



ASSESSMENT OF ACADEMIC ACHIEVEMENT AMONG SECONDARY SCHOOL CHILDREN WITH EPILEPSY/SEIZURES IN NIGER STATE

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Abstract

Students with cognitive medical condition of disability like epilepsy or seizures are generally considered to have difficulties with their academic achievement. The purpose of this study was to find out whether epilepsy actually affects academic achievement of students in basic science subjects (Mathematics, Physics and Chemistry) among secondary school students with Epilepsy/Seizures in Niger State. The design of the study was an Expo-facto design. The study adopted a Purposive sample of 29 epileptic senior secondary two students 2020/21 academic session. The data used for the study was a primary source of data from the existing scores of promotional examination set by test and measurement unit of the Niger State Ministry of Education. Data collected were analyzed using mean, standard deviation, and t-test at 0.05 level of significant difference. The findings of the study revealed that there is a significance difference between students' academic achievement in the three science subjects as influenced by acute and mild epilepsy. This is evident as findings on mathematics, physics and chemistry showed acute and mild epileptic students' achievement on t-test as 8.29, 2.75, and 5.28, all greater than the critical value of 2.052, respectively. The study recommends that special attention should be given to epileptic students in terms of suitability of teaching methods, conducive learning environment and close monitoring to improve their achievements in academics.

Keywords: Seizures, Epilepsy, Academic achievement, Cognitive, Disability.

1. Introduction

Epilepsy is one of the most common disorders of the nervous system and affects both males and females of all ages, races, ethnic and social background. It is said to be a cognitive medical condition of disability which is not readily observed but has the tendency to affect performance of persons not only in school, but also outside the environment of the school. This is because it is a brain disorder in which a person has repeated seizure (convulsions) which are episodes of disturbed brain activity that causes changes in attention or behavior (Leislle & Anita, 2016). According to Osman (2021) epilepsy is a disorder of brain characteristics by an ongoing liability to recurrent epileptic seizures. Cooke (2017) defined epilepsy as “occasional, sudden, excessive, rapid and local discharges of grey matter”. Pietrangelo (2018) defined the term as “a cognitive impaired condition and a chronic non-communicable neurological disorder involving the brain that makes its victims more susceptible to having recurrent unprovoked seizures”. Epilepsy is a central nervous system (neurological) disorder in which brain activity becomes abnormal, causing seizures or periods of unusual behaviour, sensations and sometimes loss of awareness (Cooke, 2017). It is therefore an incident that seizes or attacks an individual with abnormality in the electrical activity of the brain.

Seizures are surges of electricity in human brain like electrical storms that briefly stop the brain cells from working normally. When a person has recurring seizures, this is known as epilepsy. It is observed in Mayo Clinic Family Health Book (2020) that “Some people with epilepsy simply stare blankly for a few seconds during seizure, and they tend to have the same type of seizures each time. So, the symptoms will be similar from incident to incident”.

However, Pietrangelo (2018) have cautioned that, although the most common cause of seizures is epilepsy, one seizure does not signify epilepsy, and as such, not every person who has a seizure has epilepsy. A person is diagnosed with epilepsy if they have two unprovoked seizures. The seizures in epilepsy may be related to a brain injury or a family tendency, but often the cause is completely unknown. Many people with epilepsy have more than one type of seizures and may have other symptoms of neurological problems as well. It's on this premise that she defined epilepsy as having two or more unprovoked seizures.

A general overview reveals that difficulties with academic achievement are common in children with epilepsy as the disease has been found to negatively affect school attendance and academic performance. Ibekwe, *et al*, (2014) comparatively submitted that “while academic underachievement and poor school attendance in students with other chronic conditions are due to recurrent morbidity, the effect of epilepsy is thought to be due to relatively reduced intelligence, psycho-social problem, anti-epileptic medication and the influence of seizure variables such as seizure type, age at onset and seizure control. Students with difficulties in academic achievement may show some level of ‘underachievement’. Underachievement occurs when a child’s actual academic achievement is significantly lower than their predicted achievement levels developed on the basis of scholastic aptitude and intelligence test (Newman, 2017). This implies that students who does not do as well as expected or fails to achieve their potentials in their academic endeavors are at risk for academic underachievement. Students with chronic epilepsy have been shown to be more at risk for learning and academic achievement problems in school than either children without seizures or children with other chronic disorders (McNelis, Johnson, Huberty & Austin, 2015).

Numerous investigations have reported learning disabilities in children with epilepsy. These learning disabilities (poor academic achievement, as well as overall academic underachievement) are not only related to cognitive impairment, but also due to lack of attention and memory impairment among other factors. Karabira, *et al*, (2020) submitted that students with epilepsy “are vulnerable to having several seizure attacks while at school, which affects their self-image, self-esteem and can contribute to them feeling insecure and stigmatized, hence leaving school. These factors can contribute to children missing more school days and school activities, leading to poorer performance and hence less academic progress”.

Mathematics is related to all subjects, especially to all natural sciences, which include Chemistry, Physics and Biology. Thomson (2018) said “mathematics” is “Science of all Sciences” and “Arts of all Arts”. After understanding the basic concept of mathematics, students need to correlate the importance and concept of mathematics with other subjects, so as to understand other subjects easily and establishing relationship”. He further argued that “Mathematics and science are intimately connected, while mathematics creates the measurement of tools, science applies the measurement of tools”. For example, in Chemistry molecular weights of organic compounds is calculated using mathematics idea, Charles’s law of expansion of gases, rate of respiration, nutritive value of food and transpiration are all mathematical related problems. Therefore, students who do excellently or poorly in mathematics could end up achieving good grades or struggling in other science subjects, as the case may be.

Epilepsy is the most common chronic neurological problem of childhood seen in Pediatrics Neurology Units around the globe especially in developing countries. It has been identified to interfere with the development of brain networks that are responsible for cognition thereby having a detrimental impact on the academic achievements of students with epilepsy/seizures. It

is important for both general and special educators not only to be aware of the disorder or of the potential consequences of the disease, but to device practical measures to bridge the achievement gap that exist between these students and their colleagues (non-epileptic classmates). The study sought to determine students' academic achievement in some selected science subjects as influenced by acute and mild epileptic disorder in Niger State.

Research Questions

The following research questions were raised to guide the study:

1. What is the difference in students' academic achievement in Mathematics as influenced by acute and mild epileptic disorder?
2. What is the difference in students' academic achievement in Physics as influenced by acute and mild epileptic disorder?
3. What is the difference in students' academic achievement in Chemistry as influenced by acute and mild epileptic disorder?

Research Hypothesis

The following null hypotheses will be tested at the 0.05 level of significance:

HO₁: There is no significant difference between students' academic achievement with acute epileptic and mild epileptic in Mathematics.

HO₂: There is no significant difference between students' academic achievement with acute epileptic and mild epileptic in Physics.

HO₃: There is no significant difference between students' academic achievement with acute epileptic and mild epileptic in Chemistry.

Methodology

The design adopted for the study was Expo-facto design it is a primary source data from ministry of Education, Minna Niger State. Information concerning students with epilepsy/seizure, and frequency of occurrences were obtained from the form-masters through school head-teachers via an instrument called Head Teacher's Proforma for identifying epileptic students (HT-PIES). Note that any student that has been attacked by epilepsy (either in school or at home and reported to school) once or twice were considered to have mild epilepsy and three times and above were considered acute epilepsy. The achievement scores of the students used were harvested from the promotional examination of senior secondary II of 2020/21 academic session through another instrument called Proforma for Collection of Epileptic Student's Score in Science Subjects (PCESSSS). The examination is usually set by test and measurement unit of the state Ministry of Education. The study adopted a purposive sample of 29 (11 males and 18 females) epileptic science students from 25 Senior Secondary Schools in Niger State, with 6 and 23 identified as Acute and Mild epileptic students, respectively. Cronbach Alpha was used to determine 0,81 reliability index.

Descriptive statistics of mean and standard deviation was used to analyze students' achievement in Mathematics, Physics and Chemistry, and use to answer research questions. The inferential statistics of t-test was used to test the hypotheses at the 0.05 level of significance, since one of the three conditions of t-test permits its use "where there are two independent (uncorrelated) means to be compared, i.e the two groups have unequal number of subjects" (Adefila, 2014). The formula of t-test for uncorrelated samples is given as;

$$t = \frac{M_1 - M_2}{\sqrt{\frac{SD_1^2}{n_1} + \frac{SD_2^2}{n_2}}}$$

Where;

M_1 = the mean of group 1, M_2 = the mean of group 2, SD_1^2 = standard deviation for group 1,

SD_2^2 = standard deviation for 2, n = size of each group.

Table 1: Purposive Sample Distribution of Epileptic Students by Schools

S/NO	NAME OF SCHOOL	SENATORIAL ZONE	MALE	FEMALE	ACUTE EPILEPSY	MILD EPILEPSY	TOTAL
1.	Dendo SSS Agaie	A	1	None	-	1	1
2.	DSS Baro	A	-	1	-	1	1
3.	DSS Zago	A	1	-	1	-	1
4.	GSS Bida	A	1	-	-	1	1
5.	DSS Batako	A	1	-	-	1	1
6.	DSS Gbadafu	A	-	1	-	1	1
7.	DSS Bakeko	A	1	-	-	1	1
8.	DSS Gabi-Kacha	A	1	-	-	1	1
9.	DSS Yakila	B	-	1	-	1	1
10.	DSS Gwada	B	1	2	2	1	3
11.	DSS G/Babangida	B	-	1	-	1	1
12.	DSS Maitumbi	B	-	1	-	1	1
13.	DSS Bosso	B	-	1	-	1	1
14.	DSS Garatu	B	1	-	-	1	1
15.	GGSS Minna	B	-	2	1	1	2

16.	DSS Tunga Minna	B	-	1	-	1	1
17.	DSS Limawa	B	1	1	-	2	2
18.	GGDSS Suleja	B	-	1	-	1	1
19.	DSS Mago	C	1	-	-	1	1
20.	DSS Kabe	C	-	1	-	1	1
21.	DSS Bobi	C	-	1	1	-	1
22.	DSS Ibbi	C	-	1	-	1	1
23.	DSS Auna	C	-	1	-	1	1
24.	GSS New Busa	C	1	-	1	-	1
25.	GGDSS Rijau	C	-	1	-	1	1
	TOTAL		11	18	6	23	
				GRAND TOTAL			29

Results

The results for this study shown in tables 2 to 7 below. Table 2 shows the analysis results of descriptive statistics of academic achievement in Mathematics of students with acute and mild epilepsy disorders. It can be seen that the difference in the mean academic achievement of students with acute epilepsy is 20.83 and those with mild epilepsy is 36.08. it is evident that students with mild epilepsy have relatively higher achievement than their counterparts who are with acute epilepsy.

Table 2: Descriptive Statistics of Students' Academic Achievement in Mathematics as Influenced by Acute and Mild Epileptic Disorders

Variable	N	Mean	SD
Acute Epilepsy	6	20.83	14.66
Mild Epilepsy	23	36.08	21.31

In table 3 and 4 the analysis is the results of descriptive statistics of academic achievement in Physics and Chemistry of students with acute and mild epilepsy disorders, in that order. The results shows that the difference in the mean academic achievement of students with acute epilepsy is 30.33 and those with mild epilepsy are 33.65 for Physics. In Chemistry the mean academic achievement of students with acute epilepsy is 25.50 and those with mild epilepsy is 30.17. It is, therefore, evident that students with mild epilepsy have relatively higher achievement than their counterparts who are with acute epilepsy in Physics and Chemistry, respectively.

Table 3: Descriptive Statistics of Students' Academic Achievement in Physics as Influenced by Acute and Mild Epileptic Disorders

Variable	N	Mean	SD
Acute Epilepsy	6	30.33	6.47
Mild Epilepsy	23	33.65	12.48

Table 4: Descriptive Statistics of Students' Academic Achievement in Chemistry as Influenced by Acute and Mild Epileptic Disorders

Variable	N	Mean	SD
Acute Epilepsy	6	25.50	11.90
Mild Epilepsy	23	30.17	16.27

Testing of Hypothesis

Table 5, 6 and 7 shows the t-test statistics for difference between students' mean scores in Mathematics, Physics and Chemistry of students with acute and mild epileptic disorders.

In table 6, the t-test statistics for difference between students' mean scores in Mathematics shows that the comparison of acute and mild epilepsy students' achievement scores at the 0.05 level of significance and 27 degrees of freedom yielded a t-value of 8.29 which is greater than the critical t-value of 2.052. Therefore, since the calculated value of t-statistics is greater than the critical value, the null hypothesis is rejected. The implication of the finding is that there is significant difference between students' academic achievement in Mathematics of students with acute and mild epilepsy disorder. It is evident that students with mild epilepsy recorded higher achievement than those with acute epilepsy.

Table 5: t-test Statistics for Difference between Students' Mean Scores in Mathematics as Influenced by Acute and Mild Epileptic Disorders

Variable	Mean	SD	DF	t _{cal.}	t _{tab.}	Remark
Acute Epilepsy	20.83	14.66	-	8.29	2.052	Significant
Mild Epilepsy	36.08	21.31	27			

$\alpha = 0.05; df = n-2$

Table 6 shows the t-statistics of significant difference between students' academic achievement in Physics of students with acute and mild epileptic disorders. The t-value of 2.75 tested at 0.05 level of significance and 27 degrees of freedom is greater than the critical t-value of 2.052. This implies that there is significant difference between students' academic achievement in Physics of students with acute and mild epileptic disorder. The null hypothesis is rejected, accepting that students with mild epilepsy achieves higher in Physics than those with acute epilepsy.

Table 6: t-test Statistics for Difference between Students' Mean Scores in Physics as Influenced by Acute and Mild Epileptic Disorders

Variable	Mean	SD	DF	t _{cal.}	t _{tab.}	Remark
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Acute Epilepsy	30.33	6.47				
			-	2.75	2.052	Significant
Mild Epilepsy	33.65	12.48	27			

$\alpha = 0.05$; $df = n-2$

Table 7: t-test Statistics for Difference between Students' Mean Scores in Chemistry as Influenced by Acute and Mild Epileptic Disorders

Variable	Mean	SD	DF	t _{cal.}	t _{tab.}	Remark
Acute Epilepsy	25.50	11.90				
			-	5.28	2.052	Significant
Mild Epilepsy	30.17	16.27	27			

$\alpha = 0.05$; $df = n-2$

The comparison of acute and mild epileptic students' achievement scores at the 0.05 level of significance and 27 degrees of freedom in table 7 shows a t-value of 5.28 which is greater than the critical t-value of 2.052. Since the critical value is less than the calculated t-value, the null hypothesis is not accepted. By implication of the finding there is significant difference between students' academic achievement in chemistry of students with acute and mild epileptic disorder, since students with acute epilepsy recorded lower achievement in Chemistry than those with mild epilepsy.

2. Discussions

The purpose of this study was to assess the effect of epilepsy on the academic achievement of students with epilepsy in senior secondary school. The results of this study shows that there is significant difference between students' academic achievement in science subjects (i.e Mathematics, Physics and Chemistry) as influenced by acute epileptic disorder. The result concurred with the findings of the study investigated by Reilly, *et al*, (2014), Danguedan and Lou-Smith (2017), Osman (2021), and Sari, Uzun and Dundar (2021) who reported that

difficulties with academic achievements are common among children with active epilepsy. Although it was observed that rates of difficulty vary as a function of domain assessed, however, Absenteeism from school, Frequency of seizures, Psycho-social and other specific cognitive deficits, among other factors were found to negatively influence achievements in academics of epileptic students. Findings from similar study revealed that epilepsy have a significant effect on performance on tests of memory, language, and mathematics and that this effect is not modified or explained by socioeconomic status or the child's home environment.

In the present study students with acute epilepsy recorded lower achievement in Mathematics, Physics and Chemistry than those with mild epilepsy. This outcome might not be far from the submissions of Krech & Lacher (2016), who pointed that, medications and periodic hospitalization would make students have frequent or unexpected absences from classes there by creating gaps in their educational experiences. This could affect academics achievement negatively. While many of the cognitive and behavioral effects of seizure disorders are attributed to the disorder itself, a significant number of behavioral and cognitive changes can result from the use of Anti-epileptic medications, particularly when more than one Anti-epileptic drug is used at a time.

Many medications have side effects which vary in children, especially. Medications used in the treatment of epilepsy disorder are selected based on the type of seizure, age of the child, side effects, and the adherence with the use of medication. According to Osman (2021), learning can be affected by the medication (Anti-Epileptic Drug); the type, the number of and the dosage level of medication a child may be taking. Some commonly prescribed medications have side effects which may include drowsiness, inattention or restlessness, all of which can have an adverse impact on a student's learning potential. If a child is taking multiple

medications to control her seizures, or taking medication at a very high dosage level, he/she may experience more learning difficulties than children taking only one drug or taking a lower dose of a medicine. For example, Carbamazepine or Phenobarbitone are major drugs used in the treatment of epilepsy and are associated with a detrimental cognitive effect on the children. Hence, the reason for poor academic achievement among children on anti-epileptic treatment may be because it reduces attention and memory, and causes behavioral challenges.

Again, teachers and other educational administrators may perceive a child with epilepsy as being unmotivated, not realizing that seizures can have a profound cognitive impact on a child. This misunderstanding can lead to a lot of frustration for the child. Hence, many children with epilepsy feel embarrassed when a seizure occurs in public. Feeling isolated or different from other children is not also uncommon. This often leads to low self-esteem and feelings of low self-worth which may metamorphose in poor achievements in students' academics.

There is, however, a conflicting view on effect of epilepsy on academic achievement as argued by Asher, *et al*, (2014). According to them the overall academic performance of epileptic children without other chronic disorders attending normal schools is not different from that of normal children in the same setting, though they are under-achieving in some subjects. It is worthy of note, therefore, that school children in senior secondary schools with epilepsy usually are not intellectually challenged as many people mistakenly believe. Like any other group of people, students with this medical disorder have different intellectual abilities. Some are brilliant, while some or many of them may score below average on intelligence tests, especially in science subjects, however, some are somewhere in the middle. Some people, however, may have epilepsy associated with brain injuries that may cause other neurological

challenges, thereby resulting to difficulties that affects their thinking, remembering, or other cognitive abilities.

Conclusion

In view of the findings of this study, the following conclusions were drawn: The seizure severity was strongly associated with academic achievement and that most epileptic students have less achievement in the three science subjects namely: mathematics, physics, and chemistry. The results of this study shows that children with epilepsy have significantly impaired academic achievement, those with a long duration of illness (acute) and short (mild) seizure that may be absent in classroom lessons, periodic continuous assessments, or examination are frequently being at higher risk of poor academic achievement.

Recommendation

Based on the findings of this study, the following were recommended:

1. Teachers should give special attention to epileptic students in terms of suitability of teaching methods, conducive learning environment and close monitoring to ensure they are not distracted. This will help to enhance their learning ability for better achievement.
2. There is need to create awareness about the behavioral and cognitive changes that can result from the use of Anti-epileptic medications. Medications and periodic hospitalization could cause absenteeism from schools and participation in academic exercises, there by creating gaps in their educational experiences. This could affect their achievement in academics negatively.

References

- Adefila, J. J. (2014). *Statistical Techniques for Data Analysis Demystify Presentation*. Ibadan: BWright Integrated Publishers Ltd.
- Anikweze, C. M., & Aminu, A. D. (2021). *A Textbook of Educational Research*. Enugu: Rabboni Nigeria Limited.
- Asher, H. A. & Paschal, Z. I., Jung, E.S. (2014). *The Early Child Psychology*. 2nd Edition. New York: John Wiley & Sons.
- Cooke, S. (2017). *Students With Epilepsy, their Experiences in School and with State Exams*. Ireland: University College Cork.
- Danguedan, A. N. & Lou-Smith, M. (2017). Academic Outcomes in Individuals with Childhood-Onset Epilepsy: Mediating Effects of Working Memory. *Journal of the International Neuropsychological Society*. Vol. 23, Issue 7/ p. 594-604, August, 2017.
- Ibekwe, R. C., Ojinnaka, N. C. & Iloje, O. S. (2014). Factors Influencing the Academic Performance of School Children with Epilepsy. *Journal of Tropical Pediatrics*. Vol. 53, No. 5/ pg. 338-343.
- Kirabira, J., Forry, B. J., Fallen, R., Sserwanga, B. & Rukundo, G. Z. (2020). Perceived Stigma and School Attendance Among Children and Adolescents with Epilepsy in South Western Uganda. *African Health Sciences*. Vol. 20, Issue 1/ pg. 376-382.
- Kogevinas, M. & Chatzi, L. (2022). *An Introduction to Research Methodology*. 5th Edition. Oxford University Press.
- Krench, L. K. & Lacher, A. F. (2016). Impact of Epilepsy on Children's Academic Performance. *International Journal of Academic Research in Progressive Education and Development*. Vol. 3, No. 1/ pg. 359-366.
- Leslie, F. & Anita S. (2016). Perspectives on the Meaning of Disability. *American Medical Association Journal of Ethics*. Retrieved on 10th December, 2021 from <https://www.journalofethics.ama-assn.org/article/perspectives-meaning-disability/2016-10>.

- Mayo Clinic Family Health Book. (2020). Patient Care and Health Information: *Epilepsy*. 5th Edition. Scottsdale. Retrieved on 19th December, 2021 from <https://www.mayoclinic.org/about-mayo-clinic>.
- McNelis, A. M., Johnson, C. S., Huberty, T. J. & Austin, J. K. (2015). Factors Associated with Academic Achievement in Children with Recent-Onset Seizures. *European Journal of Epilepsy*. Vol. 14, Issue 5/ p. 331-339, July 01, 2015.
- Newman, T. (2017). All you Need to Know About Neurons. *Medical News Today*. Retrieved on 15th October, 2021 from https://www.medicalnewstoday.com/articles/320289#carry_message.
- Osman, H. (2021). School Enrollment and School Performance of Epileptic Children, Fath Alrahman Neuropediatric Refer Clinic, December-January 2017-2018. *Journal of Neurology and neurophysiology*. Vol. 12, Issue 6/ p. 540-549, July 01, 2015.
- Pietrangelo, A. (2018). Everything you Need to Know About Epilepsy. Retrieved on 14th October, 2021 from <https://www.healthline.com/health/epilepsy>.
- Reilly, C., Atkinson, P., Das, K. B., Chin, R. F. C., Aylett, S. E., Burch, V., Gillberg, C., Scott, R. C. & Neville, B. G. R. (2014). Academic Achievement in School-Aged Children with Active Epilepsy: A Population Based Study. *Epilepsia*. Vol. 55, Issue 12/ p. 1910-1917.
- Sari, H. Y., Uzun, O. & Dundar, N. O. (2021). Effects of Epilepsy Education on the Academic Achievement and Quality of Life of Children. *British Journal of Neuroscience Nursing*. Vol. 17, Issue 6/ p. 231-238. <https://www.researchgate.net/publication/357652445>.
- Thomas, L. (2021). *Research Methodology in Education*. 6th Edition. New York: McGraw - Hill Book Company. P.345
- Thomson, V. (2018). *The Use of Mathematics in Everyday Life*. 4th Edition. New York: Harper and Row Publishers.