Table-2: Gender distribution of case and control

SN	Anthropometric Variables	Cases (n=34)		Controls (n=34)		Student 't' test	
		Mean	SD	Mean	SD	't'	'p'
1-	Height (cm)	112.21	6.82	117.38	6.05	-3.312	0.002
2-	Weight (kg)	18.14	2.94	21.29	2.83	-4.510	<0.001
3-	Body mass index (BMI)	14.33	1.26	15.39	1.03	-3.786	<0.001

Table-3: Comparison of Anthropometric Variables

(p=0.793).Demographic profile of Cases and Controls enrolled in the study was comparable (table-2).

A statistically significantly higher value among Controls as compared to Cases was found for all the anthropometric variables i.e. Height (117.38±6.05 vs. 112.21±6.82 cm), Weight (21.29±2.83 vs. 18.14±2.94 kg) and Body mass index (BMI) (15.39±1.03 vs.14.33±1.26 kg/m^2) (table-3).

DISCUSSION

While there have been many studies that have focused on the factors affecting the epilepsy, no effort has been put towards studying epilepsy in north Indian context. We now discuss our results and also compare our results with that of studies for other geographical constructs. Our analyses shows that the mean height, mean weight, and body mass index (BMI) were higher in Controls in comparison to Cases (p value is 0.002, <0.001, and<0.001 respectively).We also observed that the prevalence of malnutrition is higher in Cases than in Controls.Additionally, insignificant difference in socioeconomic status and level of education was observed between the parents of Cases and Controls.

A previous study by Crepin S et al., (2007)[13] found significant differences in anthropometric parameters, weight, height, mid upper arm circumference, and triceps skin fold thickness, in Cases compared to Controls.They also record poor nutritional status in epileptic subjects.Our results are in line with the findings of the aforementioned study in showing higher prevalence of malnutrition among Cases than Controls.

Richard Hackettet al.,[14] foundhigher prevalence of epilepsyin developing countries due to acquired brain injury and malnutrition. Malnutrition may lower seizure threshold, due to its effects on inhibitory neurotransmitters and electrolytes. S Bertoli[15] found children with refractory epilepsy were weak nutritionally (by anthropometric assessment). It may be due to anorexia, chewing, swallowing difficulties or vomiting, use of anticonvulsant drugs (altered metabolism), and energy requirement.

Symon M Kariuki[16] did a cross-sectional community-based surveys in sub-Saharan Africa (SSA)and found active generalized tonic clonic seizure had higher prevalence of malnutrition and cognitive and neurologic deficits.

Nidhi Vaid et al (2012)[17] performed an Ethiopia (a developing country) based case-control study to determine the association between epilepsy and early under-nutrition (marker of poverty). They show that the patients with epilepsy had evidence of stunting and disproportionate skeletal growth, raising the possibility of a link between early under-nutrition and epilepsy. The findings of the study are validated by the results of our study, i.e.,early malnutritionwas higher in Cases than in Controls.

Epilepsy and nutritional status are directly related in developing countries (like sub-Saharan Africa).[18] Low socio economical conditions, unemployment and less awareness may be associated factors for malnutrition. Nutritional Programs are needed to improve the nutritional status of people with epilepsy.

CONCLUSION

The statistical analysis results unveil insignificant difference in socioeconomic status and educational levels in between the parents of Cases and Controls. In particular, a significantly higher value of anthropometric measurements in Controls is observed compared to that of the Cases i.e. Height (117.38±6.05 vs. 112.21±6.82 cm; p value 0.002), Weight (21.29±2.83 vs. 18.14±2.94 kg; p value <0.001) and Body mass index (15.39±1.03 vs.14.33±1.26 kg/m^2; p value <0.001). These results show that generalized epilepsy may have effect on growth and development of children, reflecting that nutritional programs are required to improve the nutritional status in children with generalized epilepsy so as to optimize their growth and development.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 03-04-2019; **Accepted:** 25-04-2019; **Published:** 20-05-2019